

COMPUTER

Bit Slices From a Life

Herbert R.J. Grosch

[\(COVER\)](#) [\(PORTRAIT\)](#)

[\(ORIGINAL TITLE PAGE\)](#)

[-iii-]

COMPUTER

BIT SLICES FROM A LIFE

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THIRD EDITION

[-iv-]

For Mabel and Dorothy and Elizabeth and Joyce
—and especially for Nancy

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PREFACE

to Web edition

Computer: Bit Slices from a Life was converted to HTML for the Web by [Frank da Cruz](#) in May 2003 for the [Columbia University Computing History Project](#) with permission and collaboration of Dr. Grosch. This is a manuscript of the 3rd edition, a work in progress sponsored by the US [National Science Foundation](#). The first edition was published by Third Millenium Books, Novato, California, in 1991 and as noted below, copyright was reassigned to the author upon breakup of that company. As to conditions for use, Dr. Grosch says "make sure it's as generous as possible. The only restriction I really want is, no alterations, or elisions which change [my] intentions." To this I would add that the definitive, complete, and up-to-date Web copy of this work is to be found in the following location; copies at other sites might be dated, incomplete, or altered:

<http://www.columbia.edu/cu/computinghistory/computer.html>

This is a simple, monolithic, and validated HTML file, 1.7MB in size, representing over 500 printed pages, self-contained, fully searchable, coded (as of 4 March 2021) in Unicode UTF-8, properly announced, and displayable by any browser.

The [Index](#) (which applies only through Chapter 25) is fully linked, and page anchors have been added through the end of Chapter 25, and correspond to the printed pages of the first edition (which has 24 chapters and no index). Page numbers appear inline, representing the *beginning* of the corresponding printed page, as [-xx-] (in red if your browser and computer permit), where xx is the page number. You can search for any particular page (through 270) using this format.

Comments to: fdc@columbia.edu

Chapters: 56

Change Log:

08 May 2003	Conversion from MS Word to HTML 4.0.
10 May 2003	Installation on CU Computing History site.
11 May 2003	Fixed formatting glitches in Chronology and Chapter 56.
13 May 2003	Fixed assorted minor formatting glitches, all chapters.
23 May 2003	Corrected Bell Mark V references; pagination through Chapter 25; full Index activation.
24 May 2003	Supplied missing <i>xiv</i> page number.
05 Aug 2003	Bell Mark V → Model V;
29 Oct 2003	Minor updates and corrections to Chronology
29 Mar 2004	Minor fixups - italicize some French words, etc.
25 Jan 2010	Herb Grosch dies in Toronto at age 91. [ACM obituary] [Wikipedia]
01 Apr 2011	A few photos added, belatedly, at Herb's request [Photo repository]. Also see many more photos here .
04 Mar 2021	Converted to HTML5, reduced max-width from 100% to 800px for ease of reading, and adjusted for fluidity so it can display properly on narrow screens. The HTML was validated at https://validator.w3.org on 27 February 2021 with no errors or warnings.

[-vi-]

PREFACE to third edition

THREE YEARS AGO I finished the 55th chapter of *COMPUTER*.

[not yet finalized]

—Las Vegas, Nevada [2003]

[-vii-]

PREFACE to second edition

EIGHT YEARS AGO I sent the first 23 chapters of *COMPUTER* to press. I wanted to go on; I had toured Europe in the early Sixties, and had other stories from those days that historians and veterans would want to hear. But as I began again, a family tragedy intervened, and I set the work aside.

When I returned to the United States I brought with me the remains of my huge original archive: my 1962 call reports to Control Data, my flight logs, my appointment (and hotel/restaurant) lists, some of my expense account carbons. Cautiously I began to reconstruct what had happened to me and to the burgeoning world of computers from mid-1959 on. It went slowly.

Then I was awarded a National Science Foundation grant. It was to me as an individual investigator (unusual), and it permitted me to move from New Mexico to Washington, where I had the resources of the Library of Congress and of the Smithsonian within walking distance. The publishers of the first edition had broken up, and courteously relinquished the copyright. I decided to continue the material more or less seamlessly, and to call the result a second edition of COMPUTER rather than a separate book.

What follows is the result. There are no pictures this time, although I have many more to display. The pagination of the bound volume is preserved. Errors that I am aware of in the first edition have been corrected, although I am sure there are others, and not a few in the new material. The table of contents and the chronology have been extended. And at the very end I have appended the index to the first 23 chapters, which Underwood-Miller did not print.

Providing this edition on CD-ROM, uncoded and uncompressed, means that chapters or sections of the book can be downloaded and subjected to full-text search. This is a poor substitute for a careful index, and I apologize. If I ever complete the 1967-87 years, which is possible but not too likely, I will then undertake a full index.

In a few months Y2K will be upon us. To look back from that cusp to a younger and happier time, when anything seemed possible and the world of computing was just opening out, is a great privilege, and a very great pleasure.

—Washington, D.C. [1999]

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PREFACE

to first edition

THIS BOOK was to be an autobiography. I was made into a computer fifty years ago. I was the second scientist ever hired by IBM, and I watched the Watsons on Olympus, and Bill Norris and Ken Olsen and Gene Amdahl, and a thousand great commercial and academic figures. Later, for three amusing years, I was the top Federal computer honcho, and escaped to be editor of the major trade newspaper. I was a charter member of the world's first and largest professional computer society, and the first national president ever elected by membership petition. I worked in Monaco and Switzerland and the Netherlands when I was too controversial to be employable in the U.S., and I consulted for the largest and best Japanese computer company.

And I had four wonderful wives, and a hundred lovely supporters, and terrific friends on five continents - and some very lively enemies. Perhaps I could do for the computer trade what Casanova did for Venetian diplomacy? Only problem was, his story ran to twelve volumes!

Or I could do a history: a history of the computer times I had lived through. I had mountains of books and papers and clippings to help me crosscheck against the increasingly divergent recollections of others, and could certainly make a useful contribution to the unfolding story of that intelligence amplifier everybody now calls the computer. Well, it looked like a lot of work, and not much fun for me or for the readers.

For a while I thought about doing an ALICE. Lewis Carroll is a favorite preceptor for just about everybody in the computer wonderland, and the thought of Watson Senior shouting "Off with her head!" at every

married IBM woman [1948] was very appealing. I could see myself saying "Good-bye, feet!" as I grew into a manager - oh, the parallels were evocative. But I had to admit the idea was pretty far-fetched.

Then I wondered about PLAYER PIANO. Kurt Vonnegut did his satire on automation so well; I had gone to GE's Association Island [1955] and had sat under the elm that was transformed into a ruined oak at the end of his yarn. As Schenectady became Ilion, so could Endicott become, say, Watsonville, and the shoe workers could parade past the IBM factory shouting "While you're thinking, we're drinking!" just as they had in real life. But the themes would have to be spare, or the satire would be blunted. What I wanted to do was to weave an exceedingly rich and complex fabric, with a warp of computer history but a filling, a woof, of wives and friends and travels. No, Vonnegut didn't look much easier than Carroll.

Think of my magnificently complicated life as a huge multi-dimensional data bank. The totality is the autobiography - millions and millions of bytes. Slice it along the time axis and you have histories: big computers, software, the evolution of standards. Slice it another way and you have applications: science, or banking, or air defense; another, and you have organizations. What I have finally chosen to do is to slice it so as to feature wonderful people: some of them famous, like the great Vons - von Braun, von Karman, von Neumann; some of them tremendously significant but not so well known, like L.J. Comrie and Wallace Eckert; some of them just vivid and exciting, and important to me because they were wonderfully human if not historic.

[-ix-] I aspire to Magic Realism - a picture somewhat larger and much clearer than life. But let me reassure readers, and future thesis perpetrators: I have not given "...to airy nothing/ A local habitation and a name." All the things in my stories actually happened. The Old Man really did order the support columns removed from the SSEC room. The television link between the jet engine test cells in Lynn and the GE 704 really did click only a few moments before the generals and the airline presidents arrived. Tom Junior really did walk through the sacred halls of Armonk carrying a whisky carton, and with a duck in it!

I have not sharpened the joys and the sorrows; there was genuine gold and genuine guilt. And when I praise Grace Hopper and Gerhard Neumann, or criticize Vin Learson, it is from the heart. I lived in vivid times.

Finally, there is no point to disclaimers. The characters in my story are real, every one of them. Some are not identified precisely. That is not an accident. And some, some of the best ones like Comrie and Watson Senior and Wallie Eckert, have gone beyond my praise. As with all the others, wives and lovers and pets, friends and enemies and quizzical bystanders, I've drawn them as I remember them, with no fear and much, much favor.

—Mies, Switzerland [1991] **[-x-]**

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01 WATSON IN ALL HIS GLORY

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In Chapter 01 you will encounter

(in order of appearance):

Watson Senior [Thomas J. Watson] *the Imperial Presence*
IBM [International Business Machines Corporation] *the empire*
The SSEC [Selective Sequence Electronic Calculator] *12,000 tubes*
Betsy Stewart *mistress of the SSEC console*
The ENIAC [Electronic Numerical Integrator And Calculator] *18,000 tubes*
The ASCC [Automatic Sequence Controlled Calculator] *first of the giants*
Wallace Eckert *first scientist ever hired by IBM*
John McPherson *IBM engineering director*
Pete Luhn *inventor of relay calculators and much else*
Pres Eckert [no relation to Wallace] *builder of the ENIAC*
John Mauchly *designer of the ENIAC*
Howard Aiken *he upstaged Watson Senior at the ASCC dedication*
Grace Hopper *everybody's favorite naval person, and mother of COBOL*
The Watson Lab [Watson Scientific Computing Laboratory] *at Columbia*
Rex Seeber *master of the SSEC*
Hilleth Thomas *mathematical physicist*
The NORC [Navy Ordnance Research Calculator] *first supercomputer*
Frank Hamilton *builder of the SSEC*
George Richter *Gray Eminence of IBM deliveries*
L.J. Comrie [Leslie John Comrie] *great English table-maker and computer*
Becky Jones *the Moon on a Friden*
John Backus *father of FORTRAN*
FORTRAN [FORmula TRANslation] *longlived technical computer language*
Ted Codd *lawgiver of relational data bases*

Richard Courant *famous NYU mathematician*
I.I. Rabi *top physicist at Columbia*
Dwayne Orton *editor of THINK*
THINK Magazine *IBM prestige publication*
Dorothy [Dorothy Carlson Grosch] *Mount Wilson's loss was my gain*
The Waldorf Astoria Hotel *scene of many IBM parties*

NOTE: In later lists, there will be entries without comments. Instead, I give the number of the chapter where that entity was first introduced.

[-1-] He would be 74 next month, although no one in IBM dared to mention the number to him. The family, the large and devoted family, would of course celebrate - very privately, and without emphasizing his age. In his sharp but nevertheless sentimental way he was looking forward to the dedication next week as a major present - a recognition by devoted employees of his foresight, his vigor, his determination to make "the IBM", as he called his empire, an even more important leader in American and world business.

This was Thomas John Watson, "Mr. Watson" when addressed directly, "T.J." in most third-person mentions inside the company and nearby, "The Old Man" informally and pejoratively. The use of "Watson Senior", to distinguish the emperor from the heir apparent, would not be in frequent use for another five or six years; indeed, it was really a coined label for the convenience of media people and historians rather than something used in IBM.

It was Thursday, January 22, 1948. Watson and his entourage stood inside the world's second giant electronic calculator (we say "computer" today, but more about that a little later). Three months ago the space had contained The French Bootery, a handsome and quite successful shoe shop catering to 57th Street ladies and would-be ladies. From the ground floor of the building adjoining IBM World Headquarters, a building owned or at least controlled by IBM, the Bootery had been summarily moved across the street - these things were much easier in 1947 - and the cavern remaining had been miraculously transformed, with walls of plate glass and stainless steel shielding some 12,000 full-sized vacuum tubes and 20,000 special relays: the SSEC.

Watson, his vice presidents and sycophants, and senior technical people nervously awaiting judgement, were clustered around the free-standing units on the raised floor of the lovely room. A little further back, a gaggle of less senior engineers and scientists was tensely watching the action, available to answer questions or open and close panels and doors. The giant control unit **[-2-]** covered with hundreds of identical but handsomely labeled switches, was "manned" by Betsy Stewart, appearing quite at ease and in command of the situation. Behind her were attractively cased line printers, and fairly close were repackaged punched card readers and gang punches, and some special units.

Questions, many questions, and answers; none about money, for T.J. assumed that others were seeing to it that enough had been provided and none wasted. Not much about the press; T.J. knew that they would flock when he beckoned. Would the demonstration impress the important men and women who had been invited for the dedication? Would the IBM creation outshine the ENIAC? How would it compare to the machine Mr. Watson had donated to ungrateful Harvard, back before electronics?

There was a pause. Those of us away from the center of Watsonian attention, standing near the inscription which offered the huge device to Science - over the famous Watson signature, of course - began to relax a bit. T.J. had not appeared to notice that the machine was not doing anything important, although those of us who had been close to him on other occasions could not be sure. He had eyes in the back of his head, and the memory of an elephant. True, he was not supposed to understand much about electronics - on the other hand, somebody had supported a good deal of experimentation before the war, and was authorizing the hiring of bright young guys from the radar shops of MIT. The recent upsurge, including the giant machine we stood inside of, was arguably the brainchild of Wallace Eckert and John McPherson. But

the pre-war patents, now embodied inside the walls of the new calculator, had been funded by The Old Man.

Anyhow, no embarrassing comments. He assumed everything would be ready by next Tuesday - after all, he had ordered that it be so. We were not so sure, but we were all committed, seniors and juniors alike.

The emperor looked around one last time. The whole session, although vitally important to the fantastic future of IBM, had taken less than an hour. "A great credit to the IBM," he said, and all the vice presidential heads nodded in unison. "Science will move ahead more rapidly. Our universities and our government will surely benefit, and world peace and world trade will be fostered as people from other countries visit and perhaps use the calculator."

"There is just one thing," he said somewhat off-handedly. "The sweep of this room is hindered by those large black columns down the center. Have them removed before the ceremony." And out he marched, tailed by his quivering followers!

Well, we had four days, counting the weekend. Also - slight complication - those columns concealed the steel uprights that held up the twenty-story building. Even for Mr. Watson, no one could remove them. Now, that elephant memory was selective. Later that year I watched him order one of his cleverest inventors, Pete Luhn, to build terminals and connect them to a big relay calculator "on a lower floor", so that the "research area" would be more attractive - not bad, in 1948, and from a 74-year-old! I asked Pete later what he would do. Would he propose a hundred-man effort, abandon his current projects, and set out after The Old Man's casual dream?

"No," said he, "he'll never mention it again unless I bring it up. Of course, [-3-] if he gets mad at me about something else, even ten years from now, he'll remember he told me to do it - and that I didn't. And tell everybody nearby I disobeyed a direct order."

The cooler heads assumed that T.J. would forget the whole thing. Cynics like me figured he just wanted to keep the troops on their toes; he knew very well those columns held the building up. On the other hand, non-tech types who had watched the old boy in action reminded us newcomers that he might use noncompliance as an excuse to erase some poor soul who had "failed" him before, perhaps - looking hard at me - by omitting to invite someone to one of Mr. Watson's celebrations (I had just done the scientific invitations for the dedication).

Inspiration! Wasn't mine; I seem to remember a chap named Macnamara, who was doing the goodies: programs and table favors and souvenirs for the luncheon, and discreet corsages for the two or three lady guests. There was to be a fancy four-color brochure about the machine, and it was to feature a big centerfold view of the main area. We junked the whole stack (how I now wish I had had a copy!) and, over a frantic weekend, printed a revised edition. Alas, it had to be in sepia; even for IBM the colored option was out of the question. The centerfold photograph was carefully retouched, and all traces of the offending columns were removed.

I loved it; the semantics boys were right - there is Reality, and then there are representations of reality, and layer upon layer of more remote imagery. The columns were still there on opening day, and they stayed there for the life of the machine, and on into the golden days when a 701 lived there. A major Saturday Evening Post story published later in the year has a fine colored illustration of the area, with the columns front and center. But the history books show a beautiful room without columns - the room Watson ordered!

What was I doing in the back of that room, and why had I been the one to work up the scientific invitation list for the unveiling of the SSEC, the Selective Sequence Electronic Calculator? It was the third giant machine of the Babbage line, and like the first, the ill-fated Automatic Sequence Controlled Calculator which Watson had had built to Howard Aiken's specifications four years before, it was to be dedicated to

the greater glory of Science and - unlike the ASCC, now universally called the Harvard Mark I - to the glory also of the International Business Machines Corporation. The second giant, and the first to use primitive Forties electronics, had been the ENIAC, cobbled together by Pres Eckert and John Mauchly in the Moore School of Electrical Engineering of the University of Pennsylvania, in dumb downtown Philadelphia.

ENIAC added nothing at all to IBM prestige, although the builders had reluctantly been forced to use IBM gang punches as input/output devices. What it had done, by appearing on the front page of the New York Times - the first such device ever to do so - was to make The Old Man grind his teeth so ferociously that people, dozens of people, shivered as far away as Endicott, home of the IBM "research" laboratory.

I was the second scientist ever to be hired by IBM, and an anomaly in a dozen other ways. In later chapters I'll tell the details of how it happened; the important points are that I had been a computer since the autumn of 1935, [-4-] was an authentic member of the same tribe of scientists as Wallace Eckert, and had responded instantly to the announcement in SCIENCE that he, Eckert - no relation to Pres Eckert, by the way - had been hired in March 1945 to head a new Department of Pure Science in IBM, and to establish the Watson Scientific Computing Laboratory at Columbia University.

Remember the name ENIAC? That acronym stood for Electronic Numerical Integrator And Calculator. Almost every current article about that incredible machine, with its 18,000 highly-fallible vacuum tubes, and the thousandfold increase in speed it brought to major calculations, says "Computer". But it wasn't so; from the mid-Nineteenth century until about 1952, a computer was a human being who did computations (and associated technical tasks in laboratories and observatories). He - or more often, she (I married one) - used printed math tables and calculating devices. The people who didn't do it full time, or who used slide rules and planimeters and such, usually didn't use the label. I did, and was quite proud to have been made a computer by a more experienced member of the clan, in the mid-Thirties. All the Cs in ENIAC and EDVAC and EDSAC and UNIVAC stood for Calculator, which is what we computers used, along with Marchants and Fridens and Monroes and Brunsvigas, until the Defense Calculator became the IBM Type 701.

Eckert hired me in May of 1945, and the Watson Lab had been under way for some months - and both the European and the Pacific wars deliriously concluded - before the ENIAC announcement. Although I had been busy shaping up and running the computing side of the enterprise, I had helped Wallace interview his second senior employee, a relieved refugee from Howard Aiken's sweat shop. He was one of the two or three people in the whole world who had managed a giant machine, the one at Harvard. Aiken, the irascible boss, and Grace Hopper, nowadays everybody's favorite computer person but then known principally as the co-author of the handsome Harvard Mark I operating manual, were his only counterparts.

Eckert wanted Rex - Robert R. Seeber - because he expected to build another giant. Watson had told him IBM intended to do so, and had indicated vigorously how unhappy he was with Aiken and Harvard. Now, Eckert had good lines into MIT, and although not himself at ease with even old-fashioned electronics, knew that the new radar techniques developed so quickly there (and in Britain, and at the Bell Labs, neither of which were readily accessible to Watson and his business-machines-oriented crew) would be the building blocks of future calculators.

In parallel to his recruiting Seeber, and IBM's third scientist, Hilleth Thomas of Thomas-Fermi statistics fame, Eckert set out to pick up three or four youngsters, hot off the radar griddle, to work on long range projects at the Watson Lab rather than in IBM shops in Endicott and Poughkeepsie. He was not at all an empire builder - it would have been good for IBM, and certainly for me, if he had been. He simply planned to stockpile some advanced technology against the time when Mr. Watson might need it. When ENIAC hit the front pages, he was ready with Seeber, but the pulse-electronics boys were not tuned up, and the SSEC had to be built with big bottles and old circuits. Out of that tiny specialized group finally came NORC, the Naval [-5-] Ordnance Research Calculator - the very first supercomputer. It just took a while!

Watson pushed the "start" button. He picked Frank Hamilton, who had been Number Two on the ASCC.

"Put every IBM resource to work, Mr. Hamilton. I want the new machine to be faster than that one in Pennsylvania, more capable than the one we gave to Harvard. I want it to be installed here at World Headquarters, in one year. And I want it to be available to the scientific world, not hidden away at a selfish university or at a military installation."

Frank realized how horrendous the task would be. But he was a big, handsome, forceful engineer - a natural leader, with a team in place in the Endicott laboratories and a clear idea of what other projects he could dip into. It was a great challenge. Besides, you did not say no to the boss - not when he gave you an, ahem, opportunity like that.

Although I did not yet see it clearly, this was my first exposure to the IBM Contract. During good behavior, you had a life job, at non-decreasing pay, and with great perquisites, ranging from membership in lovely dollar-a-year country clubs to suites on the Queen Mary, provided:

- a. you accepted any job offered you
- b. in any location whatever, and
- c. thanked everybody concerned for the wonderful opportunity.

Good behavior included not growing hair on your face, not wearing colored shirts, not taking a drink in public (one very senior executive, who frequently occupied those Queen Mary suites, was to die two years later from a hobnailed liver), and never contradicting The Old Man or his direct representatives. I did all four in my first two years in the company, and for a while lived to tell the tale. What got to me in the end was c); I kissed the whip very poorly indeed.

Hamilton and Eckert and Seeber settled the specs in just a few days. There had been a series of memos and meetings in 1945, and not just desultory ones. John McPherson, then Director of Engineering and approximately Eckert's boss, had made heavy contributions - intellectual and technical ones, not managerial; you will see much more of him in later chapters. The old-timers who had built the Harvard machine and who held the primitive but valuable vacuum-tube-circuit patents had joined in. What was lacking was money and people and priorities. Watson supplied them.

The SSEC was built in Endicott, under the toughest kind of forced draft, out of standard pieces and simple circuitry. Only IBM could have done it. No other outfit had stuff on the shelf - well, except the phone company, and it was too hidebound; had no Watson, and wanted none. By today's standards the cost was low; not much over a million dollars. But T.J. brooked no nonsense from beancounters. There was a story in the trade that when Claude Shannon and his lovely wife were moonlighting at the Murray Hill Bell Labs, and "borrowing" components from the stockroom to build a maze mouse, accountants disguised as [-6-] janitors were recording every peculation and taking notes for the patent attorneys besides.

None of that in 1946/47 IBM. The million dollars or so was off the top; the myriad services which Hamilton drew on from all the rest of the company, ranging from the time of Eckert and McPherson down to that of the Endicott janitors, were never charged. No one knows - in fact, no one ever wasted time trying to find out - what share of IBM's total resources over say 18 months went into the SSEC. I'd bet it was four or five per cent, at a time when total annual sales worldwide were well under \$200 million. Ah, Watson!

I said McPherson was approximately Wallace's boss. There were no organization charts in IBM, and if there were any in 1958 when I was invited back to the much larger company - T.J. died in 1956 - I never saw them. Tasks in the Forties came almost entirely from Mr. Watson. If John had needed to force something on Wallace - and he almost certainly never did, at least for many years - he would have had to somehow arrange that his needs reached T.J. The latter, if he agreed, would have given Eckert the word, and in no uncertain terms. The idea of formal, announced channels of authority so prevalent in General Electric in the Fifties when I worked there, was unheard of in IBM. Mr. Watson ran everything.

By extension, there was no budget. Oh, there were accountants; there were taxes due in many countries,

an annual report to produce, invoices to send and bills to pay. And some very strange Watson charities and beneficences, we understood. But in general, people downstairs proposed and Mr. Watson disposed. You - well, not me, but Eckert for instance - you sat outside The Old Man's office until someone shoehorned you in between the man from the Metropolitan (Opera or Museum; he did both) and the regional manager he was "promoting" to run the Anchorage office. You asked briskly for what you needed, answered amazingly pointed questions, and got your money or your refusal, or something in between. Very quickly!

I have often said Watson kept the money in a shoebox, and handed it out to petitioners as he saw fit. That's amusing, and somewhat true, but it doesn't allow for two things: first, the box never ran empty; he had a magnificent feel for the inflows as well as a running score on recent disbursements. Second, there were secret forces at work, like those Shannon-watchers; he built the French plant about that time, and there must have been many cross checks. He could expand Poughkeepsie off the cuff, but something more sophisticated must have been coming over the wires from World Trade in Europe. And he had more than sources of information; he had hidden controls. Watson could speed up or slow down the factories, and deliveries, and hence rental income - there was always an eager waiting line of customers, especially at war end. All it took was a short call or note to George Richter, the Gray Eminence Of Scheduling, two floors away.

Even in the Forties, IBM was something special. Small compared to, say, General Electric, it was already recognized for its amazing growth, its cash flows (for years to come, the punched card machines and the early computers would only be rented), its lovely profits, and above all, its Maximum Leader. Watson was into everything: not just the opera and the art world, but as the most powerful trustee of Columbia, the head of the International Chamber of Commerce, and in a hundred power-related civic tasks and charities. A whole floor of World Headquarters, "590" [590 Madison Avenue], could barely hold the secretaries and assistants that surrounded this power source. Where an AT&T or an RCA would have had to go through carefully announced organizational maneuvers, and much-discussed budget reallocations, [-7-] to start up a Hamilton group, T.J. did it in minutes. And with the Endicott and World Headquarters grapevine carrying the word about Watson's heavy support, Hamilton in turn could cut through personnel and procurement problems almost instantly. And these were serious; remember, this was 1946 - even IBM was having trouble with people and supplies. Frank's engineers had expeditors up and down Cortlandt Street looking for surplus electronic gear, and the major factor in choosing vacuum tube types for the buffer memory and arithmetic unit of the SSEC was availability ("We need ten thousand right now, Sol, and they gotta work!").

In parallel with the electronic and mechanical work - system design, we call it now - the physical layout and handsome presentation of the huge machine had to go ahead. As soon as The French Bootery was known to be extrudable, plans for a big power supply and a unique air conditioning system were set in train; each unprecedented in central Manhattan and in IBM experience. No replays would be possible.

The machine took form in Endicott. A year, in spite of the Watsonian directive, was not enough. But in that year, all of the electronics, the sixteen-foot-high racks of special Lake relays, and the incredible tape units, were designed and built and tested. "The Soul of a New Machine" tells about a tiny child's circus, and with thirty years of industry experience to draw on; this was center ring in The Big Top: "Ladies and gentlemen, a feat never before attempted on any continent!!".

On 57th Street, the heavy machinery went in. Also there was to be a raised floor - another world first. Watson would not have his guests, his customers, his stockholders tripping over snarls of cable. The inscription on the wall had to be written, by Wallace Eckert I think, and approved (and quite possibly changed) by The Old Man, and engraved, and approved again. But that, as we all know today, is only half the story. How about the software?

No problem about languages - there weren't any yet. Whatever problem we chose would be written, and debugged, and run, in machine language, and in absolute: two four-address instructions per line of input tape. Eckert and I talked it over: one very short meeting. It would be from astronomy, of course; that was our trade. The very first automated scientific calculations in the world had been done by the great L.J.

Comrie at Greenwich in the early Thirties, and had drawn both of us into the game. And if we redid them, more carefully, and from the original math rather than from intermediate tables, as Comrie had had to do with his rented Hollerith equipment, the output would have actual immediate value to the national almanac offices around the world. So - the SSEC would calculate the positions of the Moon!

Eckert had insisted from the beginning on a strong table-lookup capability: a design offshoot of the big tape drives, as it turned out. Its capabilities were set. For the demonstration problem, each date put in would require looking up 1870 sines and cosines, to eight-figure accuracy. I had begun to develop a powerful method for minimizing the size of such tables (later it came into heavy use among operators of the first IBM mass-production, um, minicomputer, which had only a few dozen words of storage - and the technique disappeared completely a year or two later, overtaken by Big Memory).

[-8-] The method wasn't quite ready, but no matter; off I went to design the table anyhow. Like everything else, it had to be ready on time - or else! Youngsters in corners at World Headquarters were feverishly writing code, without knowing the first thing about lunar theory. That too had to be finished and checked out by opening day. Eckert was the authority (I had a substantial computing shop to run at the Watson Lab, and classes to teach - and some of the youngsters were in them). Somehow it got put together.

It is worth noting that the check calculation, done on a Friden desk calculator by Eckert's assistant Becky Jones, took more than three months - for one date! And even then, we did not have time to exactly duplicate the table lookup and the arithmetic operations to the full precision of the machine, which was fourteen decimal digits; other tests of the pertinent units, and my off-line experiments on the sine/cosine table, had to suffice. I often wondered in later years, when lunar landers were putting down on an object whose coordinates came out of an ephemeris based on those 1947 programs, whether anyone had ever gone back and checked out the less-significant digits!

Incidentally, among the youngsters were John Backus, the father of FORTRAN, and Ted Codd, the father of relational databases.

The programs, and data, and my table material, were punched at the Watson Lab on standard IBM cards. These were converted to input tapes on a free-standing punch called The Prancing Stallion (from its profile), which later was put in its final position on the SSEC raised floor. Some program testing was done under Rex Seeber while the machine was partly assembled in Endicott, but most of it had to be deferred until just before the ceremony. This partially explains why I was Cool-Hand Luke years later at GE; after that kind of pressure, the jet engine business looked pretty peaceful!

About those tapes: the card plant in Endicott got enormous rolls of card stock from the paper mills. For regular card manufacturing they slit the rolls to three-inch width (card height). For the SSEC they furnished rolls eight inches wide (card length). The resulting rolls weighed 400 pounds, and had to be hoisted onto the SSEC with a thoughtfully-provided chain fall! For the Stallion, we pushed the rolls up a ramp.

The punch stations, slightly modified from standard IBM reproducer components, punched two round sprocket holes at the edges, and 78(!) regular IBM rectangular holes in between. The sprockets drove the tape one line at a time, and drives under separate program control fed the fresh or pre-punched tape under ten 78-brush reading stations. The tapes hanging down could lengthen and shorten, and for program tapes and the table lookup unit we cemented the tape end-to-end into short loops (yes, someone had had to provide the jig). There were three of these monsters at the end of the machine room.

Up to 36 of the fixed-length tape loops could be mounted on the separate table-lookup unit, which in later years was also sometimes used for program reading. For the lunar calculation, I used 24 loops to make lookup time as short as possible, and we got programming from the main tape readers.

Behind the scenes were racks and racks and racks of superfast small relays, which were used for intermediate storage. The tapes were slow **[-9-]** storage, and of course we had infinite storage on standard

punched card decks, which could be read by the SSEC directly (and punched). The two printers behind the operator had hidden plugboards for producing handsome output formats.

On the famous Thursday when The Old Man ordered us to remove the offending columns, Rex and his crew had had all of these units buzzing and punching and looping. But the lunar program had not yet run. I was smugly aware that the sine/cosine table was checked out and working, so I was somewhat relaxed. But the strains were literally palpable. It was to be a long weekend!

Two months before, Hamilton had committed to an opening date: Tuesday January 27, 1948. He had done his fantastic task - designed and built the huge system, assembled and partially tested it in Endicott, torn it down and shipped it to Manhattan, fended off the unions who demanded that non-union IBM let them reassemble the monster, provided the support systems, and prettied up the joint - all in a little over 16 months. And, to jump ahead a little, on opening day, everything ran! Yes, the hardware, and the program, and the air conditioning, and the people - one of the very greatest feats of nearly a century of data crunching!

On the great day, the multitude assembled. It was not the first major Watson charivari I had attended, but it was a first for Rex and his senior crew. Everyone looked very cool and confident: T.J. himself because he assumed everything was as ordered, the rest of us because he was watching. The scientific contingent turned out in full force; I hosted one table at lunch, and landed Richard Courant, whom I greatly admired and had never met. I unblushingly told him I had done the invitation list - well, I had proposed, even if Wallace and John McPherson and a whole floorful of Watson aides had disposed. He was more interested in my stories about the punched card work we had done for Los Alamos than in the SSEC; like most of the seniors present he assumed that there would never be more than two or three machines like the one being dedicated, and that only very special science would ever be allowed near them. Today the NYU center named after Courant mounts several hundred thousand times as much computing power as the SSEC, and complains about the constriction!

Mr. Watson - you couldn't call him anything else at that moment - made a sententious little speech and posed for photographs with guests, including Rabi of Columbia and other scientists. One could often figure out who wrote the draft of a Watson speech; I could hear Eckert in this one, but the overall effect was preachier - probably from Dwayne Orton, editor of THINK. They had done the internal photos, the poses with Hamilton and Eckert and Seeber, the previous Thursday; this was a day for his guests and personal friends; another Watson triumph. He had many every year.

Six months later my wife Dorothy and I received a telegram, delivered to our apartment in Chelsea, although addressed to the Watson Lab at Columbia (T.J. had special relations with Western Union, too!) It invited us to an IBM Family Weekend, at the Waldorf Astoria no less, to thank the men who had worked so hard on the magnificent Selective Sequence Electronic Calculator, [-10-] now at work on important scientific problems at IBM World Headquarters - and especially to thank their wives, who had been so supportive.

Turned out that the last time The Old Man had done this (also without warning), he had organized a private train and taken a hive of senior executives and their wives across country to see the IBM exhibit at the San Francisco World's Fair. It had been a very dry trip, even with Pullman porters fanning out at every stop looking for liquid relief. This event had benefited from that experience; the Waldorf had been found to list bar tabs and such as "restaurant" on the final bill!

You can imagine the scurry for babysitters and new hats in Endicott. Well, come the great day Mr. and Mrs. Watson had a little luncheon for us (and a hundred or so Headquarters executives and their wives) in the Wedgewood Room, and told the honored if somewhat flustered ladies that the weekend was theirs. "Go to restaurants and theaters and the opera, as IBM's guests. Enjoy the shops, and the spectacle of New York. We at World Headquarters thank you for the support you and your families gave your husbands, which in turn enabled them to produce this spectacular machine." There were tours of the SSEC, by the

way, which many of the wives had not seen - a nice touch.

Asides: of well over two hundred ladies present at the luncheon, only two, my wife Dorothy and Hilleth Thomas' wife Naomi, did not wear hats. Hmmm! Intellectuals! And the next night the Watson Lab couples, who after all lived in the city, had a fancy dinner together, in the hotel. As a matter of convenience, sitting at one end of the table, I signed the check: about \$200 (it would be ten times that today). Six weeks later Eckert got a phone call from a hushed-voice little beancounter at 590. "About this, ah, rather large restaurant charge..." Eckert told him it was quite all right; he had been in the party. There were accountants in IBM; they just didn't come out of hiding very often!

Watson got his investments back many-fold: the price of the SSEC, and the price of that Family Weekend. The one placed him in front in the Big Science sweepstakes, at a time when a dozen larger hi-tech companies should have towered over him. The other confirmed the feeling in two hundred engineering and executive families that Mr. Watson's IBM was a wonderful place to belong to. It was a good time to be an emperor.

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02 THROUGH A GLASS, DARKLY

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(in order of appearance):

The Naval Observatory *where Eckert did the Air Almanac*
Pearl Harbor *you could see the smoke from the Japanese Embassy garden*
Dorothy [01](#)
NBS [The National Bureau of Standards] *still on Conn Avenue in D.C.*
William Meggers *NBS spectrographer*
Uranium *undoubtedly for the Stagg Field pile*
The Watson Lab [01](#)
The American Air Almanac *to be done on IBM machinery*
John Willis *officemate at the Naval Observatory*
The Ritchey-Chrétien [reflecting telescope] *notorious plate breaker*
J VIII [Jupiter's eighth satellite] *the lost is found - and a Ph.D. too*
Harvard summer conferences *optical design skills, and a fiancée*
Leland Cunningham *my opposite number at Harvard*
Aberdeen Proving Ground *where Cunningham did his war work*
Army Air Corps *geodetic surveying in Alaska*
BuOrd [Navy Bureau of Ordnance] *exit pupils and boresights*
Stanley Ballard *he traded up to Re4e from pineapples*
American Institute of Physics *optics and a lot more*
Russell Banker *a link to the pre-war Gun Factory*
MIT Radiation Lab *the word "radar" was still secret*
Japanese optics *captured gunsights were different from Zeiss'*
NDRC [National Defense Research Committee] *a "torrent of novelty"*
The Alabama [new battleship] *made us all forget BuOrd bureaucracy*
Doc Draper [C. Stark Draper] *his gunsight gave 20mm cannons more punch*
Keuffel & Esser *stereoscopic rangefinders from Hoboken*
OSA [Optical Society of America] *my second professional society*
Foldboating *Dorothy and I preferred it to spelunking*
Sperry [Sperry Gyroscope Company] *mechanism yes, radar yes, optics no*

Suzy [cat] *many litters in a Hempstead coal bin*
Interchemical Corporation *spectrography and glossy black paint*
The B-29 [bomber under design] *fancy optics instead of a tail gunner*
Eastman Kodak *my first view of industrial research and development*
Rudolf Kingslake *Kodak's master lens designer*
Harold Bennett *wanted to automate ray tracing - on a Friden!*
The Mark 14 *Draper's gunsight went into mass production at Lake Success*
George Bentley *thousands of Mark 14s for the Pacific*
Jack Varick [Sperry buyer] *"it took more than scientists to win a war"*
Perkin-Elmer *from astronomical telescopes to war work*
The Mark 15 [gun director] *we put optics and radar into a full box*
C.L. Farrand *his factory needed a second optical designer*
Sy Rosin *Farrand Optical Company designer*

[-13-] There was of course no such thing in World War II as a civilian draft; at least, not in the United States. There was a military draft, and millions of youngsters had been involved with it. A fair percentage escaped from the process. I was one. Yet when I talk in the next chapter about how I came to IBM and the Watson Lab, and overnight to be in complete charge of one of the most powerful computing installations in the world, I usually say, "I was drafted" - that is, drafted into a civilian job.

I clung to the Navy for a while after the war started. I was at the U.S. Naval Observatory, just up the street from the Japanese Embassy on Massachusetts Avenue in Washington, at Pearl Harbor time. My wife Dorothy, having helped me finish my doctoral dissertation, and fired with California patriotism - a somewhat more vigorous form than the District of Columbia variety - had drawn on her Mount Wilson connections to obtain a laboratory job at the Bureau of Standards. We were surrounded by the excitements of the time.

Dorothy's work turned out three years later to have been involved with the atomic projects, although we didn't know it then. Her boss was a famous spectrographer, William Meggers, who was an authority in metals analysis, and Dorothy found herself obtaining and measuring (she was new to the former but very experienced at the latter) spark spectrograms of the rare element uranium. We talked about it freely; there was no security, no hint of anything mysterious - except that, aside from very specialized uses such as coloring glass, and from its unusual density, uranium wasn't exactly an everyday market item.

Both of us, as astronomers, knew of the Hahn-Meitner experiments on the fission of uranium under laboratory conditions, and I had been an avid reader of science fiction for over thirteen years, so we wondered idly about whether there might be a connection. But neither of us had been close to that kind of physics. I was doing the driest and most remote kind of celestial mechanics; **[-14-]** she had been doing observational astrophysics at Mount Wilson. We didn't have day to day contact with the quantum mechanics people, although I had had courses from them (Goudsmit, for one) two or three years back.

Incidentally, that kind of security, out of fashion for decades, is very effective - no obvious security at all, that is. What you keep secret is that there is anything to keep secret. If Dorothy had had to take a lie detector test, and list all of her addresses from conception, and all her Swedish third cousins, we would have known something important was up. As it was, we didn't pick at it, and tended to talk about her problems in preparing samples!

A great deal of the work at the Naval Observatory had value in the war effort. There was the time service, obviously, and the continuing annual preparation of the astronomical ephemeris and marine navigation almanac. Right across the hall from me was the first permanent rent-paying scientific IBM installation, hard at work on the brand new Air Almanac. But these activities tended to be staffed by older men and women, and such younger men as were involved were much married and bechiltered. Also, turnover in those barely-post-depression days was low. It didn't look as though I could offer help in those areas. Of

course, the more purely astronomical tasks such as my own were going to continue; the observatory had weathered earlier wars and intended to keep its key researches alive. An astronomical observation is like a modern airline seat; you have to take it when available - tomorrow will be too late.

I was rather surprised, for instance, to discover that some solar observations that were collected in my division were routinely being sent to Italy for international compilation. Italy was at war, so the stuff had to be routed through Switzerland. But science was to be served!

I had some ideas about improving the reflecting telescope on the grounds. Because of the bright lights of the city, completely surrounding the minor hill on which the Naval Observatory stood, not much "modern" (i.e. astrophysical) use had been made of this strange beast. In fact, when I arrived it was used only a fraction of a night per week, as against every clear night for the huge old fashioned refractor - the one with which the tiny satellites of Mars had been discovered many decades ago. As an important part of my thesis calculations, I did a prediction of where to look near Jupiter for its eighth, extremely faint, satellite. John Willis, my office mate, had said there was no chance of photographing it locally. But when the city lights were shut down or dimmed as a wartime precaution - Japanese submarines coming up the Potomac, no doubt - we decided to give it a try. And there, right in the middle of the big photographic plate, after a ninety-minute exposure that could not have been made six months before, was my Ph.D. insurance, J VIII, later christened Pasiphae to please the space amateurs and the Carl Sagans.

This gave me the unpleasant experience of using the reflector, called a Ritchey-Chrétien type. The problem was that you had to use very thin glass plates, and bend them slightly to a spherical contour in special plate holders. Many broke in the process, and a few even broke afterwards when they were being released for development, wasting the human and telescope time invested. I was fortunate; nevertheless, I had held my breath.

[-15-] It occurred to me to use my skills in computing higher optical aberrations, which I had acquired (along with a fiancée and a first taste for fancy Chinese food) at a summer course at Harvard in 1940. I would see if I could design a field-flattening lens so that ordinary photographic plates and plate holders could replace the special ones. Willis and other senior figures were startled at the idea. But no special permissions were required in those days; you just worked longer hours so as to add the new project to the assigned ones.

While I was happily at work on the idea, I got drawn into a typical informal just-after-Pearl-Harbor project on improving the maps of Alaska. The Army Air Force command involved needed to locate ground stations with geodetic accuracy. They wanted to use a very carefully levelled zenith camera, and were asking us astronomers to help.

I couldn't do much better for them than a minute of arc - say a mile on the ground. The officers were impressed, but we agreed it wouldn't be good enough. I suggested that if they took two exposures on each film, with the camera turned about the vertical axis in between, much less accurate measurements would show where the center of the field was. They looked unhappy, presumably because of the time needed to modify the cameras yet again, and went away.

I had had fun. I had been caught up in the Real War for a few weeks. The fly boys had come to me because of my optical knowledge. Could I use it elsewhere? Not at the observatory, probably. I cast about. In retrospect, I should have looked farther afield, and certainly taken more time. My opposite number at Harvard, a strange plump creature named Leland Cunningham, ended up running an IBM shop at Aberdeen Proving Ground and writing the sample-problem specs for ENIAC. But it took him a year or so to get the job, and I wanted to do something right away - a trait that will surface many times in these stories!

Also Dorothy was doing very well indeed in her new job at the Bureau of Standards, and having uprooted her only the year before from lovely Pasadena, I wanted to stay in Washington if I could. Simple inquiries revealed that the Navy had need of optical experts in the Bureau of Ordnance. Presto! I was a P-2 Assistant

Physicist in BuOrd Re4, Fire Control Research and Development. And at a pleasant salary increase besides: \$2600 a year.

Doesn't sound like much today, but on the strength of such wealth Dorothy and I bought our first house. It was brand new, located in Kensington, Maryland, on an unpaved street - and cost \$8500. It is probably still there (they paved the street after the war), and I'll bet it now goes for ten times our price.

Most of BuOrd was housed in horrid temporary structures left over from World War I, and I was put to work in a gigantic drafting room at the very back of the buildings. My routine, six days a week of course, was ten minutes walk to the Kensington Jitney, twenty minutes ride to Chevy Chase Circle, thirty minutes more downtown. Plus connecting waits, plus the Ordnance Amble from the front door and the guards to the sign-up sheet; call it an hour and a half. Dorothy was in a five-way car pool; gasoline rationing had begun.

I worked for a civilian named Mike Goldberg, an expert on mechanical linkages, a curious component of the analog gun directors that are now one [-16-] with the dinosaur and the dodo. He passed on assignments from the young Re4e officers, who worked in somewhat more pleasant quarters down the hall. Their boss was a two-striper named Stanley Ballard, who had been an insignificant physics professor in Hawaii when the war started. He fit the job well, and afterwards used his connections to rise quite high in the American Institute of Physics.

Another physics type was Urner Liddell, who was seconded much later to work on the postwar nuclear tests in the Pacific. And there were several others, all quite serious about their uniforms but none very knowledgeable about old-fashioned lens-and-mirror optics, which was a backwater of 1942 physics in the same way that my orbit computing specialty had been a backwater of 1936 astronomy. So I was welcome, although on my side I knew too much about the subject rather than too little. That is, I knew about higher aberrations of fancy astronomical telescopes and Schmidt cameras, and not much about gunsights!

Anyhow, Goldberg sat me down next to a career civil servant, an engineer from the Naval Gun Factory named Russell Banker, who knew plenty about gunsights but very little about theory. We made a good team, and in only a few days I knew about parallax and exit pupils and such. Also, Re4f (next door to Re4e) turned out to be the boys who did radar, so secret still that the name was not used in public, and through them I first heard of the gigantic buildup at MIT, which was for disguise called the "Radiation Laboratory". So there were lots of new work tools on the one hand, and war vistas far beyond those at the Naval Observatory, on the other.

About the difference between gunsight optics and fancy aberration theory: when I came up for my thesis defense in Ann Arbor, a few weeks after moving to BuOrd, I tried to explain to the physics prof on my committee what I was doing. He was, by coincidence, the optics man at Michigan, and was so put off by my plebeian use of his elegant science that he sat on the suggestion I get a cum laude for recovering J VIII. Sigh!

I had a nice Friden calculator - such gadgets were already under wartime allocation - and was put to work on donated British and captured Japanese gunsights. The latter were tested and disassembled at the Gun Factory, the lens parameters measured, and the dope sent over to Re4e for analysis and comment. I was startled to be told that, while Japanese optics were supposedly copied from the Germans, the Navy patent files showed nothing similar from Zeiss or thereabouts. This was the first indication I personally had had that Japanese technology was not just duplication and adaptation. It was confirmed several times for me during the war; first hand in optical engineering, anecdotally in nearby fields like fire control and radio. So I was not as surprised as the media and the public when the Japanese cameras and consumer electronics came on strong two decades later.

The load increased. Somebody produced an assistant for me, a young New Yorker who yearned audibly for the fleshpots of the Grand Concourse but found working in BuOrd preferable to boot camp. Indeed, after I

left Washington things got tighter in the Bronx draft boards, and they took him away. His output was low, and supervising him took more time than he saved me - another lesson to store away for Watson Lab futures. But there was [-17-] indeed some small pleasure in command, or at least I found it an interesting departure from being commanded.

The pressures of a Real War were fascinating. Major projects, considerable excursions from old ways of doing things, could be set up in days. I was accustomed as a budding scientist to "keeping up with the literature", so the flood of reports and recommendations and proposals didn't faze me the way it did the older civil servants like Banker and the drafting room types. I began to realize that having young physicists in the Re4 offices was working better than their lack of practical experience might have promised.

For instance, there was a horrendous shortage of fancy rangefinders, and of experienced operators on shipboard. Some years back a decision had been made to adopt stereo rangefinders rather than split-field. In a peacetime service the Navy could take the time to select and train sailors with keen depth perception. Now they needed ten times as many, instant. Re4e beat the bushes for psychologists, and also for firms to design and build training gadgets. The bright people under Ned Land at Polaroid were among those who surfaced.

I wasn't directly involved, but had lots of ideas and advice to offer anyhow - much of it unwelcome, because there was so little time to argue. Decide! Act! Try something else; we just lost another carrier! In my drafting room men were worrying about the torpedoes that unexpectedly failed to work. Was it the fire control equipment they had designed, or manufacturing problems, or poor training, or something unforeseen? There were horror stories from the European theaters too. I still remember one about the escape hatches on one type of bomber being just a little too small for a gunner with his parachute to squeeze through. Solution: select very small gunners!

There was a weird project to increase the accuracy of those stereo rangefinders by filling them with helium instead of dry nitrogen, and that involved a Princeton professor named Merrill Flood who surfaced thirty years later in Management Information Systems - another helium-filled instrument! The NDRC, National Defence Research Committee, under the aegis of Vannevar Bush, produced such projects, and academics to staff them, in an amazing torrent of novelty. But I learned little about radar, and heard nothing about atomic weapons.

With all this excitement and hard work, there were still strange interludes. The battleship Alabama was commissioned and before going off to first station, anchored in Chesapeake Bay for a week or so. Annapolis got a day, and us Navy civilians got a day; we were bussed over, put aboard via glamorous launches, and allowed to clamber all over the huge ship. My gang looked at fire control gear: gun turrets, gun directors, rangefinders, radar equipment. Others looked at propulsion, or ammunition hoists, or whatever. Great idea; it charged us all up for weeks; we even quit complaining about the (lack of) air conditioning!

Another: one day a very academic type from the University of Chicago showed up at BuOrd and walked off with a best-design submarine periscope. Since periscopes were even scarcer right then than submarines, we were all flabbergasted. Of course, three years later I realized he had been outfitting [-18-] the Stagg Field pile, for Fermi and Co.! It was the second clue Dorothy and I had had about the bomb, and we missed it as we missed the first.

Antiaircraft guns were increasingly important in the Pacific, although kamikaze attacks were still rare. These cannon were then directed by gunsights attached to the guns. There were few skilled gunners; the old open sights that we still see in World War II movies didn't let novices knock down many attackers. So, technology - in fact, Massachusetts Institute of Technology - came to the rescue. Doc Draper, whose big postwar enterprise was to draw student and flowerpower protest in Cambridge in the Sixties, was designing an analog computer, later to be called the Mark 14 Gunsight, to replace the low-tech ring sights. The latter cost maybe \$50; the Mark 14s, even in huge quantity, cost nearly \$10,000 - but the warships the

kamikazes were damaging cost a lot more!

I came in contact with that effort in a roundabout way. The 20mm cannon involved had to be boresighted on shipboard. That is, you had to make sure the cannon and the gunsight were lined up. The sight was no problem, but when a gunner looked through the bore of this skinny little gun his field of view was so tiny he often wasted much time finding the boresighting target. I had the idea of putting a plug with a negative lens in it, in the gun muzzle, and another, with a positive lens, and a mirror to make things convenient, in the breech. A reverse telephoto or reverse opera glass, in effect; what it did was increase the field of view fourfold. The demagnification of the target didn't matter; if anybody cared, a bigger one could be used. Well, much to my pleasure, a small company was found to make the little kit, and in some quantity. I still have the drawings, but nobody ever sent me a sample. Ah, wartime!

This sounds like a lifetime. Actually, I had come down to BuOrd from the Observatory in May [1942], had gotten my Ph.D. in June, and all the excitements I've been reciting had taken about six months. Some of it was the war, some of it was biological; the clock runs differently when you are 24 - and the gonads too, for sure! I did some travelling; notably, flew up to the rangefinder production operation at Keuffel & Esser in Hoboken, in a two-seater Navy trainer with a nice Re5 flyboy who did barrel rolls until I informed him grimly that I was about to throw up all over his airplane! I joined the OSA, Optical Society of America, and because I had lots of surplus energy - and it didn't hurt any that I was sponsored by Dorothy's boss Meggers, an OSA bigwig - began rising in that hitherto-conservative outfit.

Also at the Bureau of Standards Dorothy had encountered an unusual outdoor group. They called themselves spelunkers (cavers, in Britain). They specialized in exploring Schoolhouse Cave in nearby West Virginia, longer drives being impossible under gas rationing. We were not much into caves - darkness, and narrow places, and a lot of mud - but two dozen of the bunch were foldboaters. They had learned about the sport on pre-Hitler European travels, brought the folding rubber-skinned kayaks back with them and stored them in their Washington closets, and went out on the upper Potomac and such, when the water was white and the weather not too grim. I'll have more to tell about the sport, which was the first of many high-thrill adventures I have enjoyed after emerging from my soft [-19-] childhood; anyhow, Dorothy and I bought one of the last prewar foldboats available, and tried to learn by doing.

There wasn't much other social life, especially for newcomers. The Naval Observatory crew was pretty inbred, and the BuOrd civilians were the same. Ballard and his young officers were learning to be Navy - Navy Reserve, we said cuttingly - and had special privileges we mortals lacked. The Meggers family had a big house out toward the Bureau, which was then on Connecticut Avenue, and invited us several times. They ran to collections of many kinds, and indeed in postwar the oldest daughter became a well-known anthropologist, which is sort of people-collecting. We liked them and admired Meggers himself very much; he was a cross between a senior scientist and a Will Rogers, and had a comic feud going with George Harrison of MIT, the world-famous designer of ruling engines (on which the diffraction gratings for Dorothy's spectrometers were made). Dorothy's part of NBS, in fact, looked very much like the Harvard astronomy milieu out of which I had plucked my optical theory and my marriage.

We were isolated, besides. I had been a part of the Ann Arbor scene, and Dorothy, of the Cal Tech/Mount Wilson scene, for six years. Washington was very different, and especially in wartime. We had a house, and problems with furniture, and not much money, and our personal relationships to work out. So what time was left over from pretty heavy work commitments got used up fast. Neither of us were family-dependent; still, it didn't help any that mine were in Michigan and Dorothy's in California.

I was restless. I had enjoyed the little burst of creativity while I was doing the boresight design. And I was more than a little jealous of Navy officer privilege; you didn't actually have to bow when a four-striper swept down the hall, but you felt that nobody would be surprised if you did! The wartime selection process put some great guys in the Pacific (or so the papers told us, between accounts of the many U.S. disasters) but the ones left behind on Constipation Avenue, as we frequently called it, didn't turn me on.

Seemed like I ought to be able to help more, and be more creative, and still not rile my Michigan draft board. Dorothy was willing, if not eager. We had decided not to try pregnancy, let alone parenthood, for a while yet, so we were portable. I cast about, and almost immediately tripped over the Mark 14, which was being boresighted with my gadget. The Draper Gunsight, as it was still called, was going into mass production at Sperry Gyroscope up on Long Island; meanwhile, would I consider a position at their Garden City laboratories as a fire control scientist? I certainly would!

The house was simple: we told the real estate agency we were leaving, they kept the payments we had made so far, the papers got torn up, and somebody moved in as we left - same day, in fact. Washington! We called a mover and our very minor possessions were collected at Sperry expense, and reappeared a few days later (after all, it was wartime, and a very small part load besides) in Garden City.

We had found another house, in nearby Hempstead, after about two days. We knew no more would be built; the remaining potato fields would survive until we left in 1948, as it turned out. In fact, our little place had been too late for a gas hot water heater; there was a gas stove, but hot water came via pea [-20-] coal and a peculiar pot stove in the basement, which went out several times a week. Our cat Suzy had her many litters in the big crate we kept the special coal in, next to the regular coal bin beside the hot-air furnace. The house cost \$11,000 but the down payment, although not as minuscule as in Kensington, was only \$1500. And we had a garage; useful on Long Island, where clearly there weren't going to be any new cars for a while, or even new tires. Our neighbors were not war types; on one side, a barber; on the other, a lead-burner (he said "boiner") who did things like chemical sinks, and industrial plumbing in general.

Dorothy answered ads for a while, and found a job in Manhattan as an industrial spectroscopist at the labs of the Interchemical Corporation, which until the war had been mostly making printing inks and special paints. In fact, they were about to get a contract for a surprising black paint for the Black Widow night fighter. The surprise was that it was not dull, dull black but high-gloss; turned out one of those NDRC professors had shown that the returns when a searchlight found such a plane were less for specular reflection!

She had general work to do, metals and pigments and such, but also was trying to apply spark technology to organic materials like amino acids. Hasn't survived; things like infrared spectroscopy and chromatography are easier and more general. But she had some fun, and felt useful. Main trouble was that she had to commute on the notorious Long Island Railroad, plus a short hop on the Eighth Avenue subway, which wreaked havoc in our sex life. And six days a week!

Meanwhile, between attempts to keep the pot stove in our basement going, I was entering a new world of optical complexity. Of course the K&E Navy rangefinders were fantastic, but those designs had been frozen before Pearl Harbor. My Sperry project was in the design stage, or at least in design revision after prototyping. It was a double-ended aircraft periscope, to stick out of the top and bottom of the secret new B-29 bomber, mid-fuselage. There were small plastic domes through which the optics looked at attacking aircraft. When the gunner tracked a plane across the zero-elevation "equator", a prism flipped the eyepiece field from the upper to the lower periscope or vice versa. The junction case also contained an analog computer featuring three-dimensional cams, rate gyros, and a hundred pounds of ancillary gear. Outputs from the system were to control remote machine gun turrets on the top and bottom of the plane, and at the tail. One human advantage was that there would be no poor devil as tail gunner. The system had a major competitor from General Electric, which won out in the end, but that was some years in the future - in fact, so was the B-29, which was still under design and test at Boeing Seattle. And it too had competitors in 1943.

The periscope and all its complex optics had been designed, and would be built, by the Hawkeye Works of Eastman Kodak, in Rochester. Sperry Gyroscope furnished the central box and the entire gun turret complex, with much hydraulics from Vickers, another division of Sperry Corporation. My major job was to keep track of Kodak progress, check proposed design improvements, approve the optical tests at Hawkeye,

and generally represent the Garden City crew in a completely novel arena. They knew fire control, [-21-] radar (the Varian brothers were big guns on the staff), and hydraulics. As far as lenses and prisms were concerned, well, they knew they were made of glass. Usually!

It was fascinating. There were all kinds of new ideas. The plastic domes on the ends of the periscopes introduced a systematic error in elevation; should we put a mechanical correction cam in the computer or make the inner and outer surfaces of the domes non-concentric? Would new eyepiece designs (like the ones in today's most expensive binoculars, and actually a copy of a Zeiss patent) really improve gunner performance - wider field, yes, but more distortion?

Main thing for me, though, was meeting an individual. As I began to make frequent trips up to Kodak, usually by overcrowded train, I had more and more to do with a real lens design expert, the head of the Hawkeye group. He was an Englishman, Rudolf Kingslake, world famous in his very special field, and also the son-in-law of a chap named Conrady, the author of the treatise on lens design from which I was studying the art. There was supposed to be a second, unpublished volume of this opus, with much reference to photographic lenses, and Rudie, as his bevy of female computers called him, had the only copy. Great story, and it may even have been true; more likely, Kingslake knew enough to have written the volume himself!

He had a chap (Harold Bennett) working for him as a senior lens designer, who wanted to mechanize ray tracing calculations, which Kodak did with Fridens and Marchants, having stepped up from five-place logarithms in the Thirties. You could tell an optical computer by the fact that his or her trig tables were much dirtier - that is, much more frequently used - at the front (small angles), while astronomy or physics computers used all angles impartially! Today a programmable hand-held calculator would be much, much better, but such computations are now deeply imbedded in fancy overall design packages (expert systems) and no longer are performed out where designers can see them.

Having watched the punched card operations at the Naval Observatory, and having heard about all the fancy electronics in the MIT and Sperry radar equipments, I was quite sure attaching funny little servos to the keyboard and twiddlers of a Friden was not the way to go. But my obvious admiration for Kodak (and Kingslake) design skills, and my activities in the Optical Society, made up for my criticisms.

Some years later the prototype machine was demonstrated. It was so far behind what could be done with truly automatic equipment, and so far out of step with the promises of ENIAC and radar electronics, that it died. Compared to the room-sized machines of the late Forties, you could call it an early "micro"computer!

About this time the Mark 14 began to come off the assembly lines, and I was asked to move to the new Lake Success plant on Long Island (where the nascent UN activities lived later, while the Manhattan headquarters was being built). The work was entirely different, and I would have preferred to stay with the Garden City/Rochester project. But the war in the Pacific was central to everything, and the kamikazes were increasingly dangerous. The [-22-] Mark 14 was needed, and in vast quantities - one to every 20mm cannon, if possible.

The optics were exceedingly primitive. The gunner looked through the box, which was mounted right on the gun. He tracked the target plane through two very thin unsilvered glass plates, off which an image of bright crosshairs was reflected. The plates were wiggled by the innards of the gunsight - rate gyros working against springs, whose tensions were set by a range knob on the front of the sight. So they had to be light.

Sperry needed sources for tens of thousands of sets of these optics, and then to inspect them for adequacy and assemble them into the sights, and test the whole box on special calibration rigs. The set was two thick windows, two thin reflecting plates, a collimating lens (no problem), a special light bulb (ditto), and a reticle with a very fine transparent pattern on an opaque background. Parenthetically, the

company we found which could etch the reticle pattern through a thin metal substrate is today active in chip fabrication - Buckbee Mears, it was called then.

My boss was a George Bentley, who had gotten a doctorate from Draper at MIT and then become director of research for Hamilton Watch. He teamed me with a buyer named Jack Varick, and sent us out to hunt glass and reticles. The thin plates were going to be difficult: optical glass, bubble and stria free, quite accurately dimensioned, and with the reflecting surfaces very flat and very parallel. Kodak could make them on their camera-lens line for a thousand bucks a pair, and I wasn't convinced mass quantities were possible. The shop tested them for flatness before uncementing them from the tool, and most of the plates sprang unflat after separation. Post-separation testing was tricky - expert hand work - and I was going to have to set up methods back at Sperry for girls to use, so I was very worried.

Jack remembered that quartz crystal plates, which he bought for the radar boys, had to be pretty fancy too, and to extremely close thickness tolerances besides. He found a company that could make what I needed in unlimited quantities, and for less than \$50 a pair. It took more than scientists to win a war!

Buyers and travelling salesmen had other capabilities. Jack was an expert at finding the "action" - good wartime restaurants in Rochester, bars with stocks of Scotch in Chicago. He wasn't as interested as I in women, but was considerably more expert at dealing with them (I was a great judge of striptease - a much more passive skill). He learned a little about optical parts from me; I learned a lot about life on the road from him.

Back at the ranch I had to set up inspection methods. Sperry had used almost no optics; the regulars could handle the reticles and the light bulbs, but I had to do the rest. My astronomical antecedents got me into Perkin Elmer, which was so loaded down with high-priority work even Jack Varick and Sperry were not welcome. They were using a simple, sturdy interferometer for several inspection tasks, and I persuaded them to make me a couple. These became the heart of the Lake Success department. Wages were frozen, but I got a small raise anyhow.

One of the small pleasures of life was to walk down the long rows of girls and women on the assembly floor, and have them whistle at you. Men were [-23-] very scarce; even my pre-IBM goatee was acceptable. Dorothy was warily amused.

Bentley And Co. were now engaged in a much more ambitious project - to redesign and build the next Draper gunsight. This was to control quad-mounted 40mm cannon and even larger guns, would be free-standing, and needed to reach out much further for its targets. It therefore was to have a 5-power telescope, with lots of difficult optical goodies that are of little interest against today's Star Wars electronics.

I was asked to design - yes, design, not just approve, or inspect - an auxiliary optical system to superimpose a radar image from a tiny internal CRT, on the gunner's field of view. Trouble was, the box was full! I learned to greatly respect the skills of the senior designer/draftsmen, who moved things around for me. This came in handy later, in IBM and GE, when most of my confreres were carried away with exotic electronics. I still marvel today at the innards of the magnificent laser printers, knowing how demanding the mechanical parts of the system are, and therefore understanding that such machinery will remain expensive even with one-dollar chips, and will always require skilled maintenance.

There were procurement problems with this gunsight also (it was really a minidirector), notably to find a zero-thickness beamsplitter flat to less than a wavelength of light. Jack and I did it, but it wasn't as much fun the second time around. I didn't look forward to new inspection technology.

So in the fall of 1944 I began looking for a real design job. I knew I was not in the Kingslake class, but how would I ever get to that eminence beating the Utica bushes with Jack Varick? What I needed was a job at Perkin Elmer or Keuffel & Esser or Polaroid, if not at Bausch and Lomb or Kodak. And I found the Farrand

Optical Company, in the very far Bronx.

Clare Farrand held valuable patents on the dynamic loudspeaker, and had answered the call of WW II by establishing a remarkable optical house, mostly with his own money, to tackle the toughest level of the technology. For instance, Farrand was building a very complex large rangefinder. That was the province of Bausch and Lomb in Rochester and K & E in Hoboken - and Zeiss in Jena, of course. Kodak's Hawkeye works had tried to build a similar instrument, and it was giving them fits. Farrand had mastered that, and was looking for more difficult projects. They had a designer named Seymour Rosin, and needed another. It looked promising.

[-24-]

03 A LITTLE MAN FROM THE MANHATTAN DISTRICT

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Bob Tripp *chief engineer at Farrand, and ex-Disney*

The Flight Briefing Trainer *"dodge-em cars and science fiction lighting"*

Dorothy [01](#)

Optical patents *the mass of ray tracing reminded me of Comrie and Eckert*

Wallace Eckert [01](#)

Department of Pure Science *the new IBM venture at Columbia*

The Watson Lab [01](#)

Columbia University *Eckert's old Morningside Heights stamping ground*

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The Manhattan Project *Los Alamos wanted me taken me away*

IBM World Headquarters *later I christened it "Galactic Headquarters"*

John von Neumann *a major intellectual force on a dozen wartime fronts*

I.I. Rabi [01](#)

Los Alamos *still ostensibly a post office box in Santa Fe, New Mexico*

ASTOUNDING STORIES *several hundred copies vanished into thin air*

Lillian [Lillian Feinstein Hausman] *hired by Eckert back in 1938*

Stan Frankel and Nick Metropolis *ran the special 601s at Los Alamos*

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Thomas J. Watson Astronomical Computing Bureau *doing war work upstairs*

Pupin Physics Lab *I got half of the tenth floor, and a big safe*

Hans Bethe and Roy Marshak *bomb physicists until Hiroshima*

Maria and Joe Mayer *the same; like Feynman, she later won a Nobel prize*

Dick Feynman *"like a torrent from a fire hose"*

S. Chandrasekhar *mathematical astrophysicist*

Ev Yowell *worked on the upstairs project with Lillian*

Marj [Marjorie Severy Herrick] *she ran the IBM machine room for me*

Spherical explosion *a simulation 50,400,000 times as slow as Alamagordo*

Liz Ward *a bluestocking rides the shock wave*

"von Neumann ripples" *"a nice dissertation topic", said Johnnie*

Hiroshima *now we knew what we had been working on*

[-25-] No one else at Farrand lived on Long Island, let alone near Hempstead. And moving in wartime was almost impossible. So a major task when I accepted the job there was to convince my local rationing board that I had to drive over twenty miles a day each way, six days a week. It was actually harder than persuading my draft board, which by now was used to having my various employers claim that the entire war effort revolved around my fantastic scientific capabilities. But with a little help from my new personnel department both projects succeeded.

My poor little 1937 Plymouth soon edged past the 100,000 mark, but actually benefited from its new duties, since it was soon allowed a new set of tires and a better battery. Meanwhile, diligent Dorothy continued to suffer on the Lonny Guyland, as the veteran commuters called it. Even she got some pleasure from my gas coupons, however, since occasional little trips which we could not have done on an A-ration book (into Manhattan and back for a concert, for instance) became possible with a C sticker. And to my amazement, Farrand made me an allowance for gasoline and bridge tolls.

Sy Rosin and I reported to a man named Bob Tripp, who had been chief engineer for Disney, and was a fountain of weird ideas. Sy was conservative and I was still rather astronomical, so Tripp was a bridge to wilder shores. I have to get back to stories about the computer, but a short sample of the games we played may be fun, if only to show how differently we had to approach problems like flight simulation before we had computer graphics and heroic software.

Tripp had agreed to explore building a Flight Briefing Trainer, to simulate invasion approaches to the Pacific islands and the Japanese coastlines. He planned a large room with an absolutely flat terrazzo floor (in my cynical way **[-26-]** I claimed that this would be the hardest part of the whole project, and I was right). A powered cart with analog computing gear would run around on this floor with the same freedoms as a dodge-em car at a carnival, and would carry a simulated cockpit and controls, and the trainee. He would be looking into the eyepieces of a periscope, which stuck up through the roof of the cart and could be raised or lowered by the cockpit controls. On the ceiling was a gorgeous relief map of the target area, and the head of the periscope could come "down" close to the terrain. What a monstrosity!

I was charged with designing the head prism and top end of the optics, which had to replace the upper part of a specified Navy periscope. Tripp had already solved the problem of depth of focus, which is serious in all such model devices, by planning to synchronize rapidly changing focal length of my top lens with selective illumination of the map, on a 30-cycle-a-second basis. Good grief - dodge-em cars and science fiction lighting!

Most of it was built, I heard later, but fortunately the war ended before full operation was needed. I'd love to have seen it, and ridden it.

There was a great Christmas party [1944], where us upstairs types got a long-awaited chance to, ah, mingle with the all-female assembly and test crew from the rangefinder area. Dorothy had been hoarding red stamps to buy a Christmas Eve roast, which was ruined long before I staggered in from my long drive and other exhausting efforts, and collapsed on the sofa. It was a very cold Christmas, it was. A once-a-year fall from grace might have been forgiven, but coupled with other adventures which I had not concealed very well, and with those wasted ration points...

I finished the initial periscope head design and began on the eye end. The idea was to split the light into two eyepieces to simulate infinite-distance binocular vision, and also to feed in a view of the instrument panel. Then Tripp said one day that he and Mr. Farrand wanted to build optics for projection television after the war, and would I put a few hours a month on a library and patent search, since I knew about Schmidt and similar high aperture systems, and since the shop downstairs was making deep-dish mirrors on a secret contract? I quickly decided that to check out even a few patents would require hundreds of hours of ray-tracing - even with a machine like the one planned at Kodak!

Unlike an initial design, where you trace a ray or two and then change something, and trace a few more, in

the assessment of finished designs you could select an assortment of rays in advance and trace them all through the first surface of the lens, or even through the first surface of each of several lenses under investigation. Then you could repeat through the second surface or surfaces, and then the third, and so on. I was of course reminded of Wallace Eckert's punched card shop at the Naval Observatory, and of Comrie's work at Greenwich, where calculations for many dates were carried ahead one step at a time.

Today we would immediately think of parallel computing, one of the major current big-machine enthusiasms. In a machine with say 1024 processors we could trace a hundred rays through each of ten lens designs (at a millisecond a surface), and finish all ten analyses in less than a second. In 1945 you could only have one "processor", and it would be a whole room full of [-27-] electromechanical punched card machines, and with two or three operators. Ten complex lenses might well take a week to run - but by hand it would take months.

One very nice thing about working at Farrand was that you were encouraged to keep up with the literature. And not just by subscribing to it yourself; the company took all the useful journals, and suggestions for additions to the list were welcome. These were circulated briskly, and Rosin and I were right behind Mr. Farrand and Bob Tripp in priority. In early April a very short article appeared in SCIENCE to the effect that the International Business Machines Corporation had appointed Dr. Wallace J. Eckert, former director of the Nautical Almanac Office at the Naval Observatory, as head of a new Department of Pure Science, and that he would be establishing a Watson Scientific Computing Laboratory at Columbia University.

The note said that the laboratory would have a full complement of IBM gear, which would be used for instruction and research. It mentioned Eckert's former connection with Columbia as chairman of the astronomy department, and somewhat *sotto voce* that the chief executive of IBM was a prominent trustee of the university. I saw the piece at the beginning of May, and immediately wrote Eckert a letter explaining my idea about mechanizing large-scale optical calculations. I suggested he might let me come over at night when things got rolling, and experiment a little. And to sugar-coat things I mentioned that my employer, "Farrand Optical in the Bronx", would have commercial use for such an application after the war.

Ten days later a little man showed up in Farrand's office. He introduced himself as representing a Manhattan Engineer District, a secret agency of the Army with offices in the Empire State Building. I never knew exactly how he approached it, but somehow he explained to Farrand, who of course had very high level personal security clearances, that something much more important than optical design was going on out in New Mexico. He produced my letter to Eckert, which Farrand had never seen, and said he wanted me for this operation at Columbia. Coooo!

They had me in. I was dumbfounded. I protested that I had not talked to Eckert, that I had had no idea of going to work for this new laboratory, that I liked it where I was. "No matter," said the little man. "Report to this Mr. Eckert tomorrow, and he will arrange everything. His office is at 590 Madison Avenue." I protested that no such impressment was possible - I remember using the term "shanghai" - and that my Michigan draft board would have to be consulted. But down inside, a great feeling of excitement was growing. I was going to get my hands on punched card machines at last, and do some massive computing.

The next days were a blur. I went in to Manhattan with Dorothy on the train the next day, and discovered that 590 Madison was the headquarters building of IBM. In later years I invented the name "Galactic Headquarters", but the Watsonites then called it merely "World Headquarters", capitalizing on the IBM phrase "World Peace Through World Trade" which T.J. had adopted in the Thirties. In typical IBM fashion, I was expected (although the reception desk was somewhat disconcerted by my beard and sport jacket). Eckert was indeed upstairs, and was delighted to see me.

Within a few minutes I knew that there was to be an atomic bomb. It was [-28-] mid-May, two months before the Alamogordo burst, but Eckert had not been cleared for such information. What he knew, and passed on to me, was that a secret laboratory had been established "near Santa Fe", that very senior

scientists like his old friend I. I. Rabi of the Columbia physics department, and the famous John von Neumann, were prime movers, and that the group was harnessing the fission of uranium to make a fantastic weapon.

This laboratory, which I was to hear called Los Alamos a few days later, was officially just a post office box in Santa Fe (which among other curious mail got several hundred copies each month of ASTOUNDING STORIES!). Eckert told me that there was a major punched card installation there, with something like four IBM 601 multiplying punches, all of which could allow for algebraic signs and two of which could actually do division. There were supporting machines: tabulators and sorters and reproducers and such. The shop was run by Stan Frankel and Nick Metropolis (and, I found out many years later, Doc Nelson), who supervised a mixed bunch of young civilians and dragooned enlisted men; it was working around the clock and still falling behind, and there was neither floor space nor personnel to expand the operation.

"They came to IBM for help," Eckert said. "Mr. Watson and John McPherson (whom I was about to meet) thought immediately of the Astronomical Bureau at Columbia, but it is heavily engaged in fairly high priority work for another part of the Army, and really has no room for physical expansion anyhow. It has only two 601s and an old 285 fixed-plugboard tabulator, and there is hardly room to move."

What I had not thought of when I read the story in SCIENCE was that IBM itself had to have wartime priorities - and very high ones at that - to retain any of the machines that were coming down its overstressed production lines. Even the cards were under strict allocation. If T.J. wanted to help the war effort, and at the same time position his company for postwar scientific initiatives, here was the perfect opportunity. He had his all-seeing eye on Eckert, on the Naval Observatory shop, on Columbia of course. He was still outraged at Harvard. So he decided that there should be a new venture on Morningside Heights, told McPherson, who was then director of engineering at 590 Madison, to see to it, and turned to his next imperial task.

Eckert was offered a chance to go back to his beloved Columbia in a very prestigious role, a chance to direct a far more powerful computing facility than he had ever had before, a chance to build a better machine than Aiken's - and, as I found out sixteen years later, at two and a half times the rather good salary he was getting from Uncle Sam!

He had set up the little astronomy shop a decade ago with his own hands, but it had been run for the last five or six years by a vigorous woman he had selected and trained, named Lillian Hausman. The newer enterprise in Washington had been run for him by Jack Belzer, about whom more in later stories. Eckert needed another subordinate, and was therefore delighted to get my letter. I was well known to him, a fellow astronomer of the same celestial mechanics persuasion, a Ph.D. acceptable to his snooty Columbia buddies, an expert computer and numerical analyst - scarce as hen's teeth, especially in wartime - and I lived right next door! And also I came cheap, although it was [-29-] a year or two before I sadly recognized the fact. But I couldn't have said no, with that little man telling Farrand where to send me, could I?

Eckert and McPherson had worked out a list of machines, and the Columbia administration had found space on the tenth floor of Pupin, the physics building which contained the astronomy department and the Thomas J. Watson Astronomical Computing Bureau. There was even an old teaching telescope up topside, for undergraduate use on the three clear Manhattan nights a year! The Los Alamos priorities began to function; crates of IBM equipment, chairs and tables and file cabinets (and a very big safe), cartons of punched cards and tabulator paper, all appeared as if by magic. What fancy priorities couldn't provide, IBM money and prestige - and Wallace's old Columbia connections - always could.

All I had to do was put it together. McPherson said he would send some bodies. I went upstairs and borrowed operating manuals from Lillian and her people, and asked naive questions about plugboards (Wallace had not ordered nearly enough). We all knelt down prayerfully in front of the hoary old 285 for my first wiring lessons - wasted, because it turned out we were getting a much fancier machine if the Pupin elevator was up to it. You have to understand that I had never even run a sorter!

Also I had summer flu, and Dorothy's parents arrived from California for a long visit. And the cat was pregnant again, but not urgently.

The intellectual excitement was enormous. In two weeks we had visits from Johnnie von Neumann, Hans Bethe, Roy Marshak, Maria and Joe Mayer, and - like a torrent from a firehose - one Richard Feynman. Three of them were to be Nobelists, and Johnnie was supposed to be the world's greatest applied mathematician (I was a Chandrasekhar rooster myself). The punched card boys were too busy to come, but Feynman seemed to know all about the machines (and everything else besides). For instance, he showed me how to wire a chain of selectors on my new 405 tabulator, a technique which in those days was too esoteric to be in an operating manual. He showed me once, and pretty briskly; you didn't get a second shot with Feynman! Lillian didn't know such tricks, Eckert didn't know, McPherson knew (he had edited "IBM Pointers" for a couple of years) but was far out of my reach. So I had to learn from a future Nobel prizewinner!

World Headquarters had me fill out a form or two, and took over the struggle with my draft board. I still have my original ID card, almost certainly the first one ever issued at 590 with a beard on it. There was no physical; a year or so later the personnel department ginned one up, and told me to get my tonsils out - no mention of removing the plaid lining in my sport jacket. I kept my tonsils, and have them today; they are healthier than the rest of me, having been exercised much more vigorously.

An expert machine operator? One appeared. Machine repairs? A very good man was on call. A receptionist? A secretary for Eckert? More plugwires? Coming right up! Ah, IBM!

The operator was an oldtimer named Cliff, who had the machine room culture down pat. He could juggle a vast wodge of cards, carried a sorting needle, knew how to stick chips back in a card for a quick fix. The customer engineer (IBM for "maintenance expert") showed me where the machine [-30-] blueprints were hidden. Lillian knew these things as well, but thought astronomers should be above such details; when I got tired of imitating Cliff I would sidle upstairs and talk to Everett Yowell, who was running the military project in the Astronomical Bureau for her (years later he was scientific marketing manager for NCR). He didn't have his Columbia degree yet, and had to be affable.

One day an attractive young blonde - sharp features, summer freckles, clear voice - came up from 590. Her name was Marjorie Severy, and she had just graduated from Wellesley with a math major. The personnel people thought she would make a possible machine room supervisor. She was just what we needed.

By this time Eckert and I knew that the unit of temperature in my calculations was a million degrees Kelvin, and so on. We kept the equations I was working with, and my translation into computable form (approved, with a warning, by the great Johnnie on his first visit), and the starting values, in the big safe. What Marjorie and Cliff and the others saw was a long shelf of 28 IBM plugboards, which when cycled through the various machines produced a messy and unlabeled printout from the 405 tabulator. While I bundled this up and mailed it with my own hands, registered, to von Neumann - later, to Marshak - at the anonymous Santa Fe box number, the machine room team began to repeat the cycle. We did two a day; each predicted the temperature and pressure up to the (moving) shock wave after one more time step - a millisecond. Allowing for the fact that we did not work Sundays, that was 50,400,000 times as slow as the real atomic explosion! A Cray 2 today would be ten million times faster - and give you Saturday off besides!

About von Neumann's warning: he instantly realized that Eckert and I were experts only on numerical solutions of systems of ordinary differential equations, which are central to all the problems of celestial mechanics. I had had a good course in quantum theory in graduate school, but no practice in solving those kinds of partial differential equations numerically. Nor had Eckert; in fact, nobody had - solutions took much more computing power than the physicists were accustomed to in 1940.

The little group of Giant Brains at Los Alamos, especially Feynman and the card pushers, had learned from Johnnie and from sad experience that if a certain ratio of distance interval to time interval was exceeded,

the numbers went wild. I was told to check after each time step to make sure that ratio was still all right - a minor desk calculator operation. One of our new hires, a bluestocking named Liz Ward, did our desk calculator work. After figuring out where the shock wave had gotten to, she did the little ratio calculation carefully, but neglected to report to Marjorie or to me when the ratio went bad. And I didn't look over her shoulder: mea culpa!

So I had to get on the telephone to Johnnie and confess we had blown two cycles - a day's work. "Dr. von Neumann, suppose I run a smoothing operation to get rid of the ripples? Will it distort what follows?" "That will make a nice dissertation topic in applied mathematics after the war, Grosch. Meanwhile, to be safe, do the last three time steps over." And there went Sunday!

[-31-] Eckert and I had clearances, and access to that safe. McPherson had even higher clearances - IBM was involved in cryptography, for instance - but no need to know. The machine room gang had none, although they did know they were doing something very important. Oh, and the listings I mailed to Los Alamos had no hand-written labels, but matched a labeled master copy that had been carried back by Feynman: primitive but exceedingly effective security.

Then it was August 6, and the radio and the newspapers told us about Hiroshima. We knew what we had been working on, and that tens of thousands of Japanese civilians had been incinerated. Before the moral pressures could mount, events swept us away. The war in the Pacific ended, the war in Europe ended. All our perspectives lengthened overnight - from a few months "to the end of the war," to the long reaches of peace.

[-32-]

04 THREE YEARS AHEAD OF MYSELF

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In Chapter 04 you will encounter
(in order of appearance):

The Great Depression *dominated the American scene until Pearl Harbor*
Parents [Mabel and Bert Grosch] *produced a hatchling in Saskatchewan*
Saskatoon *the Central Hospital got an incubator in early 1918*
Andrew Booth *built a drum computer at Birkbeck College, London*
Canadian schools *skipped the bright kids ahead*
Mrs. Linhart *we started the Science Club together in Toledo*
"Benjamin Franklin" [play] *turned out I was a born ham*
Early heroes: Ozma, Dr. Doolittle and Captain Nemo *no computers yet*
AMAZING STORIES *Buck Rogers and his flying belt, on a 1928 cover*
H.G. Wells *I knew at twelve why "favorite" was impossible*
Edgar Rice Burroughs *but I had hopes for Deja Thoris*
The Toledo Museum of Art *the collections were better than the classes*
Sex *even the juvenile form was great stuff*
High school mathematics *flying solo in calculus was too difficult*
High school debating *a big thing in Michigan and the Middle West*
High school chemistry *Mr. Erickson had an unofficial lab assistant*
The Detroit Public Library *an adult permit for a persuasive 13-year-old*
Graduation [Royal Oak Senior High School] *at fifteen, but not a monster*
Albion College *offered a debating [!] scholarship*
University of Michigan [Ann Arbor] *offered a tuition scholarship*
Going steady *"meager sensual pleasures"*

[-33-] After almost five years of war, peace was a stranger. And I did not remember it all that fondly, especially when I thought back before my college years. The Great Depression had been pretty awful for a youngster, especially near Detroit, where the clang of closing factory doors was nastily punctuated by the splat! of defenestrated bankers.

My parents, Bessie Mabel Adams ("Mabel") and Reuben John Grosch ("Bert", since his father had also been Reuben), had emigrated from England to Western Canada. They were both Londoners - Walthamstovians, and from large families. Dad had been apprenticed as a cabinetmaker, and retained the skills all his life - made very handsome violins as a hobby during the Evil Thirties. The rather Germanic name stretched back through a line of furniture makers, perhaps to the Hanover accession with its train of tradesmen - always in the London suburbs. Dad broke the pattern; came out to Saskatchewan as a construction carpenter, and sent for Mabel as soon as he had his feet under him. They were married in 1912. I was born in Saskatoon in 1918 in Caesarean style, and survived only because the Central Hospital had just added an incubator to its equipment. Not surprisingly, I remained the only child.

We moved steadily eastward in the next years. When I finally got back to my birthplace fifty years later, I asked my hosts to drive me past the hospital to see if there was a plaque to their first (and presumably most famous) incubator baby; alas! they had torn the place down. My host, Andy Booth, ex-Birkbeck College, London, and builder of the first British drum computer, claimed they had sown salt in the ashes!

I went to school in Ontario; first in Chatham, then in Windsor. Canadian schools did not, at least in those less-U.S.-influenced days, let a student sit [-34-] idle; I spent one semester in each grade and ended up three years ahead of myself. I remember only one teacher clearly. The provincial government was instituting French classes as I was zooming through the sixth grade [1928], and I can still sing a few phrases about the bridge of Avignon.

My father had been inside superintendent and senior detailer for a Detroit fine-woodworking company, commuting across the river each day. He was offered a better job in Toledo, Ohio, and worked there for a few months while coming home to Windsor on weekends - via interurban trolley, today only a hobbyist's dream. He persuaded Mabel to put away her English preferences and emigrate yet again.

Parenthetically, he soon became a U.S. citizen, and conferred the same citizenship on me by the derivative route, but my mother remained a determined British subject. George V and George VI were much more real to her than our all-enveloping FDR. Yet although she corresponded copiously with relatives and friends in England from 1912 until her death in 1962, she never showed the slightest interest in going back to visit the country that seemed to hold her loyalties.

I started the seventh grade at Alexander Hamilton Junior High School in Toledo, a few days before my tenth birthday. The teachers were dubious, especially when they found that I believed the Canadians had won the War of 1812! Within a month or two the science teacher, Mrs. Linhart, and I had started the school's first Science Club. A few weeks more and I was writing for the school paper, usually the province of the eighth graders. My English teacher, Miss Morgan, reported to Mother that she wanted to hug me, and to shake my head off, on alternate days - an emotion shared often in later years by a long string of wives, managers and friends.

In the spring rehearsals began for the Annual Play, customarily dominated by the older grade. But this year the staff had chosen "Benjamin Franklin", which required a smallish boy to be on stage continuously, gabbling away the while. Guess who was the only boy in AH that could memorize the part?

I loved it - loved being up there in front of those kids and teachers and parents, the center of all attention. It turned out that in spite of my glasses, and my reading, and my science club, and my good grades, I was a Born Ham.

The previous August I had persuaded my dubious father to buy me my first AMAZING STORIES, the pioneer Gernsback science fiction magazine, which I read without missing an issue for over a dozen years. Twenty five cents, it cost, and had a drawing of Jupiter as seen from Ganymede on the cover, and the original Buck Rogers story ("Armageddon, 2419 A.D.") inside. I had started with the Oz books at five, and Dr. Doolittle; then Verne; then a heavy dose of mythology - Greek, Roman, Norse, even Hindu. Well before my tenth birthday I was off into space!

AMAZING led me to Wells and Burroughs, and a year or two later the first issues of ASTOUNDING appeared on the newsstands, with science as well as fiction. Perhaps more importantly, I graduated from the primarily juvenile library collection in the basement of the Toledo school, to an adult public library, and later to the large main Detroit Public Library. Reading had to be the prime resource of a boy three years younger and a head shorter than his classmates.

One of my teachers got me enrolled in a Saturday class at the very good Toledo Museum of Art, and I liked it. But I really wasn't much at fine arts, and enjoyed wandering among the collections more than being creative with pen and brush. A modern color graphics terminal would have helped, of course.

And I discovered sex. Given my social disabilities, it didn't involve girls or women, or even boy friends [-35-] - just what the Victorians rightly called "solitary" and wrongly called "vice". I was barely ten. I thought it was terrific. Not one day has passed since that first wonderful discovery without my wishing for or planning for - or on good days, experiencing - the manifold pleasures of sex.

The company Dad had worked for in Detroit, a private outfit named Moynes, which did fancy churches and Grosse Pointe mansions and lots of circular staircases, wanted him back, and came down to Toledo and said so. This was 1930; in the Fifties and Sixties, when I was asked back for second hitches by IBM and GE and Uncle Sam, I often thought of his experience. He was flattered, as I was later; he accepted. We moved to a convenient Detroit suburb, Royal Oak, and I entered the ninth grade at the senior high school. I was barely twelve. The Great Depression was only a few months away. I don't remember much about mathematics in Windsor or Toledo. Skipping ahead as I did, I missed whole chunks of arithmetic and only noticed it once, when a review examination revealed I had never had decimals! I did the whole exam on the assumption that 6.28 meant 6 and 1/28th, got an abysmal grade, and discovered the right system by myself, in a week or two. The teacher never knew.

At Royal Oak I took considerable pleasure in algebra and geometry, and was so expert that in my senior year I sometimes sat in as instructor for the freshman algebra teacher's last class while he coached football. At the end of my second year my geometry teacher, Miss Gibson, who was to teach junior-year algebra, gave me the next textbook to work over during the long summer vacation, graded my problems and administered a mini-final examination in October, and excused me from classes. In my senior year we did solid geometry in the fall and trigonometry in the spring; the latter introduced me to logarithms, and I spent many hours in class - while the others sweated - building a better seven-place table from a curious book I got from the town library which had accurate logs, but of prime numbers only.

From that same library - adult side, but they had lots of Jules Verne on the juvenile side! - I got the Granville Smith and Longley calculus text which turned out next year to be used in my college class. I tried to master it on my own, but stuck at the approach to the limit idea. I asked my trig teacher, Miss Kirk, for help, only to learn she had never had calculus and taught her "advanced" classes by rote. I was disillusioned.

On the Ham side, I soon discovered debating, a big thing in that part of the Middle West, with a statewide competition among high schools each year and even college scholarships similar to but less plush than those for football and basketball stars. But it was the public-appearance thing I enjoyed, especially when it involved a trip to another high school, and a fresh audience. I soon became the expert rebutter and "closer", much improved the Royal Oak standing in the state, and captained the squad my senior year.

On the science side, I became unofficial lab assistant in chemistry, had the [-36-] complete run of the shop for two years while the teacher, Mr. Erickson, very good indeed but also busy coaching track, watched my struggles to do primitive qualitative analysis without a good balance (I remember making standard solutions with constant-boiling hydrochloric acid and lots of pipette/burette work).

My father cut into a gas line at home and inserted the appropriate fixture so I could have a Bunsen burner instead of an alcohol lamp. I did the usual dangerous flashlight powder/thermite/gunpowder experiments in our back yard, and decided to be a research chemist. All this was amplified by a steady flow of books from the big Detroit Public Library, for which I managed to promote an adult permit on the strength of Dad's employment a few blocks away. I was then just thirteen, but persuasive!

Physics was a bust. Astronomy I studied out of AMAZING and ASTOUNDING, plus dull books from my three libraries (there was a rather good library in the high school also). I didn't confuse the sources; I already understood at twelve or thirteen that H.G. Wells' "cavorite", which took his confused heroes to the Moon, was an impossibility - and why.

This is a good place to explain why I flourished so early, and yet didn't turn into some kind of a monster. I was immersed in a rather ordinary environment - good schools, good teachers, but nothing like the Bronx High School of Science, or the Cambridge or Pasadena hotbeds. And everything was seriously damped by the Depression, which was raging with special virulence in the Detroit area. That meant no travel, very little spending money, very few purchased books, and at school very limited equipment.

On the other hand, my parents and all my teachers were enormously supportive. The former never really understood what I did after I finished high school, but they were proud of my honors and my Ph.D. and my mysterious jobs. They watched me as Benjamin Franklin and as debating captain, came to all the school events - but shunned the PTA. My teachers were no great minds, but they worked far harder, especially on me and the other bright kids, than they would today; teaching was still honored in Canada, and a stable and fairly well-paid job in Toledo and Royal Oak - and the Depression sharpened their appreciation.

Of course it seemed like a struggle at the time, and I had occasional setbacks and social disfunctions, but compared to most youngsters in those Depression years I had a red-carpet path. My debating coach, Miss Moore, got me the offer of a scholarship at Albion College; my Latin teacher, Mrs. Land, was an active alumna of the University of Michigan, and helped me apply for and win a tuition scholarship there - and that, I accepted.

If I had been surrounded by really fancy teachers, or if my parents had been intellectuals, I would have been steered to Harvard or Cal Tech or whatever, and with much more generous scholarship support - I saw this quite clearly after only a couple of years at Ann Arbor. And I could have upgraded myself, but by then I was doing published research - at seventeen! - and was far too engrossed to make the effort.

About the high school social thing: I yearned for girls and cars and sophistication just like other boys, but I was too small for athletics, too young to drive or work (and there were no jobs, anyhow), and too intellectual to be [-37-] a smoothie. I managed a year of "going steady" when I was a junior, and only fourteen, but was dissatisfied with the meager sensual pleasures extended by my lovely but cautious girl friend, and regressed to less frequent dating as a senior.

[-38-]

05 2500 HOURS ON A MERCHANT

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In Chapter 05 you will encounter
(in order of appearance):

Alumni Scholars *welcomed to Ann Arbor during Freshman Week*
President Ruthven *of the University of Michigan*
The Michigan Catalogue *familiar terrain for outmanoeuvring an advisor*
Astronomy courses *not for freshmen, but after six years of AMAZING ...*
Maxwell [Allan Douglas Maxwell] *he made me a computer at seventeen*
James Craig Watson *anciently director of the Michigan observatory*
Computing forms *the software of desk calculation*
The Jellyroll Hectograph *you could pull forty copies, and in color*
A.O. Leuschner *the link between Oppolzer and Maxwell*
The Delporte Object *an asteroid that came almost as close as the Moon*
"Real Research" *like a tonsured scientist or an ASTOUNDING STORIES hero*
Parents [04](#)
The Director [Heber Doust Curtis] *welcomed me to the Observatory family*
Scholarships and fellowships *Curtis and Maxwell kept me going*
The Suitcases *a necktie semanier and a two-year supply of scratch paper*
The Marchant ACT-10M *Maxwell and I preferred it to a Monroe or a Friden*
Oberth and Hohmann *German authors of serious treatises on space flight*
The AAS [American Astronomical Society] *Maxwell nominated me at twenty*
L.J. Comrie [01](#)
S. Chandrasekhar [03](#)
Wallace Eckert [01](#)
Seth Nicholson [Mount Wilson] *discovered J IX, J X and J XI*
New satellites of Jupiter [J X and J XI] *they needed the 100-inch*
A Rackham Predoctoral Fellowship *my first bicycle, and summer at Harvard*
Harvard College Observatory *a major center of world astronomy*
Harvard summer conferences [02](#)
Whipple and Cunningham *the Harvard competition for Maxwell and Grosch*
Paul Herget *the Cincinnati competition for Maxwell*
J VIII [02](#)
N. Boeva *the woman astronomer at Leningrad who had last done J VIII*
The Royal Society *elects Comrie, its first computer, in 1950*
The Naval Observatory [02](#)

[-39-] I arrived in Ann Arbor on the 16th of September [1934], just three days after my birthday. Freshmen had to be sixteen on registration day, which was the 25th for Names Starting With G; I made it with 12 days to spare! The new Alumni Scholars were welcomed during Freshman Week by the president, a herpetologist named Ruthven. I next shook hands with him when I received my doctoral diploma in 1942 (when I got my bachelor's, he handed it to me at diploma length). It was a big place, not at all like Royal Oak Senior High School, and I was excited and challenged.

There were a thousand rules and regulations about course selection. I had studied the catalogue for months, and knew it much better than my advisor, but was unable to find a way into the "professional" introductory chemistry class; the department wanted you to have calculus along with it, and calculus was normally a sophomore subject. The best I could do with math was to choose the "professional" introduction, which got you ready for differential equations as a sophomore, but clearly didn't do calculus for many weeks. Physics was also impossible, and with more justification; the budding chemists didn't use calculus at all, even in the second semester, and the budding physicists certainly could have used it - but usually didn't.

I wiggled on the hook. In a careless moment the advisor allowed me to sign up for the entry astronomy course, which really was also for sophomores. It was a snap for someone who had been reading and rereading Verne, Wells, AMAZING STORIES and ASTOUNDING STORIES for six enthralled years. By the time

an assistant dean called me on the carpet for being in a sophomore subject, I was leading the class, and the laboratory class as well. He could see I had been a knowing infractor - but he let me stay!

I had been depressed that my trigonometry teacher had not known calculus. Now I was in a different league; my math professor was a famous mathematician, who took the advanced freshman section to encourage entry [-40-] into the field. My astronomy lecturer was a real live researcher who became director of the Dominion Astrophysical Observatory in Victoria a few years later. Even my English class was taught by a publishing poet, who was also proselytizing (it too was an advanced section).

And I made the freshman debating squad.

The Depression was fierce. Dad managed to get me a little summer work as a helper, building a temporary keg-washing plant for the Stroh Brewery in Detroit - alas, I had not yet learned to drink beer, pails of which I brought out for the delighted carpenters. I suspected it was a non-standard arrangement; there were unions about, and I was still only sixteen. And it was heavy work - but how I needed the money!

Ann Arbor was a relief that fall. With my tiny earnings I found a single room in a nicer boarding house: great landlady and good housemates (I lived there contentedly until I left for Washington six years later). I signed up for an advanced astronomy course, and unknowingly set all the rest of my career in train. I had been drawn to the astronomers of my freshman year, and chose physics in the new term - yes, the fancy course - instead of chemistry, and to take an extra fifth subject, as a consequence. But in September [1935] I was also thinking about being a mathematician or a physicist; by Christmas, those options had pretty well faded.

The fifth course was Astronomy 101, Practical Astronomy - the old-fashioned stuff that had been the entry to classical astronomy for centuries, and was then withering under the fires of relativity and quantum mechanics and astrophysics. There were only ten students. Most of the others were seniors and graduate students majoring in other subjects (surveying and navigation and such), and there were two or three apprentice astrophysicists. I was the first student who ever elected the course before choosing a major, and was five or six years younger than the rest.

We were to do the old precise-measurement kind of astronomy: use of the meridian circle and the chronometer and the filar micrometer. No photography. No spectroscopy. Very accurate. Lots of spherical trigonometry; in fact, it was the only course in the university which taught that variety of math heavily.

The professor was one Allan Douglas Maxwell, unhappy with the way that his kind of astronomy was being brushed aside by the astrophysicists, and hungry for a disciple. He had been at Ann Arbor for nearly ten years and had not had a single doctoral candidate. His father had been a streetcar conductor in Woodland, California, and by his mathematical aptitude Maxwell had won scholarships and prizes at UC Berkeley. He became the final disciple of Armin Leuschner, then chairman of the department and head of the Student Observatory (not to be confused with Lick, on a mountaintop behind San Jose, where the Real Research was done).

Leuschner had spent much of his career reformulating old methods of computing the orbits of asteroids and comets for "modern" calculating techniques. He discouraged the use of six-place addition-subtraction logarithm tables, used a hand-cranked German Brunsviga desk calculator and tables of natural trig functions, and looked forward to the days when many computers - remember, computers were still people in those days - when many computers would have access to calculators with (gasp!) electrical motors.

[-41-] Maxwell found this immensely satisfying. He did a thesis, helped Leuschner write and publish a major text on orbit computing methods, corresponded with the other dozen or so specialists elsewhere in the U.S. He was ready to go out into the world. The University of Michigan had a tradition in the field and in the specialty: there had been an active observatory in Ann Arbor for over a century, and one former director was James Craig Watson, whose book *Theoretical Astronomy* had been the standard American

text for (logarithmic) orbit computing since 1867. Even the astrophysicists conceded that Ann Arbor should have another orbit man, and Maxwell had been their choice.

He taught by demonstration. At the blackboard he would derive the appropriate expressions for computation, and then distribute beautifully prepared computing sheets, with an example filled in on one page or set. We called them computing forms, and they were the equivalent of programs - the term "software" would not be invented for more than twenty years. They directed the computer, Maxwell himself or a student, step by step through the complex calculation. The sample showed how many decimal places to carry, neither too few nor too many, and he would justify the choice and recommend calculating tools and tricks as we went along. Just as in today's software, bugs sometimes showed up, or (much more frequently) Maxwell would see a better way to do the job. Then the forms would be revised or replaced.

Instead of a laser page printer he had his personal hectograph machine. It was a long roll of jelly on a cloth backing. He would draw a form in hectograph ink on bond paper, roll out a fresh foot of reproducing surface, press the original face down for just the right number of minutes, peel it carefully off, and then draw off duplicate forms on plain paper until the copies became too faint or blurry (copiers were also twenty years in the future!). When the takeup roll was full he would go back to the beginning, where the six-month-old image had completely absorbed, and start over. I thought such modern technology was terrific. Why, you could even use more than one color!

Maxwell did all his calculations in ink, and admonished us to do likewise. I did; the others tried, and reverted to pencil. He told us that engineers had to do many calculations in bound laboratory books, for patent and similar reasons, and that they worked in ink and crossed out but never obliterated errors. "In practical astronomy and especially in orbit calculations, which you will do in Astronomy 201, the calculations are so voluminous that the sheets would be a mess, so I use ink eradicator on my mistakes, and write again in ink after the spot is nice and dry" - much shifting in their seats by the poor victims, who were mostly resolving never, never to take 201. I adopted his tactics enthusiastically, and in later years helped him experiment on what combination of paper, eradicator and fountain pen ink worked best (one of the Hammermill bonds, Clorox [!!], and blue Washable Quink). I made very few mistakes; indeed, I didn't dare!

One of the young astrophysicists dropped out. The surveyors and would-be navigators grumbled. Then, metaphorically at least, the heavens opened. An astronomer named Delporte, at the Uccle Observatory near Brussels, photographed a very rapidly moving asteroid. Even assuming the motion was [-42-] entirely lateral, and against the grain of the solar system, it could not move so fast unless it was closer than any previously observed body - except meteoroids, of course. The world orbit-computing experts were agog, at all eight or ten sites: Harvard, Leningrad, Berkeley, Greenwich, Cincinnati, Ann Arbor et al.

Observations were sent by specially-coded telegrams from a central bureau. Maxwell started in. But he needed a check computer, who would work twenty or thirty hours straight and not make many more mistakes - hopefully, different ones - than he himself. The forms were ready, although like today's software, "a few small changes" were required. Ignoring the child labor laws, and the fact that I had an examination in Physics 35 scheduled for the next day, he drafted me!

I still have the sheets. Faded now, and not at all elegant because I had never done anything that serious and that urgent before, they mark my initiation. I was barely seventeen. I loved the whole thing; I was doing research, just like a real astronomer or an AMAZING STORIES hero. And in the end I got an A in the physics course anyhow. I had become a computer.

Maxwell was my leader for almost six years. I took my Ph.D. from him, but much more important, learned numerical analysis and practical computing as his apprentice. Neither of us doubted, from early 1936, that I would follow the line, through Oppolzer the eclipse computer and Leuschner the asteroid computer (he had been Oppolzer's disciple in Germany) and Maxwell the comet computer, to become Grosch the (as it turned out) satellite computer.

There were obstacles, mostly financial. I was literally undernourished. My parents managed five dollars a week my freshman year, out of which I paid room rent of \$1.25 [!], surely the lowest in Ann Arbor, saved toward next semester's textbooks, and bought AMAZING and ASTOUNDING of course. A wonderful thick malted milk was ten cents in those days, and a large hamburger the same, but it was several years before I could afford breakfast. It will give some idea of my priorities to note that I always bought brand new textbooks, even when used ones were available, and that after dozens of transcontinental and intercontinental moves I still have the best of them - no longer pristine - on my office bookshelves!

The sophomore year started out only a little better; my earnings as a summer worker were minuscule. But I was quickly adopted by the observatory "family". The University of Michigan Observatory sat on a knoll across from the big teaching hospital, which was unfortunate for the observing astrophysicists because of light pollution, but good for me because it was within walking distance of the main campus and my boarding house. The director, a wonderful warm old guy named Heber Curtis, lived in an attached residence which went with the job, and used to walk through the intervening halls and library at all hours, often finding Maxwell and his prize catch computing away, independent of bad observing weather.

Maxwell used to take me out for late snacks after such sessions, and observed my scrawny state. I ate everything the all-night Greek cafe could produce, including messes I couldn't look at today after decades of gourmet [-43-] dining all over the world. He reported this to Curtis, who first produced a \$50 "assistantship" (it was too late in the budget cycle to do more), then in my third year somehow awarded me half of a graduate astronomy fellowship, and later heavily supported my applications for larger scholarships and fellowships. Also, fearing that I might collapse under the 8-by-10 beams of my construction job, Curtis gave me summer observing assistantships in 1936 and 1937, ostensibly "to show you what most astronomers do at night", but really to provide eating money. I was nurtured by Maxwell and Curtis, and intellectually by the other astronomers as well: nice, nice memories.

The office that I was to share for more than five years was at the end of the main block, and butted on to the circular wall of the main reflecting telescope. This was convenient during thunderstorms, since the dome was metal, and Maxwell, who was deathly afraid of lightning, could unobtrusively slip out of his quarters and be safe. The observatory carpenter had built a set of inexpensive shelves along another wall, and on these shelves sat sixty or so identical cardboard suitcases, the size of a large attache case. Almost everything Maxwell owned was in these cases or elsewhere in the office; he kept his meager wardrobe and linen in his nearby apartment, but his professional and private belongings were "at work".

An unwilling bachelor of 36 or so, he belonged to a faculty eating club called "The Apostles". He would rise early - when he had not been up all night computing or, on clear nights, observing - put on a clean shirt and one of his two somber suits, and go to his club for breakfast. He would then go to the office, where in my thesis years he would find me banging away after an all-night computing session, and take down Suitcase 14. Opening it at his desk, he would take out his electric razor (the first one I had ever seen; they were quite new) and a small round magnifying mirror, and shave. Putting these tools carefully away, he would next take out a large paper envelope containing one empty and six laden smaller ones, labeled for the days of the week. Slipping the noose of yesterday's necktie over his head, he would put it in the empty envelope. Taking today's equally dull necktie from its envelope, he would put it on, draw the loop tight, and be ready for the day. Except for infrequent trips to astronomical meetings, he did this every single day of the year. He was never ill.

I have mentioned that the computing forms were often replaced by improved ones. Obsolete forms were cut in half and saved, since their blank back sides made admirable scratch paper for calculations, first drafts of letters, and such. When I was made Keeper Of The Suitcases in 1937 - or to be more precise, Indexer - "we" had three suitcases of scratch paper, and the number grew to five by the time I left for the Naval Observatory. Maxwell's rather small technical library was in university-issue bookcases; his professional correspondence was in suitcases, his tiny family mail likewise; his skimpy loveletters and miniature diaries were in a locked tin box in his desk (but the spare key was in a carefully labeled envelope in Suitcase 1).

Our days revolved around two other possessions, however. When he made me a computer in late 1935, he had two Monroe calculators on trial. One was full size, and had electric shifting - you held down the plus or minus bar for the six or less revolutions of a multiplication (for seven, say, you [-44-] "shortcut" by doing one forward, shift, three backward; shortcutting saved 27 percent compared to just holding down the motor bar and gritting your teeth at the nines), then shifted with an adjacent bar. The other was, ahem, a mini, and you shifted the carriage with a knob (left hand) while you held down one motor bar or the other (right hand). It had never occurred to me until I wrote these lines that there were no left-handed desk calculators, manual or electric!

I did the check computing on the Delporte Object with the mini, and Maxwell used the bigger and faster machine. We agreed the other way around would have evened out our speeds, but he had additional chores to do while I was plugging away, such as decoding the observations coming in by wire. Oh, and teaching his classes!

Next year [1936] he tried the equivalent Friden, which shortcuts automatically when you push the multiplier digit on a separate keypad, and the top-of-the-line Marchant, which had multiplier keys up the right edge of the main keyboard, and a higher RPM. In the end he bought the mini-Monroe and the Marchant, Model ACT-10M. And the observatory had a communal Heavy Old Monroe, which sat in the conference room. It had been retrofitted with a giant external electric motor, and experiment revealed that if you pushed down all of the keys on the keyboard - that is, ten in each of the ten columns - held down the motor bar, and switched on the motor, the entire sixty-pound contraption would leap at least half an inch vertically.

It drew only a few users, and most of the staff used logarithms - the astrophysicists, Maxwell and I would say scathingly, only needed six-inch pocket sliderules.

My esteemed preceptor - and, needless to say, good friend, although I always called him "Dr. Maxwell" until I left his tender care - had three goals. He wanted to get married (I considered that a euphemism, but bluntness was not appreciated), he wanted to have a nice car, and he wanted the best calculator available. But he only earned \$3500 a year, so he settled for buying his own machines (the Marchant was over \$600, even with a professorial discount) and a drab second-hand Chevrolet, and yearning after the pretty young girls he saw going to the classes of the other Apostles. Alas, he complained, no such lovelies ever elected Astronomy 101, let alone 201!

He made no effort to steer my course selections in the following years, mostly because he approved of my choices. I took all the astronomy courses, a great deal of mathematics - not too pure - and as little other than sciences as the regulations permitted. But I was deeply interested in the outside world; as my finances improved I joined a local rental library, brooded over Mussolini and Hitler, and for broader themes managed to get a stack permit for the huge Main Library, where I read mountaineering and city planning and fine bookbinding, and Rider Haggard. The Observatory, physics and math libraries were very good, and Curtis would approve special purchases for me (and other apprentices); I still remember his permitting me to get the Oberth text on rocketry, and another serious German book by Hohmann about space travel trajectories.

Maxwell had not been infected with academic greed. Where the poor physics grad students were doing research in the name of their advisors, or [-45-] helping build the Michigan cyclotron - not only without credit but mostly even without pay - my guy was routinely making me co-author of "our" publications and even nominating me for membership in the American Astronomical Society - at twenty! Sure, he yearned for a disciple, and wanted me to stay around, but he was naturally generous - and disapproved of the way other youngsters were exploited.

What has stayed with me, and what (mostly through me) he contributed to the philosophy, the morality if you will, of modern computing, were the ideas of economy and elegance. The first lessons were

elementary - don't work to seven places if five will do, use the special qualities of the machine at your disposal, make your computing forms carefully and revise them continually. Then he showed me the ways of using higher differences in tablemaking, so as to minimize the size of complex calculations, and introduced me to the publications of one L.J. Comrie, then head of the Almanac Office at Greenwich. The economy he had had to learn because he worked alone so much; the pleasures of accuracy and neatness and elegance were natural to him.

It wasn't all sweetness and light. I got uppity, and poked fun at some of his idiosyncrasies, and he sat on me firmly. For nearly a year [1938/39] I drifted away from him toward what you might call computational astrophysics: the use of fancy applied math to explore stellar interiors, following the work of an Indian at Yerkes named Subramanyan Chandrasekhar. I got excited about mechanized computing - punched cards - after reading Comrie and Wallace Eckert, and was unhappy when Maxwell would not introduce me to the local expert in Angell Hall, who did much administrative stuff and a little statistics, and years later published one of the first books on matrix arithmetic.

What drew me back in the end, along with the old friendship and his continuing support, was another discovery. An astronomer at Mount Wilson named Seth Nicholson, who was allowed to use the 100-inch for old-fashioned direct photography, announced two new satellites of Jupiter, X and XI, and the recovery of VIII and IX, which had not been identified for several years. I was intrigued with the odd problem of preliminary satellite orbits, which didn't seem to be in the textbooks. I was about ready to start thesis research, having decided to pass up a master's degree as not useful in astronomy (holders seemed to end up as planetarium lecturers, and NASA and the missile boys were two decades ahead). How about the new Jupiter moons?

Maxwell was willing, but pointed out that the observational material was pretty skimpy for a definitive orbit, and that out at the edge of Jupiter's gravitational dominion the solar perturbations would be enormous, and therefore hard to calculate. I set to work to investigate. Much to my surprise, I found that multiple solutions were possible. On reflection, you realize that an observed direction would be the same if the satellite were "in front" or "behind" Jupiter - that is, less or more distant from the observer than its primary - and that four combinations of early and late observations were possible. Three of these fit the mid-range data only for very strange orbital parameters; the fourth was probably right, but you could only be sure after the new satellite had been observed for a near-revolution.

I had won a super fellowship for my first full graduate year, 1938-39: one [-46-] of the new Rackhams, a gigantic \$1000. I got my teeth fixed, bought a better radio and a three-speed bicycle, and still had money left over. I decided to attend an all-summer conference at Harvard Observatory, where Fred Whipple and Leland Cunningham, contenders with Maxwell and Grosch for the orbit computing championship, held forth. I gave a conference talk about the multiple solution thing, which was well received, but found out from Whipple that Paul Herget of Cincinnati had sort of staked out the two new satellites, with the concurrence of Nicholson.

I wrote Nicholson, and he replied promptly that Herget was really being a little ambitious because of observational deficiencies, that IX seemed to be lost again, but that there was a wealth of data going back thirty years for VIII. Moreover, VIII seemed to be the most highly perturbed satellite in the solar system, and had already been lost (and recovered) three times. "A really good job would not only keep that from happening again, Mr. Grosch, but one might later make a very valuable determination of the mass of Jupiter" (relative to the Sun, that is). I announced to a waiting world - about six people, including not only Maxwell and Curtis and Nicholson and Whipple and Herget but a woman in Leningrad named Boeva, who had done the best orbit so far - that I would massage VIII to a fare-thee-well.

It was probably more than I should have tackled. A reasonable thesis topic would have given me my Ph.D. in mid-1941, at 22. The usual age for the degree in those simpler times, at least for astronomers, was 27 or 28 if you worked right through (unusual even then). As it was, the huge mass of calculations took 2500 hours of all-night Marchant work - I kept meticulous logs, as Maxwell would have done - up to May 1941,

when I left Ann Arbor for the Naval Observatory job, and many hours more in Washington. Still, I got done with everything except the writing by Pearl Harbor time, and was able to take my doctorate at the 1942 Commencement.

This chapter is not really about my doctorate, but about an early and effective computer now almost forgotten. There were dozens like him, and not just in the United States. Some were innovators, like Wallace Eckert. Some were caught up in the early machine revolution, like Paul Herget. Comrie, by far the greatest of the clan, was elected to the Royal Society for his contributions, but died before the Big Boom. Maxwell, having helped me so much, dipped a toe in the waters and pulled back.

He wrote me about his discouragement with astrophysicists. Should he follow me to the Naval Observatory (I was well into IBM by then), and would his preference for and his expertise in hand computation be valuable? "Allan," I said, "what you do is basic to any kind of calculation, and vital for astronomy. But these places are going to get electronic machines. Can you still work with youngsters using them, who need to be schooled in numerical analysis, and encouraged to do better than just grind away?"

He went. The Almanac Office got an IBM 650. He returned to teaching, in Washington, and told me the last time I saw him that he had more or less retired his desk calculators, and reverted to logarithms. He found it dull to sit there and watch the machines - even the Marchant - "do all the work".

But I was delighted with him that day, and for a very intimate reason. While all this was going on, he had finally married. Mona was an Ann Arbor [-47-] town girl, proud to be the partner of such a clever and remarkable man. After all those years, he no longer needed fancy desk calculators. He had a better car. And he had found a wife.

He was the best computer I ever worked with. He died some years ago. I haven't forgotten him.

[-48-]

06 MATE IN TWO MOVES

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In Chapter 06 you will encounter

(in order of appearance):

Maxwell [05](#)

Leland Cunningham [02](#)

Fred Whipple [05](#)

Harvard College Observatory [05](#)

J VIII [02](#)

Dirk Brouwer *leading celestial mechanics researcher, from Yale*

James Baker *already a superlative optical designer*

The Ritchey-Chrétien [02](#)

Harlow Shapley *director of the Harvard Observatory*

Dowse Institute lectureship *amazingly, they paid me to talk*

Frank Edmondson *he drew the Packard but I drew a fiancée*

Kate Gordon *she let me drive!*

Dorothy [01](#)

Chinese food *Boston's Chinatown started me off, and with Mandarin*

L.J. Comrie [01](#)

The Smithsonian Astrophysical *not astrophysics, but all Whipple*

OSA [02](#)

Tom Lehrer *entertaining in a Winchester basement*

The Harvard Society of Fellows *fostered Baker's optics magnificently*
Howard Aiken [01](#)
The ASCC [01](#)
Skew rays *grim Aiken let Baker trace just one*
Rudolf Kingslake [02](#)
Perkin-Elmer [02](#)
The New York World's Fair *I took notes on Gypsy Rose Lee for Maxwell*
Parents [04](#)
The Junior Astronomer examination *Civil Service paid better than Academe*
FORTRAN [01](#)
Steam power *love letters to Pasadena behind 60-inch driving wheels*
Mount Wilson *visiting astronomers stayed in Kapteyn Cottage*
Griffith Planetarium *one lecturer was E.C. Bower*
Palomar *the dome was ready but the mirror was still at Cal Tech*
Engagement *it looked like a long wait, until the Navy came through*

[-49-] Maxwell and I more or less assumed I would follow in his academic footsteps, although certainly not at Michigan or Harvard or Berkeley or Cincinnati, where there was an ample supply of orbit computers - that is, one at each institution. We talked idly about the circumstances of Leland Cunningham, who was an assistant to Fred Whipple, Maxwell's counterpart at Harvard. We decided that, as Cunningham did not seem to be getting a doctorate and did not seem interested in marrying, he probably could stay on at Harvard indefinitely, but at bicycle rather than used-car (let alone new-car) wages. That didn't attract me.

My orbit of Jupiter VIII progressed forward from the 1938 observations through 1939, where I gleefully discovered that Nicholson's single published observation at the 100-inch was of something else, and was able to tell him where to look on his plates to find a genuine image. I was beginning to run the calculations the other way, to pick up and use the 1935 data, when the summer of 1940 rolled around.

I had gone to the conferences at Harvard the year before, at my own expense, and the 1940 version promised to be even better - a course by Dirk Brouwer, undisputed international champion of fancy celestial mechanics, and an unusual offering by a Harvard Society of Fellows chap named James Baker. The latter was giving lectures - perhaps the only ones he ever gave, since the war carried him upstairs the next year - on his unusual optical design methods. Some pages back I mentioned my attempt to design a field-flattening lens for the peculiar Naval Observatory reflector - well, this was the methodology. Baker turned out later to be the very best lens designer in the whole world, and the father of the Baker-Nunn cameras NASA used so enthusiastically in the Sixties (and of their classified variants orbiting overhead).

Trouble was, I was not as flush as I had been in 1939. I still had a good **[-50-]** fellowship, thanks to Curtis and Maxwell, but not the lavish Rackham. So I wrote Harlow Shapley, the famous head of the Harvard Observatory, and asked his help. He produced a Summer School tuition scholarship, and a public-night Dowse Institute lectureship. I talked about the satellites of the solar system, and got paid \$100 - the very first money I ever earned by my speaking talents. Ham that I already was, I loved it - both the lecturing and the pay!

When Maxwell shipped me off he counseled me to be alert for attractive women the first few days. "I have been to many such conferences, and taught summer classes, and the pretty ones get taken early", he said mournfully. There had been two or three possibilities in 1939, and I had indeed been too late to pick one off. Years of all-male graduate science classes had blunted what little negotiating skills I had had in high school, and the four dates I had managed with a lovely but wary creature from Michigan State that spring had not re-sharpened them all that much; nevertheless, I promised to do my best, and report. We had shared many a Saturday night expedition to the Detroit burlesque theaters, but it didn't seem likely I would attract anything that spectacular.

A few days later I found myself and a reasonably attractive young professor named Frank Edmondson paired off at Harvard with the two prettiest female attendees. By the luck of the draw - who was standing closest to whom - Frank went with Katherine Gordon, who later turned out to have driven up from the family apartment on Park Avenue [!] in her Packard convertible [!!]. My partner was a Dorothy Carlson, from the Mount Wilson office in Pasadena - yes, she knew Nicholson well - who had been saving for two years to see "the East", and meet some younger astronomers. She was delighted with the arrangement, since it turned out Frank was married. I was delighted because, in order to share the rumble seat [!!!] with Frank, Kate let me drive the convertible on all the double dates. *Quelle extase!*

Dorothy and I had a wonderful time together. Because it was my second year at the conference, because I had been helped very substantially by the ineffable Shapley, and because a nice young couple was easier to accommodate socially than awkward male singles, we were invited everywhere. The Shapley family had a complete set of Gilbert and Sullivan, album after album of heavy shellac 78s, and we went to their "evenings". Afterwards we would wander around the dark grounds of the observatory, and perhaps lie on the opened roof of the patrol camera building and help watch for meteors. Much handholding, much kissing, much talk of futures (my future, mostly, as I remember).

We went with the younger crowd to Boston's Chinatown. I had barely mastered middlewestern chop suey, and only with a fork. This bunch was full of experts. Dorothy was already more used to the Chinese cuisines than I, having lived in Pasadena for years and gotten her degree from Berkeley, but managed not to let me see it too often. Mandarin was considered advanced in those days; Szechuan and such had not arrived. Still, I learned a lot.

There were trips to the country, notably a lightly chaperoned one to the main observing station in a darker part of Massachusetts. And we shared many good evenings with Kate and Frank (and the Packard). I reported most of this [-51-] to Maxwell, emphasizing my charming companion's openness (and Mount Wilson connections) and not her willowy figure, which would have disappointed his stripteaser expectations.

I also reported on intellectual matters. I was able to observe Whipple and Cunningham close up, and discovered that Cunningham filled more than the assistant role; in fact, was the real force in the computing work. Neither of them had Maxwell's passion for neatness, nor his interest in the performance of desk calculators, nor in Comrie. But it was obvious even to me that Freddie was already a skilled politician, worthy of his Harvard tenure. The calculating work done during many later years at his so-called Smithsonian Astrophysical installation confirmed my 1940 assessment; it was not astrophysics, it was at Harvard rather than at the Smithsonian, it got major press attention - and it was Whipple through and through.

Baker was harder to fathom. I was enormously impressed with what he had done, none of it reported in the literature. He didn't hold back on his methods; on the other hand, he talked equations rather than practical computing - how I wished he would hand out forms, like Maxwell, or tell us how many trials he had to make to finish one of his super-Schmidts! He had a Friden in his office, but clearly did most of his work at home. Later, in the Fifties, he had a major long-throw optical testing laboratory in the huge basement of his Winchester house. (He threw a party there for Optical Society people, and hired Tom Lehrer, still a Harvard student, to entertain). He was by then the design genius behind Perkin-Elmer, and the source of the very best aerial camera lenses. He was elected president of the OSA. But somehow he never hit the publicity levels of, say, von Neumann or von Karman.

Two more stories about Baker, before I go back to the mating game. He had a curious problem at the end of the war: the Society of Fellows, of which he had been a member for the years while he developed his methods and began to demonstrate them, did not permit course credits. You were supposed to do research and think beautiful thoughts, and some day drop back into routine Academe for your degree. Jim did all this magnificent war work, and came back (after being fawned on for several years by two-star generals and company chairmen) to the realities of astronomy: no Ph.D., no instructorship.

Harvard was great; they called his secret NDRC reports and super lens designs his "thesis", and awarded him a doctorate sort of by acclamation. The astronomers, however, were unforgiving - jealous of his reputation, which was spread vigorously by the Perkin-Elmer organization to boost its already excellent market position - and relegated him to a trial untenured slot out West. "Do some real astronomy", they said, "and then we'll see". He took it for a while, and finally went back to optical design; that was better for everybody, astronomers and optickers and the whole world of technology. But it was still a sad story.

The other yarn is more technical. When Watson gave Harvard the ASCC, Baker went to see the irascible Aiken. High-aperture lens designs were known to suffer from a computing *lacuna*. Desk calculation was too slow and expensive to permit the tracing of skew rays. These were rays which did not stay in one plane - the plane of the lens cross section. They would have taken six or eight times as much work per surface as the ones usually traced; [-52-] moreover, the designers, since they never traced skew rays, had also never worked out how to use the results.

You designed the lens in two dimensions, and tested a sample on the bench (the effect of skew rays could be examined by using appropriate masks). The folklore of lens design, which was the stock in trade of Kingslake and his father-in-law, much less familiar to Baker, and hardly known to me, said that certain types of fast lenses, notably the Zeiss Sonnar family, suffered less from wandering rays than most. Some of Baker's methods bypassed this difficulty, but he wanted to explore the problem in detail.

Aiken reluctantly let him write a skew ray program for the big machine, and trace one ray. Losing patience with the whole thing - perhaps partly because the ASCC was by this time the, ahem, Navy MARK I, and Jim's wonderful designs were for the Army Air Force - he ran the protesting young man off the premises. When I reported tracing thousands of skew rays on the SSEC in 1949 (and, not accidentally, through a Sonnar type), Baker told me he liked my formulation, and had used a less satisfactory equation "on Aiken's machine", which is how I first heard the story. When I pressed him to say whether he would use the new machines that were on the drawing boards, he put on his Perkin Elmer hat. Of course he and his assistants did in the end.

Well, Baker's course and Brouwer's course, and the ones Dorothy was taking, came to their ends. I pressed her to come down to the New York World's Fair with me (absolutely no chaperones) but she had family visits to make. In the end I went alone, took notes on Gypsy Rose Lee and her competitors for Maxwell, and got back in time to take Dorothy off the train in Detroit the following week. She met my parents, who were a little reserved - they feared for that doctorate. We went out to Ann Arbor and saw Maxwell, who approved thoroughly. That evening I put her on the train to Chicago and California. We would meet at Christmas, in Pasadena, we agreed.

I ran Jupiter VIII back toward 1935 enthusiastically. But I also resumed talking to Maxwell about a job. He thought things were rather quiet in all the astronomical fields at the moment; there would be post-doctoral fellowships at a few places like Yerkes and McDonald (in very remote Texas), "but not for orbit men". I cast about. There was an announcement in SCIENCE of an examination for openings at the U.S. Naval Observatory: Junior Astronomer, \$2000 a year. Now, the starting salary in 1940 for an unmarried instructor was around \$1600 - maybe \$1800 if married, but that was not considered too sensible, at just 28 - so in spite of the high cost of living in Washington, the stipend sounded pretty attractive. And it would be my kind of astronomy, not an appendage to astrophysics.

This was a competitive written technical examination, administered at the Ann Arbor Post Office [!] by a Civil Service official. Different from 1986: instead of writing a FORTRAN program (or describing in poor English how experienced you were at writing FORTRAN programs), you sat down with curious logarithm tables furnished by the examiner and actually did sample calculations. It was easy for me; the budding astrophysicists across the nation must have sweat gallons - well, liters!

I was surprised to run second in the country, of over a hundred aspirants; I had assumed I would be an easy victor. In fact, the victor, whom I knew slightly, was named Victor, which probably accounted for his

victory. He [-53-] ultimately did not take up the post, and in the early spring [1941], after a marvelous Christmas, I got a stodgy telegram from the Secretary of the Navy - well, that's what it said - offering me the job. Needless to say, I packed up Jupiter VIII and went. What I found across the hall from my new office is described in the following chapter.

About that Christmas: Dorothy and I corresponded four or five times a week all through the fall. I would bicycle down to the Ann Arbor station on my way to an all-night session with the Marchant, and post my love letter in the slot on the side of the Chicago-bound mail car as it came through just before midnight. Behind steam, big beautiful 60-inch-driver steam - what a thrill to see your increasingly urgent literary efforts go ka-chuff, KA-CHUFF, KA-CHUFF away to California. A diesel would have seemed second rate!

We arranged I would come out to sunny Pasadena by Greyhound - three days, five busses - as soon as school shut down. That got me to Dorothy on Christmas Eve, in time for Swedish Lutheran festivities and family celebrations. I was to stay a week, meet Nicholson of course, spend one night "up on the mountain" - that is, in Kapteyn Cottage (for visiting astronomers) on Mount Wilson. We were to visit Griffith Planetarium, the Cal Tech workshop where the 200-inch mirror for Palomar was being ground, and go down to Palomar itself. John Carlson donated the family car for much of this, and Dorothy's mother Ida and brother Bob were fairly happy with me also.

Southern California was still smog-free. There were lots of orange groves. Each evening we parked up among them in Altadena, and shared a wonderful private world - after the windows steamed up, that is! We were definitely engaged. We would marry when I found a job. We would not "spoil things" by endangering my doctorate, however, so it looked like a rather long wait (I had not yet heard that the Naval Observatory job was still unfilled). The war in Europe worried both of us.

There was a small problem about ages; Dorothy was six years older than I, and nervous about my parents, and criticism. I pointed out that I was now running five years ahead of the pack in every other aspect of my life, and that she could not just, ah, rob me of my precious virginity and run off into the bushes (a very unsuccessful joke)! We agreed most people would assume I was her age - and that I would still be the youngest wolf in the pack.

Decades later I looked around and found I was the oldest wolf in a very, very much larger pack. I tried to remember the crossover but found I couldn't. The biological clock keeps not only nonlinear but discontinuous time.

[-54-]

07 COMRIE, ECKERT, AND A JACK BELZER

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In Chapter 07 you will encounter

(in order of appearance):

Maxwell [05](#)

The Delporte Object [05](#)

L.J. Comrie [01](#)

PLANETARY COORDINATES *Comrie's Cartesian view of the Solar System*

Greenwich Observatory *the fundamental meridian, and Comrie to boot*

The Apollo Group *Delporte found 214 asteroids, but 1936CA was an Apollo*

Brunsviga desk calculators *you didn't need a wall plug*

Crossfooting *how bookkeepers added horizontally (they "footed" columns)*

The IBM Bank Proof Machine *summit of non-automatic data processing*

Jacquard's loom *A but not DP, in 1801!*

Wallace Eckert [01](#)
Hollerith machines *what the British called punched card equipment*
British Tab *where Comrie rented his Hollerith machines*
E.W. Brown *master of the Moon's motion, and forerunner of Eckert and Brouwer*
PUNCHED CARD METHODS IN SCIENTIFIC COMPUTATION *my second career signpost*
The Naval Observatory [02](#)
Ben Wood *Watson Senior gave him an unusual horizontal tabulator*
Watson Senior [01](#)
Nicholas Miraculous [Nicholas Murray Butler] *president of Columbia*
The Thomas J. Watson Astronomical Computing Bureau [03](#)
The sequenced IBM 601 *you could change the plugboard without changing the plugboard*
The American Air Almanac [02](#)
The American Nautical Almanac *for "gnarled fishing boat skippers"*
The American Ephemeris *the astronomical source for the other two*
IBM [01](#)
Lillian [03](#)
Jack Belzer *"all about punched cards ... and nothing about astronomy"*
Captain Hellweg *titular head of the Naval Observatory*
John Willis [02](#)
The Millionaire calculator *a horrid step down from the Marchant*
Dorothy [01](#)
The IBM 405 tabulator *a ton of machinery in a huge black box*
Proofreading *the bane of tablemakers; Eckert rendered it obsolete*
Errors in the Air Almanac *in tens of millions of digits, not one!*
Dick Bennett *an IBM customer engineer with superhuman patience*
IBM wartime benefits *Watson Senior cared about members of the "family"*
The IBM table-printing typewriter *many number fonts, and elegant spacing*
Marriage *Dorothy came East, and we did the deed in Washington*
Our 1937 Plymouth *little had it dreamed of gas rationing*
Pearl Harbor [02](#)
The 1942 Michigan commencement *Maxwell called me "Dr. Grosch"*

[-55-] Before I get into the story of the world's first permanent rent-paying scientific punched card computing laboratory I have to loop back to my earliest days as a computer, in Ann Arbor. Maxwell had set me down in front of the Monroe and explained very briskly indeed - he was, in the inelegant phrasing of today, hot to trot - how I was to check his preliminary orbit calculations. He had taken away his samples, so I would not be tempted to duplicate his undetected mistakes, and left me to it.

Years later, when I was building up my first major staff in unexplored General Electric, I used the same tactics. I called it the swimming pool method: you took the victim over to the edge at the deep end and gave a vigorous push. If you had picked your candidate for initiation correctly, he or she learned to swim very quickly.

After you had a few swimmers, you moved on to the buddy system, which was in vogue through most of the Fifties at 701 and 1103 installations. Fewer drownings!

Maxwell and I did a series of better orbits of the Delporte Object; it had by then been assigned the temporary identification 1936 CA by the international astronomical telegraph bureau which was sending out further observations. Each of these efforts covered a longer stretch, and also utilized data from a gaggle of remote observatories like Algiers which wanted to get into the act. Things were a little calmer in Maxwell's sanctum, and I had time to wonder what was in all those suitcases!

In early 1936 "we" decided to do a definitive orbit. The little rock that was causing all the excitement had

now receded too far for even the great telescopes like the Yerkes 40-inch refractor to pick it up any more, and forthcoming observations from strange places could be added at any point in [-56-] the final cycle. The big problem was to allow for the close Earth approach, which clearly must have perturbed the original path around the Sun that we were approximating with the preliminary orbits. Maxwell said, "This will be a nice variation, since we will need to separate the influence of the Earth and the Moon - so we can't use Comrie." Who was Comrie?

"Comrie" turned out to be an oversized but thin purple volume called "Planetary Coordinates", which contained the rectangular coordinates of all the major planets for four decades, usually at 40-day intervals. It was put out by His Majesty's Nautical Almanac Office at Greenwich Observatory - where my father later told me he had installed cabinets when he was a young apprentice in 1904 England.

The author of this crucial tome was the director of the Almanac Office, Leslie John Comrie, whom I regard as one of the giants of the strange computer trade. He was a New Zealander by birth, and computer historians Down Under are now proudly excavating his record. He wasn't much of an astronomer, and Greenwich was one of the great centers of the science - historically the fount of most classical observation and calculation, proud of its association with Newton and Halley, home of the Astronomer Royal. And Comrie was not at all a whiz kid: not a Sagan, or even a Whipple. What he was, was the inheritor and last monarch of the kingdom of mathematical table making. The work of the national almanac offices - Greenwich and Washington and Paris, and the German and Russian and even Argentinian equivalents - was all calculation and table-making; the observational work was done by others. He was the top, and at the top.

Maxwell explained this over the first months of our association. Comrie was "not an orbit man," but he and his people, and to a lesser extent their American opposite numbers, furnished all sorts of tools without which orbit computing would have been almost impossible. Even today, with Crays popping up in every corner and more orbit experts in NASA (let alone DOD, and Europe and Japan, and Russia and China) than in all human history up to Sputnik, the almanac offices produce the fundamental numbers. Their calculations, which in the Thirties were accepted as the most intricate in human experience, now occupy less than the full capacity of a supermini. As Galileo said, things sure do move!

Since the purple masterpiece tabulated, not the position of the Earth, but the position of the center of gravity of the Earth-Moon combination, Maxwell had to work out new ways of using other data from the ephemerides - the annual compendia of astronomical positions which were the main output of the almanac offices - to get the positions of the Earth and Moon separately, and relate those to the figures in "Comrie." I was deeply immersed.

From our best unperturbed orbit we calculated the approximate coordinates of 1936 CA; from the newly produced coordinates of the Earth and Moon we calculated their influences on the asteroid (even though the little rock had come within a million miles or so of us, the pull of the Sun was very much greater). Allowing for these perturbing forces, we recalculated the basic constants of the asteroid orbit. The idea, of course, was to keep track of the object and pick it up several revolutions later, if it came close again. Nobody except a few weirdos who read science fiction [ahem!] were yet doing Lucifer's [-57-] Hammer; the idea was to more closely determine the scale of the solar system (now done directly using radar and laser measurements) by triangulation of close approaches.

Before I get back to Comrie and such, I have to say that we lost the little planetoid. All the efforts since 1936, when Maxwell and I put out our major publication (my first), which have featured much more elaborate perturbations and used modern computers, have failed to predict a recovery. There is now a family name, the Apollo Group, for asteroids that come as close to the Sun as the Earth does, and 1936 CA, permanently christened Adonis by the discoverer, was the attention-getting member of that family. Delporte found 213 other minor planets, but Adonis was his masterpiece.

In addition to many volumes of mathematical tables, culminating in a two-volume set of six-figure material

published proudly by Chambers, and all the astronomical and navigational tables from Greenwich, Comrie kept up a remarkable flow of methodology papers in a wide variety of British publications. As an extreme example, he even made suggestions on how to do optical ray tracing, some of which I incorporated into my own efforts during the war.

He refined the use of hand-cranked Brunsviga desk calculators, including unusual variants like a model with two setting barrels that did Ax and Bx when you cranked in x (or even, with a reverse gear, $-Bx!$). He explored the use of enormous multi-register bookkeeping machines for differencing columns of figures, or to build up and print tables from higher order differences; the ugly term was "cross-footing," which hung on in IBM manuals until the early Fifties - in fact, until IBM quit painting the old clunkers black. In all this, his concern was to use the exactly optimum devices, mathematical and mechanical, for a given task; he was undoubtedly the culmination of his race, and the best we will ever see: a very Tyrannosaurus Rex of non-automatic computing. Yes, the breed is extinct.

But the reason I think so very highly of him is not his stubborn precision, not his expertise in using old-fashioned machinery, but the exact opposite: his vision, his appreciation of novelty. You have to remember that to use a two hundred pound key-driven bookkeeping machine was innovative, in the Twenties. To find optimum devices he had to try new things, and sometimes overshoot. I suppose he encountered more resistance in his (by today's standards) narrow world than Gene Amdahl or Bob Noyce did, in the fantasy universe of microtechnology.

Those clanking monsters, and the IBM Bank Proof Machine of the same era, were the summit of non-automatic information technology - that is, of computing devices that required one human operator per machine. Automatic machinery, not necessarily electronic or even electrical, was being built by Jacquard at the beginning and by Hollerith at the end of the nineteenth century. Bookkeepers and their ilk, and later, statisticians, were exposed to its power. Comrie was the first astronomer, the first scientist in fact, to put it to work. Wallace Eckert, one of the heroes of my first chapter, who was in a dozen ways Comrie's opposite number in the U.S., acknowledges his enterprise repeatedly.

In 1928 Comrie published his experiences in using punched card ["Hollerith"] equipment for table making, and in 1930 he dug down into His [-58-] Majesty's shallow purse and rented a set of machines for the Almanac Office. His young ladies punched up the fantastically complicated double- and triple-entry tables of the motion of the Moon, due to E.W. Brown of Yale (Dirk Brouwer, who drew me to Harvard in 1940, was Brown's successor). The systems design, to use modern terminology, must have been extraordinary. But that was only the beginning; he then made up a punched card for each date for which he wanted a lunar position - every few hours for several decades - and ran the huge pack through step after step after step of intricate multivariate interpolations. There were problems with checking: the results had to be perfect, not only for the astronomers around the world who would use them for the rest of the century, but because lives depended on the navigating tables which were distilled from the Greenwich data.

After many months of the most detailed and demanding effort, the task was done - and Comrie promptly returned the machines to British Tab; he could not justify keeping them for the other work of the office. He published the story in the major British astronomy journal, to which his eminence gave him access (it was not exactly ordinary 1932 research material). It was read bemusedly by the old-timers (which I have to admit included Maxwell), enthusiastically by a young Yale graduate student named Wallace Eckert, and in 1938 by an even younger undergraduate at Michigan whose fingers were coupled to a very non-automatic Marchant!

You will meet Comrie again a little later, when the computer revolution was noticeably under way, and when he was honored in the U.S. But let me go on to another publication which enthused that Michigan student. It was a book called "Punched Card Methods in Scientific Computation," and it was announced in the American astronomical journals as I got ready for my second Harvard summer.

It has recently been reprinted by the MIT Press as the fifth of the Charles Babbage Institute series on the

history of computing. I have done a review which recalled its bright orange 1940 cover and labeled it "the second signpost I encountered on the computer road" - the road of the user (the first signpost was the 1932 Comrie article, of course). Even with a dull cover, it makes remarkable reading.

The author was Wallace Eckert, and it is now time to identify him more completely. He was the second man to strongly influence my career, although by the time I went to work for him in 1945 I had my rudder welded firmly in place. It was his book, and what I saw of his work at the Naval Observatory, that had the real effect. Those two things, and my excitement about Comrie's experiments, weaned me away from Maxwell's conservatism and steered me toward punched cards and the automation of computing processes. When the little man from the Manhattan District came for me, I was ready!

Eckert was a graduate student under Brown at Yale. As I intended under Maxwell to become an old-fashioned orbit computer, so he intended to become an old-fashioned celestial mechanics researcher. He was intimately acquainted with the lunar tables when Comrie was mechanizing them, knew the details of the work at Greenwich before final publication, and like me in Ann Arbor dreamed of mechanizing the arduous calculations of classical astronomy - but dreamed of it five or six years before I did.

[-59-] As I later went off to the Naval Observatory before finishing my doctorate, so Eckert went off early to Columbia. He got his degree somewhat before the Comrie article came out, however, and was ensconced in Academe before the Depression struck - and it was less severe in New York than in Detroit. Even so, he saw clearly that a good set of punched card equipment would be far too expensive for the Columbia astronomy department.

Across campus, in the famous but much less purist Teacher's College, Eckert observed a statistical research set-up featuring a slightly modified IBM tabulator (a ton of gears, electro-mechanical counters and circuit breakers driven by a big motor). The proud "owner" was a Ben Wood, who had benefitted from an early dose of Watsonian foresight, or charity (or both). T.J. was an extremely influential Columbia trustee, with direct lines in to the equally famous Columbia president, Nicholas Miraculous [Nicholas Murray Butler].

Eckert enlisted the support not only of his department and the eminent Nicholas but of the American Astronomical Society, and approached The Great Man - the first of many, many times he got to sit outside Mr. Watson's busy office. The result was the Thomas J. Watson Astronomical Computing Bureau I have already mentioned. The work Eckert did there, considerably more advanced than the huge job Comrie had done at Greenwich, culminated in the publication of the Orange Opus.

Where Comrie used standard British machines, and Ben Wood had only a somewhat improved giant adding-subtracting tabulator, Eckert obtained from the IBM laboratories a multiplying punch with added sequencing capabilities. He could change the plugboard without changing plugboards, so to speak. And with it, making my mouth almost literally water as I read, he was able to integrate an asteroid orbit just as I was manually integrating my Jupiter VIII orbit. The details are excruciating, and even at that Eckert left out how he had to use a clothespin on the end of a stick to extend his reach!

He probably couldn't do a time step much faster than I could on Maxwell's Marchant, and I didn't need a clothespin. If you worked out in detail, as Comrie would have done, how much it was costing (including commercial rates for the IBM machines), my stuff was probably five times cheaper. But using the machines was fun, at least for a while, and people like Comrie and Eckert and Grosch and of course McPherson - and, remarkably, Watson himself - expected newer and more powerful machines every year. A better desk calculator might reduce my cycle in Ann Arbor from twenty minutes to fifteen; better IBM equipment would reduce Eckert's cycle from ten minutes to less than a second (on the SSEC, in six or seven years), and to a few microseconds today.

About the time the Orange Opus appeared, a wider door opened for Eckert. Those ephemerides that all the national almanac offices published were what astronomers and geodetic surveyors used. But each year the astronomical product was transmuted into a navigational volume, called in Britain and the U.S.

the Nautical Almanac. The data was for fewer objects, and given less accurately, but for more closely spaced dates and times, so that it could be extracted easily by gnarled fishing boat skippers who used marine [-60-] sextants rather than meridian circles. It obviously needed to be more easily readable and useable.

The human computers and calculating machines to do this were in place. But the humans were in short supply; each year some astronomical work had to be deferred because there weren't enough people to do everything. This was partly money; the Civil Service could have scraped up more Victors and conceivably even, more Grosches, if budgets permitted - but not overnight.

For some years the military had wanted the Almanac Office at the Naval Observatory to produce a third book, an Air Almanac, for the special needs of primitive aerial navigation. Bubble sextants, hence less accuracy; cockpits instead of pilot houses, hence even simpler user facilities (today we would say "very user friendly"); only a few stars, and the brightest planets; three or four slim volumes a year, instead of an annual one.

The money had not been forthcoming. Now the war was upon them; bombers were being ferried across oceans; they anticipated long over-water or over-cloud military missions. Money was available at last, but there was no time - and no more trained people. You couldn't reassign the ephemeris personnel, or there would be no fundamental data to boil down. You needed the marine book more urgently than ever.

The senior astronomers, and most of the computing staff in the Almanac Office, knew about Comrie and Eckert and their machine successes. An approach was made. Could the young Columbia professor put aside his academic career, and his IBM-sponsored laboratory, and come down to Washington? At the same time, the Navy told IBM of its problem, and asked for a quick and sophisticated response. It came together quickly; IBM would rent the Observatory an assortment of its best machines, and make sure that exceptional customer engineer service was provided; Eckert would become the director of the Almanac Office, the equivalent of Chief Scientist today; a small cadre of operating personnel would be hired. The Air Almanac would have top priority, with other work to be transferred to the IBM machines when opportunity offered.

Eckert left the Columbia astronomical bureau in the hands of his capable assistant, Lillian Feinstein Hausman. To run the machines at the Naval Observatory - and he understood he would be far too busy to do it himself - he and Lillian looked around New York, and recruited a youngster from the cloak-and-suit arena. He knew all about punched cards, a lot about IBM, and nothing whatsoever about astronomy. His name was Jack Belzer.

The installation was under a full head of steam when I arrived, eight or ten months later. I tried to get the powers that were - not the Secretary of the Navy, for sure, but senior people at the Naval Observatory whose names I knew - to assign me to the almanac operation. I had no advance knowledge of Belzer's shop, unfortunately; the notices of Eckert's apotheosis had carefully not emphasized the novelty or given details of the appointment, although Maxwell and I had nodded sagely to each other and said "punched cards." I wrote Eckert, with whom I had had no earlier direct contact, and a Dr. H.R. Morgan, head of the fundamental meridian circle work and of the internal scientific council which advised the superintendent (a Navy captain of absolutely no distinction, named Hellweg).

[-61-] Eckert replied that there were no vacancies in the Almanac Office - true, in the sense of authorized Civil Service openings, in spite of the military urgencies building up at every scientific institution in the government. In a later chapter I will tell how the same sort of bureaucratism got in Wernher von Braun's way in 1957, when the race to orbit a satellite was heating up.

Morgan told me I would be assigned at first to the Equatorial Division, but that in view of my interest and advanced training in "theoretical" [computational] astronomy the observatory would try to move me over to Eckert's shop "in the future" - that is, when an Assistant Astronomer slot opened up. He then went on

to detail the skimpy arrangements for my actual arrival - no travel or relocation expenses in 1941!

I was to share an office in a small, rather new building with John Willis. John was an old hand in the Equatorial Division, and sort of in charge of the unpopular Ritchey-Chrétien reflector (not much of an observing program, and hence not much observing). He did little computing - just what was required to reduce the measurements he made of the strange circular photographic plates. I was therefore allowed prime custody of "our" calculator, which was by a considerable margin the funniest (in both senses of the adjective) I had ever used.

It was a Millionaire, made before the turn of the century in Germany, and examples survive today in collections and museums. It had a gear shift. You cranked a non-ergonomic handle once, while with your left hand you selected one of ten multiplier digits. Clank! Crunch! And the carriage moved to the left, ready for your next assault. But that wasn't all. I had seen such a machine already, perhaps at Harvard. This one, though, was motorized!

Some crazed mechanic, probably from the observatory instrument shop, had slung a ten-pound electric motor underneath, and provided a leather belt up to "the works." There was a neat pushbutton on the top of the crank, and the latter could still be worked by muscle power when the belt broke - which was frequently!

I couldn't believe even Captain Hellweg would want me to live with such a beast, let alone finish my thesis calculations on it. But Willis assured me he preferred it to the little Brunsvigas that others in the building used, although he mentioned wistfully that "the Almanac people" - those who didn't prefer logarithms - had Marchants and Fridens. I reported all this to Dorothy, who was suitably sympathetic, but busy arranging to come East and marry me. She wrote that she was sure she could learn to operate it for me in the long evenings when I would be writing my thesis. I obviously was acquiring a helpmeet as well as a bedmate.

My Millionaire pangs were intensified by what I found across the hall. Because of space limitations in the Main Building, and I suspect also because Eckert was wary of complaints about the noise and heat of the heavier IBM machines, Belzer and his equipment - and, aha! two handsome young ladies - had been put out of the way in my building. I had had only glimpses of the stuff before, and the pictures in Eckert's Orange Opus didn't do it justice. The machines, and especially the big 405 tabulator, were huge. They were obviously expensive (although I now found out from Jack that they were only [-62-] rented, never sold). They were noisy --even the key punch and verifier, which the more nubile of the young ladies operated.

Eckert had a 601 multiplying punch on order (without the special features of his Columbia machine), and the usual sorter, reproducer, interpreter and collator. There may well have been a gang punch attached to the 405, by which accumulated totals could be entered into blank cards. There will be more about these fascinating - to me - black boxes later. The important thing for history buffs is that this was the very first permanent IBM installation in the whole world to pay regular rent and do scientific work. Comrie's Greenwich effort had not been permanent. Eckert's shop on top of Pupin in New York had been one of Watson's many benefactions. There were places all over the world doing fancy statistical work, up to and including actuarial calculations, which were as complicated as what Belzer was doing (although not up to the Comrie and Eckert-Orange-Opus level). But this adventure was unique; I understood that clearly. And I could go across the hall several times a day and watch.

Eckert had a special challenge, and Jack a different but also very important one. Eckert's solution remains a landmark - a completely forgotten landmark. Belzer's efforts were writ on water, but amusing to recall, in a day of page description languages and desktop laser printers. Eckert's Air Almanac was even more demanding than its astronomical and marine-navigational relatives, as regards errors. An error in astronomical data would set back a research program, and waste time and money. An error in nautical data was life-threatening; the ship might be wrecked if its position turned out to be in error. But the tempo was slow, and the sea floated the customer with relative safety.

In the air, things were much tougher. A navigational error meant running out of fuel, or missing a vital landing spot. And the book would have to be used under dreadful conditions - a tiny cockpit, poor lighting, heavy turbulence. Things happened fast.

The men and women who planned the book before Eckert and Belzer arrived did their very best to make it user friendly - simple to use, and fast besides. Belzer was responsible for making it readable. Eckert was to figure out how to make every single digit correct, and he did so. Decades later the Almanac Office could say that not one error had ever been detected in any copy of the hundreds of volumes, tens of thousands of pages, tens of millions of digits, of the Air Almanac. True, cynics like me pointed out that those aviators who found errors never came back to report them! But the claim was undoubtedly valid.

There had long been a tradition of perfection in the computations. Whether done by logarithms, by desk calculators, or (later) by automatic equipment or modern computers, techniques like duplication, with great care not to replicate errors - ah there, Maxwell - and every kind of differencing and consistency checking, made the numbers unexceptionable. But to turn these values into mass printings - that was the rub. Obviously they could be set in type, and the plates made photographically from the masters would be perfect, except for deterioration which careful printers would catch. All that [-63-] had been in train for many years. But how did you make sure the masters were correct? Proofreading: dull, dull, dull - and error-prone.

The most senior and valuable men and women in the Almanac Office did it. Juniors, and clerks and such, simply could not be trusted to not overlook that one incorrect digit in a sea of figures. There were attempts to cross-check; sheets drawn from the master plates were differenced by hand, or at Greenwich on Comrie's bookkeeping monsters. And that gave Eckert his clue.

Sheets pulled from the production plates, the actual plates from which the tables would be printed, were given to Jack's keypuncher. Without having the faintest idea what the numbers meant - and that was good, not bad - she punched them onto IBM cards. When Jack had done his job (we haven't gotten to that yet) the sheets that were photographed had been made from another set of punched cards. The set that young Rubye made was compared with the older set, in a conventional IBM 513 reproducer. *Ecco!* Completely mechanized proofreading, and by inexpensive and draft-proof help!

In the early stages of the installation, that set of cards from which the plates were made was punched up from the handwritten numbers sent over from the main office. As production neared, however, much of the subtabulation of the marine and astronomical data was being done on the IBM equipment - and all of the work would be transferred when the multiplying punch was checked out and in daily use. Over many years the interface with astronomy would move upstream, so that less and less data (and more and more program material) would be key-entered.

This triumph over human proofreading drudgery and fallibility was complete when I arrived in May [1941], but Jack was in the very middle of his struggle. Eckert had charged him with producing the master sheets that were to be photographed, on the IBM tabulator. Sounds easy: wire the plugboard; feed the cards in; tear off the pages neatly. Check once in a while to make sure the type is clean. But there were a million little glitches.

He and Eckert, and the printers, had had to choose very special paper and work out the forms (very light blue ink), and then persuade some overworked Washington forms manufacturer to produce them, and with better-than-normal precision. It may well have been IBM itself, which had a card plant in the vicinity - I never knew. Then the forms had to track nicely through the 405, which was new but not perfect, The single-use ribbon, also carefully chosen, had to be monitored almost continually; a slip on the last line meant an hour's work to be done over. Experiment had already shown it was not practical to splice or patch or correct the sheets.

But there was worse, much worse. To solve major problems of formatting and presentation, and in view of

the photographic reduction that was needed to make pretty pages, a narrower type style was absolutely necessary. And even for Eckert, even for the world's first whatsit, and even for Our Brave Aviators, IBM could not rebuild the typebars and the printer unit on its 405. It would have cost the earth, and there wasn't time. What they did do was accept an order from Eckert for a special printing device to be delivered a year or two up the line - and of course Pearl Harbor intervened - and propose a crazy interim solution, which Jack was trying to make work when I arrived.

IBM put narrow-face slugs in the standard-width type bars, which went [-64-] up and down 150 times a minute for numerical output. They provided a one-of-a-kind platen adjustment which moved the platen and the paper half a typebar width laterally by manual intervention. Jack and the customer engineer and the less-nubile young lady ran the input deck of cards into the feed and printed every other column. Then they collectively held their breaths, and the customer engineer rolled the paper back [!!!] and moved the platen over. A switch changed the columns being read from the cards, the deck was run again, and the missing columns filled in. Today we would say, "You've GOT to be kidding!"

The whole unnatural process revolved around the customer engineer, who had to be ultra-precise and superhumanly patient. IBM had supplied one, as promised. He was Richard Bennett, a quiet but attractive man in his late twenties. To the chagrin of Jack's young ladies, he was married, but this did not keep the draft off his neck; after Pearl Harbor and its follow-ons, and after the arrival of Eckert's table printer, I suppose (I was off into optical adventures by then), they took him away.

IBM had a policy, mistaken in my opinion, of never requesting deferment for its customer engineers, its manufacturing people, or its engineering staff. In some cases a military agency might do so directly - I've always assumed that was what happened in my own case in 1945. More frequently the dragnet, warned of the great value of a trained maintenance man, what with the hundreds of important punched card installations everywhere in the American military environment, captured guys like Bennett as they entered the system.

IBM - or Watson himself, more likely - thought poorly of these youngsters doing the same job they had been doing in civilian life, at a fraction of the pay and without the comforts. Also, like Dick, many of them had families: in The Old Man's view, these, and the families of IBM men in combat, were valued parts of the extended IBM family. So the company, uniquely in the country I think, made substantial supplementary payments to ease the pain. And, as you will see later, it made careful provision to re-absorb the men after the war.

About that table printer: unlike much of the Belzer/Bennett effort (writ on water, I said), there are two or three articles about it in the remote and scanty literature of the time. Eckert was rightly quite proud of it, and told me years later that several copies had been made for other almanac offices and similar institutions. It was a black proportional spacing electric typewriter, which IBM had just begun to make in the Forties, in which most of the alphabetic characters had been replaced by extra numerical fonts: bold face, or small size, or small-size subscripts and superscripts; all designed to be harmonious.

Automatic spacing was crippled, and put instead under external control. This was embodied in a (black) key punch, which read the stack of data cards, rather slowly of course. On such punches there was a rack for a master card, which rode back and forth in synchronism with the detail card. IBM had modified the circuits so that the holes punched in the master card now controlled the spacing of the typewriter. Belzer's shop also supplied other material and controls on the detail (data) cards.

The results were extremely elegant, and the Air Almanacs and marine [-65-] versions printed with the device for decades were also much more readable. It was my knowledge of this antique but extremely successful accomplishment, along with a hundred adjurations from my hero Comrie, that made me such a grouch about character reading standards (MICR and OCR) in later years.

I told the stories earlier about how I left the Naval Observatory in 1942 for war work, and how Eckert was

called away in 1945 by IBM to start the Watson Lab. And I have mentioned that Maxwell served there unhappily for a year or two. The Observatory was a seedbed for computational innovation in a way that Comrie could not duplicate. This was partly due to the different kinds of war pressure; Greenwich was seriously bombed, while life went on very quietly indeed at the U.S. Naval Observatory. It was also due to the fruitful relationship between Wallace Eckert and The Great Watson.

If I may drop back into autobiography for a few lines, I can fill in about a very warm and productive marriage. Dorothy was delighted with my telegram from the Navy (even at that crucial moment, by the way, I wrote rather than telephoned - ah, 1941!). She immediately began planning to come East and join me, and we agreed to marry in Washington, and without family; both sides were very short of money, the seniors as well as the Happy Couple. There were showers and feminine festivities in Pasadena, and Dorothy also had to help her bosses find a replacement.

It was more a mark of the times than of my, um, overbearing nature that we assumed she would help me with my astronomical career rather than attempt to keep her own going. She had had one Mount Wilson publication, but she regarded herself as an assistant to the Hubbles and Humasons and Dunhams and Nicholsons, rather than as a junior aspirant. The war made a difference, of course, but the attitude remained.

My parents were a little dubious about my leaving Michigan, but in their usual supportive fashion promised me the family Plymouth - then pushing 75,000 miles but in excellent shape - as our wedding present. I resigned my last fellowship (only two months remained), shook hand with Maxwell fondly - we both knew it would never be the same again, but even the most ardent disciple has to go on the road in the end - and moved six years of belongings back to Royal Oak. Sorting furiously, I packed all the technical stuff and most of the personal - bye bye, bicycle - into the Plymouth and took off for Washington. There were no interstates or autoroutes; it was a long drive.

I found a temporary basement studio apartment near the Swiss Embassy, and on nice days could walk to the Observatory. I had been unable to have a car in Ann Arbor; I could not afford one, of course, but also university regulations prohibited - an excellent leveller, but difficult on today's overextended campuses. By the time Dorothy arrived - to stay chastely at the University Women's Club; it was a different time! - I had found a new but very small unfurnished apartment (with a suitable closet, it later turned out, for our foldboat - but no garage).

We shopped frantically for furniture, had dinner one night with our nice witnesses, and tied the knot in minimum Lutheran style. We could not afford a honeymoon. However, just as I always managed to buy new textbooks in my [-66-] darkest Ann Arbor poverty, so I managed a platinum wedding ring for Dorothy!

Things went very well indeed, although the fine frenzy and the steamed-up windows of the Altadena orange groves did not recur. Indeed, one of our more promising sexual experiments one Sunday afternoon was interrupted by the radio announcing Pearl Harbor, and Dorothy worried for several years whether a wrathful Swedish Lutheran deity had not disapproved of her waywardness!

She indeed learned to run the Millionaire, with and without motor. She was welcome at the Observatory until Pearl Harbor, after which the inimitable Hellweg made it off limits. She typed my thesis, on a rented - yes, black! - typewriter. She waved me off on my first overnight train ride, back to Ann Arbor for my orals, and insisted I have a berth to be fresh for the ordeal.

She came proudly with me to Commencement, and was the first one after Maxwell to call me "Dr. Grosch" - and kissed me besides! The war consumed us; she had only gotten time off to come with me through the intervention of her new boss Dr. Meggers. The uranium was throbbing in the spectrograph, so to speak. But with all the troubles of the time, we were beginning a good marriage.

[-67-] [-68-]

08 IN 1945 IBM HAD AN ART COLLECTION

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Harold Urey *already a Nobel prizewinner in chemistry*

Maurice Ewing *an oceanographer with terrific disciples*

Albert Einstein *only once, across the dining room*

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The IBM scientist portraits *Eckert liked Gibbs and I accepted Franklin*

The IBM ceramics collection *a Syracuse prizewinner from each state*

The Newton portrait *Mary Noble saw my bid and raised me*

THINK signs *everybody got one, and often an Imperial Portrait as well*

Frank Hamilton [01](#)

Watson Lab adding machines and calculators *"Buy an Underwood!" T.J. said*

IBM Christmas parties *the childless were relegated to the balconies*

The Hall of Stuffed Birds *a great place to announce an Arabic typewriter*

General Groves *for his luncheon, even IBM had to serve drinks*

Garland Briggs *he tried to warn me gently about the "No Booze" rule*

The Visit *Watson Senior toured a new province of his empire*

The automatic measuring engine *convinced T.J. about Eckert's priorities*

Oil paintings vs. science photos *I contradicted him and got away with it*

Later Watson Labs *the larger one on 115th had photographs in the lobby*

[-69-] The looping around is now almost done. To draw you in to an exciting time, and to introduce you to some rather spectacular actors "early on", as the Brits say, the narrative was decidedly non-linear. To disentangle it, re-order the chapters: 04, "Three Years Ahead Of Myself", was boyhood. Then came

college, and Maxwell made a computer of me in 05, "2500 Hours On A Marchant." I spent a Harvard summer and a Pasadena Christmas, and got a wife and a job, in 06, "Mate In Two Moves." The war and the doctorate arrived in 07, "Comrie, Eckert, And A Jack Belzer." Dorothy and I did war work in 02, "In A Glass Darkly," and I was drafted to work at IBM in 03, "A Little Man From The Manhattan District."

Then there was a gap; things that happened a year or two later are described in the first chapter, "Watson In All His Glory," but the transition from von Neumann, and Los Alamos and The Bomb, to relatively peaceful late-Forties IBM, is missing. I'll tell that story now, and when this chapter is done we will jointly be on a non-tangled course - from the Watson Lab days well after the unveiling of IBM's first electronic giant, the SSEC, to the day sixty years later when I finish this book.

The crates of equipment, and that big safe, and the first Giant Brains Of Los Alamos, all came to the tenth floor of the Pupin physics building at the north end of the Columbia campus. In the whirl of getting going, I hardly noticed the relationship to the parent IBM - "590", as I soon learned to call it. Eckert was luxuriating in the familiar and welcoming embrace of his old university and department and friends, which he had missed greatly at the Naval Observatory, and he drew me in to the circle from the beginning. It wasn't necessary; he could have left me outside the door. But I was a fellow astronomer, and had all the other academic credentials, and he wanted me to help him do more at Columbia than what he had time for personally - cooperate in teaching and research, and in nurturing bright youngsters.

He wanted to spread the gospel of mechanized computation, not to make money for IBM, or even to thank The Old Man for his long and substantial support, but because he believed in it and wanted to help others to see the light. He saw me as a fellow preacher. Little did he dream that the little sect he and I were helping found would throw off a torrent of machines and languages, a worldwide glossolalia with Fifth Generation Japanese and born-again spreadsheeters rolling in the aisles and masticating the carpets!

He put me up for the Men's Faculty Club - yes, there was a Women's next [-70-] door, not nearly so well equipped. I began eating lunch nearly every day at the informally arranged round tables. There were famous scientists everywhere, and humanists as well. There were men interested in both sides like Selig Hecht, whose work in the mechanism of color vision I knew from optical references, and Harold Urey the Nobel chemist, who shared a bloody field with me at Cal Tech fourteen years later, and Maurice Ewing the oceanographer. And across the room, once, Einstein.

We astronomers ate part of the time with the physicists, and part with the mathematicians. The latter were pretty pure, and getting purer as the war wound down; Eckert and I were both more comfortable with the former, and I noticed that Jan Schilt, who had succeeded Eckert some years back as head of the astronomy department, was also more at ease with the physicists. Jan was in some ethereal sense also my boss, since I had without even asking been made an associate of his department (Eckert was reassimilated as a professor, although like me without salary).

As I have said, Wallace quickly cast out a net for Rex Seeber, and rescued him from Howard Aiken and the horrors of umpteen-decimal-place Bessel functions, which the Navy was calculating with the help - I have always assumed, the reluctant help - of Grace Hopper. My opinion of the Harvard computations was shared by Comrie, I found out rather quickly; Eckert also thought them a waste but didn't worry much about it. Rex was more at ease with the IBMers downtown and was soon swept away by Hamilton's SSEC project, so we didn't see much of him at the Faculty Club.

Before the Watson Lab left Pupin for its mid-life home on 116th Street, Eckert came to me about another prospect. He had had his name from Higher Authority - I assumed IBM, which was silly of me; I realized years later it must have been von Neumann, who had a finger in nearly every erudite pot in the war effort. This was Hilleth Thomas, a world-famous but exceedingly unworldly theoretical physicist who had been doing interior ballistics - that is, explosions and such, as distinguished from exterior, which was trajectories, and which astronomers and ENIACs worked on. He had been a user of the Aberdeen punched card computing shop, which is why I thought "IBM", but it turned out Great Johnnie had scrimmaged on

that playing field also, and at Aberdeen.

Thomas, who had a doctorate from Trinity, Cambridge - the best of all the great prewar scientific colleges in England - had been teaching in the late Thirties at Ohio State. *Mirabile dictu!* a Welsh fish in midwestern shallows. As a member of the regional astronomy Neighbors' Club, which he often attended, I had met him in Columbus and recognized his great applied mathematical skills. I told Wallace he would be a real catch, and after checking around with our luncheon companions Eckert made him a bewildered IBMer - the company's third scientist. He fit as perfectly into the Columbia ambiance as Wallace, and was a valued member of the physics table from his first luncheon. Sartorially he fitted as poorly at 590 as I, but at least he had no hair on his face!

Eckert had a good relationship with I.I. Rabi, who was still senior man in the Columbia Physics Department, although seconded to the MIT radar laboratory as Number Two to the director, Lee DuBridge. When Rabi returned [-71-] in late 1945, he saw that Thomas was given professorial status. I believe Hilleth had had tenure at Ohio State, but since access to normal academic advancement on Morningside Heights was not a problem for those of us drawing IBM salaries, it didn't really matter. He was the first of the Watson Lab staff to acquire a doctoral candidate: Robert Jastrow, now a major warrior on the space publicity and government grant battlefields, but then only an overbearing graduate student, contemptuous of us plugboard wirers. He came too late to meet Feynman!

Wheels ground swiftly, down at 590. Watson wanted a handsome presence at Columbia for his new Pure Science Department and its Watson Scientific Computing Laboratory. While I was leaping around like a trout on a hook in Pupin, Eckert was drawn in to real estate negotiations downtown. T.J. had found out that a small fraternity had owned an interesting building adjacent to the main Columbia campus: 612 West 116th Street. The building was vacant; the young men were serving elsewhere - many of them in the Pacific. Orders came down to buy it, refurbish it for IBM occupancy, and then transfer it to Columbia ownership. I'm sure those subterranean beancounters at World Headquarters made sure proper tax advantage was taken, but I knew nothing about such matters, nor I suspect did Wallace.

I was swiftly drawn into the planning, which was complicated. The building was only twenty-five feet wide, wedged in between two large apartment buildings. Aside from one very small light well, the only windows were at the front (north) and the back. There was a small rear yard which was never used, but which guaranteed a little breeze; there was of course no air conditioning.

There were five above-grade stories, and two basements. One of these, as was common in such structures, was only slightly down from the street and had a separate direct entrance under the formal front steps, and a rather large front light well. The most serious problem for a computing shop was access; there was no elevator, nor any sensible way of installing one. In the event, heavy equipment had to be brought in through the front lobby for the first floor, over iron railings and through large French doors into the library for the second floor, and down through that awkward light well for the upper basement - or, theoretically, through alleys and the back yard, but we never had to do that while I was in charge.

The stairwell was rebuilt to fire-resistant commercial standards; there was no other vertical trafficway - no back stairs. The kitchen and dining facilities were torn out, and in the process steel I-beams were put in to support my heavy equipment (false floors, which T.J. insisted on at the SSEC, were never even considered). Heavy wiring, entirely different from what the fraternity boys had needed, was installed.

There was an amusing problem with the toilets. First the architect tried to put two toilets on each major floor, on the side lightwell: much too wasteful of space. The unisex arrangements of Europe and of small retail establishments were out of the question for staid IBM. I said, "Male in the first basement, female on One for visitors and a receptionist; male again on Two, female on Three, male on Four. There are gonna be guys on Five and in the sub-basement, but they can hoof it."

Alas for rationality, after the building was done, and as we were moving [-72-] in [1946], an alarmed minor

IBM vice president noted that Dr. Eckert (on Three) would be *hors concours*. Additions were made: urinals and sanitary napkin dispensers, as required. All the labels were switched. But the urinals were not taken out of the new Ladies, prompting one of my more outspoken gals to say that she really appreciated the chance to examine one closely for the first time!

The vice president concerned ended up at Diebold (Safe and Lock; He-Didn't-Invent-The-Word John Diebold was still at Harvard). Indignant surviving IBM vice presidents have heard me tell this story and have denied the culprit was, ah, eliminated because he juggled the Johns, but my view is that if that wasn't why they shipped him out, it ought to have been.

The living room of the fraternity house was converted into a lovely reception room, featuring a lovely receptionist who wore lovely tight skirts, lovely high heels, and ran a large and very unlovely switchboard - the kind with lots of cords. More about this room later; it was the scene of one of my greatest triumphs.

In the waist of the building was a space for "special" machines. Pete Luhn's babies lived there first, and later a modified pencil-mark-reading IBM test scoring machine. Still later [1949] I put the prototype 604 there, and it was still working away fourteen hours a day when I left. Then came a Men's (formerly Ladies), and the main machine room: full width, and about fifty feet long.

On the floor below - we usually said "basement" - there was a spare room in front, in which Richard Bennett (yes, the same wonderful customer engineer who had made the Air Almanac printable in 1941 at the Naval Observatory; we will celebrate his Watson Lab advent a little later) was to build an automatic astronomical measuring engine for Eckert. Then came a space for many, many punched card file cabinets, and a restricted number of boxes of blank cards (the main stock was in the sub-basement, along with my foldboat).

In back was the second machine room, also fifty feet long. This was the facility more frequented by our evening-working students and visitors, and the WC immediately became genuinely unisex, even before the offending VP had ceased to encumber us.

In the front of the sub-basement, which had a horrid access chute originally intended to bring in coal, we planned a small machine shop. This sounded wonderful to me, although it was not for my outfit; I had had the run of an experimental machine shop at Sperry, and enjoyed making little gadgets (remember that foldboat in the storage area). In the middle was a brand new oil burner, procured with enormous 1946 difficulty by IBM to replace the coal furnace. And, miraculously, a walk-in vault for the fraternity silver or whatever, whose door I promptly had renovated by a fancy locksmith so I could store our Los Alamos material there. When we moved in, I sent the giant Pupin safe back to the Manhattan District.

Behind all this was a general storeroom. There was no toilet, and the machinist would theoretically have to climb to the main floor. There was a sink in the oil burner room, however. I had had it installed for the janitor, or so I said.

[-73-] There had been two sets of fireplaces, which the architect reluctantly plugged. The rear one left lovely mantelpieces in the two machine rooms (east wall) and went on up to the fourth floor. By no coincidence at all there was a fireplace in my third floor office. The more elaborate set began in the measuring-engine room, flowered in the reception room and the beautiful library on the second floor, became more conservative in Wallace's office on Three, and terminated on Four.

The library was as large as the reception room below, which meant twenty-five by fifty feet. I had it done with walnut shelving all around, to the height of the mantelpiece. To put at the front, where the French doors needed to be kept free for equipment to be rigged in, I had Mary Noble find me a matched pair of globes, terrestrial and celestial; big, expensive, handsome. On top of the shelf cabinetry were items from the IBM American Ceramics collection.

"Mary Noble" was Mary Noble Smith, in charge of the IBM art collections. Her successor in the Fifties,

when T.J. put more emphasis on having museums inside his empire, was called a curator, but Mary Noble had not attained that title. For one thing, she did curtains and drapes as well, and furniture, at least for 590 and places like the Endicott Homestead. She appeared even before the alterations on 116th Street were finished, and Wallace shot her over to me with a sigh of relief; I was deeply interested, and he didn't care an iota. He was concerned about books for the library, however, and first got The Old Man's permission to buy some, and then solicited lists from his buddies in the math and physics and statistics departments, which I gladly incorporated into my own.

Mary Noble was in her late fifties, walked rather slowly with a cane, was distressingly barrel-shaped. But she had the proper connections all over New York City to do her multi-faceted job, whether it was to find a huge, gorgeous Oriental for the reception area or merely an ornate gold frame for the big photograph of T.J. which naturally had to go over its fireplace. And, although perpetually harried, she was a nice person, and an eye-opener about The Old Man and the inner reaches of IBM. Mind you, IBM was only a \$140 million a year company in 1945 - but it already had lots of inner reaches!

She came to me just after the move, and before there were books in the library. "Dr. Grosch," she said, "perhaps you can intercede with Dr. Eckert. Mr. Watson (she seldom said 'IBM', and never 'T.J.') has a wonderful collection of portraits of American scientists, and I have asked Dr. Eckert to select some for the library, and his office. There are twenty-five...". "Good grief, Mary Noble," I broke in, "how did T.J. get so many? They aren't all by the same painter, I hope?"

"Mr. Watson sponsored a competition for young portrait artists across the country," she said, "and the judges picked these as the best. Mr. Watson bought the whole collection. Remind me to tell you about our lovely ceramics pieces; he did the same thing recently at Syracuse University, and I have the forty-eight state prizewinners in our warehouse."

"Didn't Eckert like the paintings?" "He didn't want to see them. He just looked at the list and said 'We'll take him', and that was that." "Who'd he choose, Mary Noble?"

"It was a Willard Gibbs. Do you know him?" "Yep; the greatest American [-74-] name in thermodynamics - and from Yale besides." She didn't know about Wallace's connections.

"Let me see your list." Short pause. "OK, we'll take Benjamin Franklin; he was quite a natural philosopher even if not a full-time research man." "But Dr. Grosch," she wailed, "how about all the others?" "They're not scientists, dear lady, and the boss obviously won't give 'em house room."

She had Edison, and the Wright Brothers, and lots of other inventors. I told her to hang them on the walls of the Endicott engineering lab or in the Education Building next door to it. Mary Noble bristled a little - a very little. "Whom do you call a scientist, Doctor?" "Oh, Isaac Newton, say."

Three weeks later the art van drove up and delivered a big oil painting of the great Sir Isaac. I had them hang it over the mantelpiece in the library, the place of honor. "Mary Noble, the Newton is just great. I hung it over the fireplace. Where did you find it?"

"I had it painted for you," she said placidly. As I said, lots of inner reaches!

One of the curious customs in the IBM Empire in 1946, and for many years thereafter - it probably survives in mutated form even today - was the Portrait Kit. Not to be confused with my Newton or Wallace's Gibbs, it was a package of standard framed photographs of IBM executives which appeared mysteriously whenever a new office opened, and even when someone was promoted into physical surroundings where a current or appropriate-level package had not landed. Everybody got the standard Watson portrait, and a THINK sign; the size and framing of The Old Man's picture of course varied with your importance, or the importance of the new office. Then in proportion, there were portraits of other officers, and big shots in your own line.

Thus Hamilton had not only a large Watson Senior, an early Watson Junior, and several other Olympians, but famous engineers Bryce and Lake and - very naughty of him - a matching but non-standard one of Hollerith. Eckert had a very large Watson Senior over his mantelpiece, and a pile of THINK signs to give to visitors, but hung the Other Faces out in the hallway. The big Watson in the reception area was carefully matted and elaborately framed by Mary Noble, but nevertheless was the standard pose. Some mysterious cubbyhole at 590 dispatched these kits all over the world (the French got RÉFLÉCHISSEZ, with the proper acute accents; the Germans, DENKE).

Over my fireplace I had a handsome French post-Impressionist scene, offered by Mary Noble from her Homestead stock - that is, out of the general IBM art collection, from which paintings and sculptures and such were rotated through the various IBM country clubs and guest houses. I had elegant built-in bookshelves (Thomas had such a mass of books the architect gave up, and let him put in ceiling-high office shelving). And we all had good W.& J. Sloane furniture, but only Eckert had a rug.

Oh, by careful scheming I had a Marchant - yes, the familiar Model ACT-10M - on my side table, and made very good use of it. The two machine rooms had Fridens. Wallace didn't need a calculator, and Hilleth used a slide rule or looked sort of cross-eyed while, like von Neumann and Feynman, he did sums in his head!

I've said that T.J. decided everything. After we had been in business on 116th Street for a while, I asked the boss - I called him "Dr. E." - if I might buy a printing calculator; that is, a fancier adding machine that would do simple multiplications rather clumsily, but print on a tape. In today's world of TI and HP and Casio hand-helds you get that and a great deal more for under fifty bucks; what I wanted was a Remington Rand machine that weighed twenty pounds and cost four hundred 1947 dollars. Eckert by this time was alert to IBM customs and prejudices; he added my request to his list of things to ask Mr. [-75-] Watson. The next time he got to sit outside the throneroom, and get inside - the latter did not by any means always follow the former - he said that someone at his place wanted to buy a RemRand adding machine. The Old Man looked at him sternly and said, "Buy an Underwood!" Next item?

Usually I saw T.J. at a distance, or through the eyes of others. There were ceremonial handshakes, and receiving lines, and he would be paternal at the IBM Children's Christmas party (where Santa Claus brought Mrs. Watson the big present, and the childless were relegated to the Waldorf balcony). I remember a spectacular dinner in the Hall of Stuffed Birds at the Museum of Natural History - he was probably a director of that museum too - when he announced an Arabic typewriter, and Dorothy got the giggles at the incongruities.

After The Bomb was dropped he wanted to celebrate the IBM contribution, and incidentally to re-emphasize the recent creation of the Watson Lab. He gave a magnificent luncheon at the Waldorf, with General Groves (unfortunately) as guest of honor, and with a curious mixture of science types and military men and his personal friends. No Oppenheimer. Eckert had seen that invitations went to von Neumann and the others at Los Alamos, but only a few came - I seem to remember Bethe.

Eckert was at the head table, and I was also introduced. But what I remember is pure IBM - and because of the man involved, nice IBM. For such a gathering, with all that brass, even Watson had to have liquor. The Waldorf, for one of its most valued customers, dug `way down, and produced the best Scotch and bourbon and such - this in the depths of rationing, and when gin was made in Puerto Rico. I was much impressed; it was my very first IBM function, and I already looked forward to many more.

As I stood in the lively crowd, with a double manhattan and a handful of luscious canapes (and not wearing a sport jacket, you may be sure), an older man in IBM costume - very dark blue suit, white shirt, striped tie, conservative black wingtips - came over and introduced himself as a Garland Briggs "from 590." "I envy you people from the Watson Laboratory," he said. Those of us at World Headquarters don't feel free to have a drink at lunch. "Must be tough," I said sympathetically, setting my empty glass on a tray and reaching for another big manhattan.

Actually I was safe. No one from 590 would dream that the bearded character in the gray suit worked for IBM. Briggs, who had a degree in astronomy [!], knew Eckert and was interested in me, and in what we had been doing for the Bomb Boys. He was trying very unobtrusively to warn me of the No Booze rule, and I realized only a few weeks later that I had been, in a very unusual way, warmly treated.

Briggs had migrated to the headmastership of a fancy boy's school, and tripped over the Depression. A friend had slid him into the financial structure [-76-] at IBM in the late Thirties, and by 1945 he was something like Assistant Treasurer.

Eckert told me his story. A few weeks after he came to 590, and long before he had recovered financially, his son came down with polio. No sparrows were permitted to fall anywhere near IBM without The Old Man hearing. He ordered that "the young man" be given the best medical care, at IBM expense, and as I said earlier, turned to his next imperial task. Briggs would have died for him.

Later in the year of the SSEC dedication [1948], the Watson secretariat at 590 found time for The Great Man to make his first visit to the Watson Lab. Eckert was informed well in advance, and sat down with me to decide what to show him. Lacking an elevator, it had to be the three "main" floors, or less. We decided on the first floor machine room, because of the unusual Aberdeen machines which he had not seen in their latest form, and one or both of Pete Luhn's specials (this was the occasion on which T.J. "ordered" Pete to separate the calculating equipment and the work station).

Wallace wanted to show him the measuring engine Dick Bennett was laboring over. I thought it ill-advised to be too astronomical, but Dr. E. was the boss. And instead of his ascending painfully to Eckert's eyrie, we decided to set him down in the beautiful library for the hardware presentation, and then trot him back to the electronics lab, which you haven't heard about yet. Then back to the waiting limousines and 590.

Mary Noble and her advance men descended on us like furies. Windows had to be washed, slip covers and curtains sent out for dry cleaning. Strange actors from 590 invaded our stage and irritated the junior staff and the Columbia janitors (I was absolutely agog; they could have rolled me up and sent me to the cleaners too, and I would not have protested). Amazingly, a flower fund was installed at the nearest good florist, and the receptionist (who had lovely hay fever as well as lovely everything else) was dragooned into stopping for masses of fresh flowers every day or two. As Mary Noble well knew, Watson might suddenly decide to go to Washington, or Timbuctoo, or even Endicott. The Visit, as we had begun to capitalize it, was iffy.

On D Day, we received minute-by-minute reports. I honestly think little people were stationed in phone booths along Broadway (Manhattan phone booths still worked in those days) to report on the cavalcade. Remember, there were no car telephones or CBs. Yet the switchboard would report, "They're at Columbus Circle." "They're at 79th." "They're at 108th." And the entourage swept in, only a little behind schedule (the secretariat had probably squeezed in the Chilean ambassador at the last moment).

Everything went well. We gathered for farewells in the reception area. Mr. Watson looked around the room, which was panelled in cream and touched off by half a dozen small oil paintings of Paris scenes I had chosen from Mary Noble's best. He looked approvingly at his portrait over the fireplace. He nodded his head. "Everything is quite nice," he said, and the heads of the company all nodded blissfully. "There is just one thing, though." The heads of the 590 people all began to shake doubtfully, and the 116th Streeters began to shake all over.

"These paintings," he said, waving his imperial arm around the room (he [-77-] was a big man). "There should be photographs of galaxies, and atoms, and scientific things. This is a laboratory, after all." Mary Noble turned white.

"Mr. Watson," I said, "our visitors see that sort of thing all the time. What really impresses them is that IBM, a world leader in technology, has collected these beautiful paintings - is a patron of the arts as well as

of science." Dead silence. This miserable, bearded nonentity has contradicted Mr. Watson!!

He looked hard at me for a moment. As Pete Luhn said about his own case, if I ever tripped up in the future, The Old Man would remember my intransigence and my beard. He asked a vice president about the limousines; the whole entourage of seniors and sycophants swept out; peace descended like a blessing from on high.

The very next day Mary Noble appeared. "Doctor, about those galaxies and things...". "Forget it, Mary Noble," I said. "Those paintings stay right where they are." "But Dr. Grosch - he specifically said...". "Let's call him up and check. My recollection is that he agreed with me." "Oh God, no!"

When I left for Washington more than two years later the big room still looked lovely. Watson never visited again. But when the laboratory people outgrew the little 116th Street building and everybody moved into much larger quarters nearby, the pictures in the new lobby were not from the art collection, but "galaxies, and atoms, and scientific things." Eckert remembered!

And Mary Noble turned off the flower fund on her way back to 590.

[-78-]

09 PUNCHED CARD DAYS

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The SSEC [01](#)

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General Electric *turbine people put the first paying problem on the SSEC*

Hans Kraft *he struggled for a knowledge of steam flows*

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ACS [American Chemical Society] *enthusiasts became clients of Pete Luhn*

ASIS [American Society for Information Science] *later Pete was president*

Automatic abstracting *Pete practiced on paper tapes from TIME*

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Thomas J. Watson Astronomical Computing Bureau [03](#)

The IBM 601 *threw its answers petulantly on the floor after midnight*

The IBM 602 *not withdrawn, you understand, but upgraded!*

The IBM 602A *at least it used the same new plugwires and cute skipbar*

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A private 601 operating manual *you plugged some switches both on and off*

Edward Teller *The Scientist We Love To Hate set Hankam a task*

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Martin Schwarzschild *Columbia astrophysicist strong on stellar interiors*

[-79-] Life on 116th Street was not all panelled reception areas and the IBM ceramics collection. The Watson Lab was a nexus of attention for men and women all over the world who had dreamed for years, or had now begun to dream, about doing big technical calculations.

They read about the ASCC - the Harvard Machine, everybody called it, since Aiken's militaristic "Mark I" didn't sound right, postwar. But like a khaki-suited dog in the manger, and acting as if he had one of his migraines even when he didn't, Howard drove the supplicants from the temple. In the days before ENIAC and the SSEC came on stream, he controlled the best-publicized fraction of the world's computer resources. And he was wasting it on a ridiculous project to calculate Bessel functions.

In fact, even Bessel function enthusiasts were upset. Dorothy and I had a famous applied mathematician as house guest - J.C.P. Miller, who was helping Comrie establish the first for-pay scientific computing bureau, in London. He spent much of his leisure time plowing through every page of my 1942-47 collection of ASTOUNDING, from which he had been cut off in wartime England, and what little time was left in "collecting" New York's bridges. Well, Miller, who like Maxwell had spent untold hours bent over a hot desk calculator, grumbled first about unnecessary accuracy and then, reluctantly, admitted that "the new machines" would calculate such things as they went along, so that great tables were obsolete.

So it was no use petitioning at Harvard. A few super-priority jobs got taken on - Los Alamos stuff - via high Navy channels, but in general, no. The announcement of ENIAC raised fewer hopes, because the monster was to be shipped off to Aberdeen Proving Ground as soon as it could stand the journey, and the backlog of Army calculations waiting for it there was known to be enormous. And not nearly as silly as Aiken's Bessel functions; at least the Army **[-80-]** planned to kill some people outright with their computations, and not just bore them to death!

The SSEC was different. Watson had dedicated it to science - or to Science, to be precise - and there were ways to get access. You could be in the Pure Science Department; Eckert did his Moon calculations, and I did a beautiful optical job. You could be an astronomer, which meant you knew Eckert, and about the older Columbia bureau. You could appeal to the remains of wartime patriotism (and of priorities, which never did die off completely), often through John McPherson. You could come in via Columbia connections. You could be a specially-favored IBM customer, like General Electric.

Eckert and I, with help from Hilleth Thomas and the physics table at the Faculty Club, performed a calculational triage. Some applications went downtown, for Rex Seeber and his crew to fit in on the overloaded SSEC. Some ended up in my machine rooms on 116th Street, either queued up for my youngsters to run - that is, to analyze and wire plugboards and push the cards - or struggled over by the sponsors themselves, when they could get machine time (usually in the evening). And a lot were put in a

quiet place to die.

One major job done on the SSEC was a simulation of nuclear fission for David Hill of Los Alamos. He used an analogy based on a drop of liquid, and the resulting equations were unclassified - in fact, his results were published. Wouldn't happen today, but we were at peace in the late Forties.

Another was an unsuccessful attempt to calculate steam flow through the blades and buckets of a giant power turbine, using fancy applied math from an academic consultant and the lovely money of the General Electric Large Steam Turbine Department. That was the first job the SSEC undertook for pay. It introduced me to a pupil of the great Theodor von Karman, an aerodynamics expert from Schenectady named Hans Kraft who became a valued friend. His calculations did not converge satisfactorily, but he did not blame the SSEC - only his consultant and himself. Would that the tens of thousands of customers of such activities who were to follow him had been so civilized!

At Columbia I serviced George Kimball, a chemistry professor who wanted to use computing instead of test tubes. He introduced me to the American Chemical Society committee on punched cards, I introduced the committee to the strange relay machines and European ingenuity of Pete Luhn, and Pete ended up many years later president of ASIS, the American Society for Information Science. ASIS is sort of the computers-for-library-science outfit, and strong on information retrieval.

Because I would almost certainly forget to mention it later on, I'll say here that Pete was also the father of automatic abstracting and indexing, common currency today on PCs and word processors. He had the idea of counting word occurrences in text - he used paper tapes from TIME - discarding a standard list of linking words (and, the, to) and no-content words (I, ouch, today), and ranking the rest by frequency. He assigned weights, went back and counted the sum of the weights of the words in sentences, ranked the sentences, picked out a few of the weightiest, printed them out in their original order and with the garbage words put back in - presto: an abstract. Not bad for a German relay circuit designer, over thirty years ago!

[-81-] Kimball also sent me over some X-ray diffraction experts, who needed a lot of low-precision sums of products. For half a century they had been using Beevers-Lipson strips, sort of cardboard slide rules. Punched card machinery looked good to them. I helped a formidable woman do hemoglobin on our 405, and hoped the Watson Lab was helping medical research too.

Another Columbia figure was Maurice Ewing, an oceanographer who had done important war research on propagation of sound between the thermal layers of the ocean. He mostly sent over graduate students, one of whom, Frank Press, was much later the president of the National Academy of Sciences. Another became a major figure in radio astronomy, which had not yet begun to surge in 1949. And I remember several attractive women.

Early on, before the SSEC was commissioned, I undertook my last serious astronomical project. There had been a famous facility in Germany, the Astronomisches Rechen-Institut, which calculated (by hand, and with enormous diligence) the annual appearances of the 1500 or so named asteroids. Most of them didn't excite anybody very much - my Adonis was an exception, and there were other unusual ones, and the larger objects of course - but you had to eliminate them when you were finding new ones. The task kept a dozen subprofessionals busy around the year; the annual appearance of KLEINE PLANETEN memorialized their efforts.

Well, their institute was rubble in 1946, and the people scattered or dead - and no money to pay them with if they reappeared. The KP was published two years in advance, so 1945 and 1946 had come out before the crunch. There were plans to do the 1948 in Leningrad (the Iron Curtain had not yet descended, and we had occasional Russian visitors at the Watson Lab). The question was, how to produce the 1947 volume, in just a few months. It was an ideal task for Comrie/Eckert punched card techniques; I said we'd try.

We made it with a few weeks to spare. I did the planning, and printed up the final results on hectograph masters (shades of Allan Maxwell's computing forms!). Had to put in some decimal points, and degree symbols and such, by hand; Eckert and I had talked about using the gorgeous table printing typewriter at the Naval Observatory, and sighed over how handsome the result would have been; alas, there wasn't time.

The calculations would have taken many weeks on the regular machines, but we had just received our two Aberdeen machines - correct IBM nomenclature: Pluggable Sequence Relay Calculators. And equally important, I was in process of absorbing the remains of the Thomas J. Watson Astronomical Computing Bureau. And while the machines were pretty standard, I was delighted to find Lillian Hausman in the first crate!

She not only was a superb operator - after all, she was the senior full-time scientific punched card expert in the whole world - but she knew a lot of astronomy. In fact, she probably could have done my part of the job too. Anyhow, she wired the horrific Aberdeen boards, helped run the big decks at what seemed like miraculous speed (6,000 multi-operation cards an hour, or say 0.000005 megaflops).

Another nice benefit was that Lillian was so eager to learn the very difficult new machine, and my supervisor Marjorie Severy was so genuinely admiring of her skills, and we were all so crazy busy with the asteroids, and [-82-] the Columbia night workers, and helping train the youngsters like John Backus and Ted Codd for their coming SSEC duties, that there were no jealousies and no frictions, and we all ended up on the same side. Everybody laughed their heads off at my adventures with Mary Noble and the art collections, and that helped a lot. It was a good, good time.

About equipment: after merging in the better machines from the Pupin attic (I kept the old 285 horizontal tabulator as long as Marjorie had room for it, out of sheer wonder at its clumsiness), we had two machine rooms with sorters and reproducers and collators, an interpreter, a gang punch, and several key punches. The most expensive machine (renting for over \$1000 a month with all the bells and whistles I could hang on it) was the huge 405 tabulator, with 80 characters of alphanumeric storage, eating and disgorging 150 80-character cards a minute, printing 80 characters wide a line at a time (the type bars were too long to do this at full speed, but other models could print numbers only, at 150 lines a minute or 200 digits a second; the earth shook!).

The key machines, however, were the multiplying punches, of which I once, for a few weeks, had fourteen. Most were Type 601s, modified to take account of the algebraic signs of the three operands. The typical operation was A times B, with C added or subtracted from the product; it proceeded at the spectacular rate of 600 operations an hour. Usually the operands were read from a card and the answer punched on the same card, but you could get real wizard and hold a factor over from one card to the next, or make it a constant for a while under control of master punches in the deck. Fancy, huh?

The punching mechanism on the 601 was derived from the key punches, so you had to put funny metal or formica strips (you could file the formica ones yourself) called skip bars, on the carriage, to suppress unwanted punch cycles. Every machine room had racks of these stupid things, usually near the key punches, and you planned your output so as not to have to cut a fresh skip bar!

The 601s broke down pretty regularly, often signaling their malaise by throwing their cards petulantly on the floor. It was not uncommon for late workers - my wife Dorothy and I, for instance - to quit only after the last multiplier was busted. You left notes for the IBM customer engineer, who in our case came very early six days a week and fixed as many machines as he could before the troops arrived. (The notes helped him decide which machines would respond most readily.)

Need I say all these machines were black? The day of The Grim Gray Giant, a phrase I coined when the 700-series machines were gray, or of Big Blue, today's equivalent, had not arrived. All the major machines had little locked trapdoors, behind which lived curious stylized blueprints of that machine's current

features - the bells and whistles I referred to. The customer engineer kept these prints up to date as he added selectors and emitters and such; when a new engineer appeared he opened the trapdoor and read his patient's chart. All the keys were identical, and the rites of passage for a new supervisor included capturing one of the keys, so as to be able to gaze blankly at the secret documents of "his" machines. Marjorie depended on feminine [-83-] appeal, and someone always produced the prints when she needed them. *Lillian* had a key.

As the IBM inventors and designers got into the post-war swing, improvements began to emerge. I traded four of my least reliable 601s for a new 602, which had a larger and more rational plugboard, requiring new kinds of plugwires (sigh!) but with a "flexible" skip bar (ah!) you stuck little teeth into. It was more microprogrammable than the 601s, which was admittedly faint praise. And it was a little faster. And the control punches for algebraic signs could be in any of the eighty card columns.

But the 602 was a failure. Our copy worked fine, but of course we had really great maintenance. Most of the machines out in the field seemed to be tender, and didn't stand up nearly as well as planned (the 601s cost the earth to maintain, and the 602s were intended to be much cheaper). Now, T.J. didn't permit IBM to put out fallible machines; there was a whole string of poor jokes built around the idea that customer engineers were supposed to work on the customer! So the 602 was not, ah, withdrawn; it was upgraded to a 602A. True, to anyone but a very loyal IBMer the 602A looked like an entirely different machine, from plugboard to covers. Well, it used those same new plugwires, hmm? Anyhow, I reluctantly traded in my 602 for a 602A; the youngsters learned its capabilities, approved heartily, and in the end asked for more.

About documentation: the poor little wartime manuals were replaced for even the simplest machines by handsomer, well-illustrated, glossy-paper successors. The contents were dull: routine operating dope with a few very simple plugboard diagrams, which most supervisors and operators followed blindly. To tell the truth, so did I when it came to one mysterious machine called the collator. *Lillian* claimed to understand it, and one of our brightest young men, Eric Hankam, could make it (and the 602, and the 602A) sit up and beg. I suspect they opened those trapdoors and studied, when nobody was around!

One of the rival orbit computing shops back in my days with Maxwell had been at Cincinnati Observatory, and it was run by a Paul Herget. Paul had come out of the Bottoms, which is Cincinnati talk for the poorest part of town, and he dreamed of some day being director of the observatory. The director in the Thirties was Everett Yowell Sr., whose son knelt down in front of the 285 with *Lillian* and me when I was learning wiring in 1945.

Paul went to the Naval Observatory to help with WW II, arriving after I left but long before Eckert was called away to New York by Watson. He was a great success - probably why Maxwell wanted to go, a little later - and became a leading expert on IBM machines like the 601. I mention it here because in early 1946 he published, at his own expense (those were the days!), a most peculiar private operating manual for that machine. He had discovered that many of the plugboard holes, and the functions they controlled, had extra capabilities. There were things called "bottle plugs" - think of them as pawn-move plugwires, connecting adjacent holes - which were described as switches in the IBM documentation. Paul told us to wire some of those switches both on and off, simultaneously, and what the results would be.

For about three years possession of one of these coverless manuals was the secret mark of a scientific (IBM) computer - again, computers were still [-84-] people in those halcyon days. They were photostated extensively up and down Watson Country, and even overseas - no Export Control Act! When the 602As emerged, the people who had Herget manuals were the first to get the new machines, so the flowering was brief. I had the same experience later with my special kind of punched card mathematical tables, which blossomed nicely but was killed off by cheap storage.

My shop had an advantage for the IBM engineering groups. It was full of bright users, some of them IBM employees and some, outsiders like Ewing's students and Dr. Hemoglobin. One-off machines and prototypes could be tried out "at Columbia" without the hazards of public announcement and 602-type

failure. Luhn was our first patron, partly because of The Scientist We Love To Hate, Edward Teller.

The Los Alamos connection wound down rapidly in 1946. I was a charter member of the Federation of Atomic Scientists, which started its third chapter at Columbia, and worked at getting the Manhattan District to take away our classified material; the people we had dealt with were scattering; Eckert wanted to get back to astronomy. Urey came back to Columbia for a while, as did Rabi from the radar labs at MIT. Johnnie von Neumann dived into computers. Feynman disappeared for a while, and emerged with a Nobel, as did a terrific woman named Maria Mayer.

Maria and Joe Mayer, and I think Roy Marshak, brought Teller around to the Watson Lab in late 1945. He had some partial integro-differential equations to solve, and money to solve them with. I never knew how IBM handled my initial calculations; the Old Man might well have done them as an act of patriotism, but somehow I think the beancounters probably sent General Groves a bill. Same for Teller. I didn't yet know about the Super, as the hydrogen bomb was then called at Los Alamos, so I didn't try to avoid the job.

Problem was, the sequences of calculation were much lengthier than the ones we had been doing. Not more difficult - Teller's people had punched card machinery in mind when they did the numerical analysis. But it looked like hundreds of plugboards per cycle, instead of two or three dozen. I reported this to John McPherson.

A few days later an elegantly dressed engineer named H.P. Luhn came down from Endicott (T.J. paid his inventors - in fact, everybody but me - very well). He told Eric Hankam and me about his experimental relay calculators. For the smaller one he had modified a key punch [!!] by adding several movable sets of reading brushes - the holes in IBM cards were read by little wire brushes that contacted a brass roller when holes came along, and the timing of the electrical pulses told the machine what the numbers or letters were. Luhn had his machine punch out initial results to save storage; that result was then read downstream by one of the brush sets and used as one operand in the next addition or multiplication, and so on until you ran off the end of the card. Eric loved it (he was a three-dimensional chess enthusiast).

The arithmetic was done in a box on the back containing almost a thousand Lake relays, which Frank Hamilton was using in vast quantities in the SSEC as intermediate storage. There were the inevitable plugboards, but I seem to remember some of the sequences were hard-wired after Eric's analysis. Oh, when a card was full you reproduced the good stuff onto the [-85-] beginning of a fresh card, so in a sense you could think of a hundred-card string as a single 6,000- or 7,000-column card. As in the earlier work on the Trinity burst, there was to be a card for each space point, and a deck for each time step.

Eric ran the thing himself. He and I both took the transformation of Teller's equation into number crunching as a given. I didn't want to know, Eric really enjoyed the machine more than the mathematics, and we both knew we could call on Hilleth Thomas for help if the calculations ran away. If they did, nobody told us.

Pete had shipped us two machines; the other was a modified 405 tabulator with a separate, much larger box of relays. One of the machines was named Virginia - I think the larger, which was the one T.J. ordered him to split up. The other was called Nancy - also feminine. The smaller one I put in the space next to the disputed first floor WC, so Pete could show it off; the other had to go in the main machine room, much to everyone's annoyance. But one of Pete's young engineers kept it occupied, and gave us a lot of informal intelligence about progress on the SSEC on the side.

Pete also made several copies of a Survey Computer, which was supposed to go out in the field (say, 150 pounds - and it needed 110 volts). It was an electric typewriter hooked up to the usual Luhn box of relays, and it did polar to rectangular coordinates. You typed in X and Y, and a series of distance-azimuth pairs that you had measured with your surveying instruments, and the machine typed out a series of new Xs and Ys. Shades of today's handheld calculators, which will do the same including printing, and three times faster, for less than a hundred dollars!

I produced an extremely compact table of sines and cosines, which were hard-wired into stepper switches in the relay box. Reminded me of the little boresighting gadget I had done aeons ago at Navy Ordnance (ah, six years ago, that is).

After Virginia And Friend disappeared a modified mark sensing machine lived near the WC for a while. IBM made a machine that read soft pencil marks (electrically, not optically), and also sold "special" pencils at a huge markup. The machine ate paper sheets with multiple-choice tests on them, and scored the results on a meter. Analog, by gosh! Anyhow, some engineer wanted to convert the meter reading to digits and punch it on a card. Bob Walker was contemptuous - oh, I haven't gotten to him yet!

The final occupant of that space was the prototype, good old Serial Number Zero, of the enormously successful IBM 604. When Mr. Watson decreed the SSEC, he also set wheels in motion "to use these electronic capabilities in the IBM." The circuits had been patented before the war, mainly by one Halsey Dickinson, whose photo showed up in the SSEC brochure.

At about the same time as the SSEC dedication, IBM let the sales force have a few - twenty, maybe? - Type 603 Electronic Multiplying Punches. These were one-card-feed gang punches that ate a hundred cards a minute, read two six-digit factors off each card, and punched the product on the same [-86-] card. That's all - you couldn't even control rounding - but it ran ten times as fast as a 601. Convair San Diego swore by theirs.

The box of electronics was connected to the punch by a cable over an inch in diameter, and contained about 600 full-sized vacuum tubes - the same as the ones used so lavishly in the SSEC. I sat it up on a window-seat in the downstairs machine room, and we opened the window behind it whenever we used it - great space heater! We soon had better stuff, so it didn't stay too long.

Now, the 604 was a different matter. It was post-war circuitry and miniature tubes, and designed for production. I got mine in early 1949, and the first production version went to Freddie Uffelman at Oak Ridge, and was the Big Event of ACM's annual meeting down there later that year. That was the second ACM meeting outside New York; there had been a major conference at Aberdeen the year before, with Johnnie Von presiding over one session, at which John Mauchly describing the metal tapes of his next machine (which turned out to be the UNIVAC I).

Freddie got Number One because there were still priorities; he used it to keep track of the raw materials and finished products at Oak Ridge, which was still a restricted city. Lots of mason jar white lightning, though!

He was really doing a very simple inventory/accounting job, but with extra-sensitive goods. He wasn't an academic, and his crew were hill girls he had raised from key punchers. But he was sharp. Too sharp for IBM; he complained profanely all the way up to 590 that the #&\$%* 604 wouldn't run right. "Fix it," he screamed," or I'll have my boss telephone Old Man Watson."

I went over to see him from the ACM meeting, with Red Dunwell, later to be the head of the STRETCH imbroglio. Red was conciliatory. I christened Master Uffelman "Foul-mouthed Freddie," which tickled the dear boy no end - and his harem, too. In the end I persuaded Red to persuade IBM to replace every single one of those 1500 miniature tubes; they'd gotten cooked somehow, and FMF was quite right. I was awarded the Mason Jar Accolade; not by preference, but all of the hill girls were temporarily taken.

About Uffelman: like many of the best punched card whizzes of the day, he was self-taught; had no degree of any sort. Yet he was married to the daughter of a fancy Berkeley professor (well, actually only a dean). He had had most of his gut removed some years back, and was all crouched over and miserable; no wonder he was foul. He begged the doctors to help him, and they said, "Frederick, this is a Big Deal; when you don't care any more whether you die on the table or not, come back."

Shortly after his 604 got cracking, he went back and said, "I'd rather be dead!" So they took out the rest of

his innards, and it worked fine: last time I visited he was playing softball, and his harem was noticeably less horny. His wife Jane stood by him beautifully through all this, left him when he was out of trouble, and ended up a valued member of the Rand Corporation staff in Santa Monica.

The 604 came out of Poughkeepsie, which by 1949 had been transformed from a typewriter plant into an impressive electronic enterprise. This was Ralph Palmer country, and he had great people from MIT and other centers of excellence working for him. The machines came streaming down the floor, [-87-] and customers - not all scientific, either - were lined up outside begging for more.

The punch unit was much more sophisticated than the one on the 603, and the electronics box was five feet high and quite handsome, at least to someone who had had a 285, or racks of skip bars! On one end of the electronic unit was a one-panel plugboard, and it used ordinary plugwires - none of that ENIAC coax. The thing that fascinated the early users was that the machine was what we would now call microprogrammable; you could put together counters of various sizes, perform a completely flexible string of commands pipeline style, carry data over from card to card - and you could divide!

In those days one of the commonest problem areas was matrix arithmetic: sets of simultaneous linear equations, and so on. I had had to do several sets of sixth order, to pretty high accuracy, in my thesis work. On the Marchant that took most of a day, and the time went up as the cube of the order - that is, a set of twelve equations would have taken eight times as long; say a full week. At the Watson Lab this was a common exercise, involving a fairly complex pattern of eight plugboards and careful sorting. On the 601 the time dropped by a factor of about five compared to a desk calculator, which meant that if we had been paying rent for the machines and the building, and so on, hand work would have been about as cheap (Comrie said the same, in London).

The 602 and 602A helped, but not by much. But the 604 ate the problem for breakfast, or so it seemed at the time; cost per hour, if the shop had been run for pay, would have been about the same, and the speed was at least six or seven times the 602A, and nearly ten times our vanishing 601s.

That brings up horse racing - yes, really! I had met a strange little man named Andrew Salter, who was a psychologist or thereabouts, and who worked over an impressive range of Broadway and Hollywood types in his Park Avenue office - Judy Garland, for one. He made the cover of LOOK the year I met him: something about hypnosis. He offered to operate on my wife Dorothy, which sounded good to me but emphatically not, to her.

Andy had a wall of bound Racing Forms and other Triangle publications outside his office. This was decades before Dick Francis, and I didn't know much about racing, or (more important) about betting. But the prospect of supplementing my IBM pay - Andy said we ought to be madly rich in no time - drew me in. I proposed to work out a predictor formula, linear in twenty variables like jockey weight and track muddiness, which would give the most probable speed of the horses in tomorrow's race.

Parenthetically, this is about what most stock market prediction programs do today, on microcomputers. They make it sound much jazzier, of course.

In betting (and I suspect in the stock market play as well), you then have to apportion your money in accord with how others are playing; it does little good to bet only on the winner, and especially if the odds are poor. I had ideas about how to do it, but never got that far. I fit my formula, by least squares, to the horses in a set of a hundred past races which Andy and I carefully picked. The 604 gave me the results in a few hours, versus weeks on a 601.

Playing the predictor back against the original hundred races, I found we did only five percent better than random - and the track and the state were [-88-] taking 17 percent. And of course, results were bound to be less favorable on past races not in our package, and still less on future cases. So I shut down.

It was literally years before I saw that the whole project was unethical - that I had absolutely no right to

use the Watson Lab equipment on such stuff. The climate was incredibly different from today. Everything was grist that came to our mill. Indeed, I got a tiny publication out of the experiment, since the timings for 604 procedures on systems of that high an order were news. It wasn't even like, oh, using office supplies to write a letter; you were Doing Something New, something challenging, something good for the art. Today we would call it hacking, and I would be horrified at a senior professional dreaming of such a thing. Then, even Dorothy, who was a distressingly moral person, never thought it questionable.

Before I get to the Aberdeen machines, I need to write a little more about what professors call "the literature." There wasn't any - at least for computers. Stuff about astronomical calculations went in astronomy journals; about optics, in JOSA, the Journal of the Optical Society (which is where I published Grosch's Law, *mirabile dictu!*); about punched card techniques, in IBM's Pointers. I must mention the exception, MTAC (Mathematical Tables and other Aids to Computation), published quarterly at Brown University with National Research Council money by a Professor Archibald.

This was where Comrie, and Jeff Miller the bridge collector, and their American counterparts hung out, and it was where the very earliest descriptions of gadgets too special to get into the stodgy electrical engineering journals had to be published. Wallace Eckert's card-operated typewriter at the Nautical Almanac Office is there, and the big Bell Labs relay machine - and my Aberdeens. It still appears, under a smoother title: The Mathematics of Computation, or some such. Its early years are a cornucopia of antediluvian hardware history. Some software, too, in a way - Lillian and I put out lists of the punched card math tables in the Watson Lab files, for instance, and people from Aarhus and Aberdeen and Acme Electric wrote for copies. In today's personal computing world, they call it "freeware"!

There began to be specialized technical publications in 1949 and 1950, and DATAMATION started in 1957 under an earlier name; now there are literally thousands of magazines in several dozen languages - human, mostly, although I seem to remember some in APL and LOGO - to satiate the old-timers and bewilder the newcomers. They range from the absurdly erudite to kiddie stuff, and all are eager for material. In the Thirties and Forties computer articles were turned away from engineering and scientific journals unless very well sponsored, and even MTAC was careful: snooty funding, and an Ivy League location.

That having been said, I refer you to MTAC and an article on the IBM Pluggable Sequence Relay Calculator if you want to read more about a really important but forgotten machine. Let me start with the word "Aberdeen"; the Aberdeen Proving Grounds, in Maryland, was where the Army tested its guns and bombs and tanks. From World War One there had been a Ballistic Research Laboratory there, where later Hilleth Thomas and Johnnie von Neumann did interior ballistics (explosions) and Leland Cunningham - yes, [-89-] the one that helped me learn to eat with chopsticks in Boston in 1940 - ran a large punched card shop doing exterior ballistics (trajectories).

Why Cunningham? Well, in WW I a famous celestial mechanicker named Forest Ray Moulton set them up with a hand computing facility, and they remembered. When the Army got into anti-aircraft fire and bomb trajectories in WW II Cunningham ran out of capacity, even with IBM's best 601-type help. The key officer there - higher ones got most of the credit for a while - was a Major Leslie Simon. He let three contracts; in those urgent times, it probably took him two or three weeks. Today with competitive bidding, and EDS and Computer Sciences, and the Big Business press watching, it would take two or three years.

One contract was with the Moore School of Electrical Engineering at the University of Pennsylvania, and resulted in Pres Eckert and John Mauchly and the ENIAC (note that the machine didn't get down to doing ballistic calculations at Aberdeen until late 1947, by which time Cunningham had gone back to orbit computing and Simon was a colonel).

A second was with the Bell Labs, and resulted in a magnificent machine made out of rather slow telephone relays, with error detection and punched paper tape input making it reliable enough to run all night unattended; it would switch to the next problem if it got stuck, or shut down when it ran out. It had

pieces of Fry and Shannon in it, but was mostly due to two men named Sam Williams and George Stibitz. And the self-checking features were elevated later to a major part of the computer discipline by Dick Hamming, who came to the Labs from Los Alamos.

Well, the Model V - there had been earlier Bell machines, for smaller tasks - was slow, what with all that checking, and it didn't get to the Proving Grounds until 1946 or so. Mind you, it did yeoman work for years afterwards, and so did ENIAC. But neither, ah, saw duty in WW II. The IBM machines did.

The third contract was with IBM Endicott, to develop two high-speed relay calculators with plugboard sequencing. Two, to run the same problem in parallel (think of them as Maxwell and Grosch); high speed, because IBM had developed the Lake relays, four times as fast as the telephone units, and was building large numbers of them into supersecret cryptographic gear (MAGIC was at least as secret as Los Alamos). The key men for the Aberdeen project were Ben Durfee and Don Piatt, both of whom later contributed to the SSEC - relay storage, and much else. The two machines were finished and shipped to Aberdeen and put to work on actual ballistics before the end of the war; I assume Watson had ordered that it be so!

At the end of the war they were both sent back to Endicott and rebuilt to more advanced system requirements furnished by Cunningham (who had earlier specified the sample calculation with which ENIAC was finally benchmarked). At the same time three more were built to the new specs; one was sold or rented to Dahlgren, the Navy's proving ground in Virginia, and the last two came to the Watson Lab. And by mid-1946; IBM didn't fool around.

Eckert and Lillian and Marjorie and I were delighted. They were to be our powerhouse for internal use for many years; until the lab moved to newer quarters, I believe. Really big jobs went to the SSEC downtown, and our teaching was done on the standard machines, since IBM would build no more [-90-] Aberdeens. But for my minor planets, and Thomas' atomic physics, and the work of our cleverer research visitors, they were the key equipment. I still treasure my dog-eared Ozalid operating manual.

Picture a looming black monster, filling a six-foot cube when closed. The front part was a much-modified 513 reproducer - two hundred-a-minute card feeds and two stackers. There were two double-panel plugboards dripping with wires, on the front, and a panel of numerical switches on the right end. Hinged to the back of the punch was a dour box of thousands of Lake relays, and hinged to that a second box. The covers were usually off for diagnosis, although the un-air-conditioned and otherwise corrupted Morningside Heights atmosphere was full of dirt. There was a special oscilloscope cart nearby, to check timings and look for contact bounce. And lots and lots of thick cables.

Cards were read and punched at either feed under plugboard control: 16,000 decimal digits a minute at full bore. Calculating speed was dependent on the mix of operations: division and square root - yes, square root! - took almost a whole card cycle, while two or three six-digit multiplies or half a dozen faster operations could be fitted into the same. Besides, the Aberdeens could buzz away for several cycles without feeding or punching at all, but the plugboards got awfully complicated. On balance, each machine problem-in-problem-out ran six or seven operations a second.

Mind you, the wonderful 604, when wired by an expert like Lillian or Eric, ran almost that fast. But we had the two Aberdeens for three solid years before I got the prototype 604, and we ran each of them a hundred hours a week. Powerhouse, indeed! The experimental machines that fill the history books didn't even get fired up until the end of the decade, and had very little input or output capacity. Until 1949, it was places like Aberdeen and the Watson Lab - including the SSEC - that were crunching the numbers; the Los Alamos and tin airplane boys didn't have big machines, and the computers being built in Britain and the U.S. weren't ready. From 1944, when Aiken got the ASCC, to the present day, the majority of scientific and engineering computations worldwide have been done on IBM machinery. Commercial data processing too, of course, but that perspective is universally accepted.

One story about the Aberdeens and our night visitors: a Columbia connection Wallace and I really enjoyed

was with the astronomers. Eckert was one of the clan all his life, and while I soon realized I wasn't going back, I had friends and admired great figures in the science. One friend at Columbia who obviously was going to be a great figure was Martin Schwarzschild, a nephew or thereabouts of the nineteenth century astronomer/physicist/mathematician. Martin had been at Harvard when Dorothy and I were courting, so his presence close to the Watson Lab pleased both of us. He had married a girl who was helping him with his researches just as my wife was helping me.

Martin, who along with a dozen other contributions was later to become the best-known balloon astronomer, was still doing stellar constitution calculations - the sort of thing that almost drew me away from Maxwell in 1938. Interest was high in the outer world because of the atomic upsurge; people other than physicists and ASTOUNDING readers knew that the Sun was powered by a nuclear furnace. So, although he was too pure to be [-91-] interested in fusion power and such, the public interest made him a prime candidate for computer time.

Lillian wired him a complicated set of plugboards, and he came over with his wife to run his cases. We showed them how to print up the results on a tabulator, how to reproduce fresh card decks, how to run a sorter. He and Barbara were sharp; it was easy.

They made their first long run one weekday evening, late. There was a card jam in the monster's punch unit. Probably not their fault; all it took was a defect on the leading edge of one card. The two of them stood there watching. Why weren't the cards coming out?

An experienced operator would have leapt for the stop button. Even from across the room, the change in the voice of the machine would have meant trouble. But it was all new to Martin and Barbara. Suddenly the covers burst open and a fountain of crumpled cards gushed out. Typically, a card had been accordioned to a cardboard rod eight inches long and about an eighth of an inch square - and there were several hundred!

It took two youngsters and the customer engineer almost an hour to clean out the junk next day. Fortunately reconstructing the input cards was not too difficult; while the two delightfully abashed Schwarzschilds were doing it I asked them what they had felt. "Herb," said Martin, "we thought the machine was storing the data." Wonderful!

[-92-]

10 A VERY SMALL TENT

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[-93-] Dorothy and I had lots of pleasures besides working until four o'clock in the morning in a room full of recalcitrant black boxes. Once the war wound down, we began to use the freedoms of the IBM job and the Columbia Connection and my Astronomical Society and Optical Society activities, and also again to enjoy the outdoors. After some hesitation she decided to give up her spectroscopy at the midtown Interchemical Corporation laboratories, mostly to help me, but also to eliminate the problem of fixed hours for her, and conflicting two-week vacations, and the nasty commute from Long Island.

I had no fixed hours at the Watson Lab, nor did any of the professional staff; Wallace gave us the same liberty we would have had across the street at Columbia. And he got the youngsters off the time clock, even though it was an IBM product, and in spite of stories that The Old Man punched a gold-plated one on the sixteenth floor at World Headquarters!

I had classes to meet, but not every semester. So did Thomas, and Eckert himself, irregularly (Lillian and Marjorie did the Machine Methods lab sessions for him). There was a steady stream of fascinating visitors from all over the world: the assistant director of Pulkovo Observatory near Leningrad, which was being rebuilt; a group of Indian statisticians - and Comrie!

He was to be honored at a meeting of the Institute of Navigation for the beautiful tables he had turned out before and during the war, at His Majesty's Nautical Almanac Office. Dorothy and I had the great pleasure of escorting him to the banquet, where he sat between us and Gerald Clemence, who had succeeded Eckert at the Naval Observatory.

He was not too vigorous physically, but full of new computing projects, and with plans to expand the

commercial - well, not very! - scientific computing service he had started on Bedford Square in London. He looked rather Scottish (I did not yet know he was a New Zealander; the current pleasant habit of appending a sentence or two of biography at the end of a technical [-94-] article was not then common). He was quiet until things got going, and then his enthusiasms took over. Can you imagine being excited over which numerical type fonts worked better in a math table? Shades of Don Knuth!

He had just published a magnificent INDEX OF MATHEMATICAL TABLES, one of whose authors was J.C.P. Miller. Comrie intended to update and extend it, and Dorothy and I volunteered to work up a cross-file as a third part of the new edition. This involved her key-punching a good part of the 450-page book; the days of machine-readable text were many years off. The major part was arranged by function, and the second was a bibliography of the books and articles where the tables were to be found; we were to furnish a listing of which tables were in each book or article.

I did the system design and printed up the results; she did the hard part. We sent the cards and listings over to England a year or so later, and Comrie added it to the second edition. It was in some ways a contribution to a dying art, like hardening copper and gold (or designing lenses by hand, or wiring plugboards). But I was still deeply engrossed in 1947 computing techniques, although of course excited about how they were going to change as electronics took over.

Comrie, and Wallace Eckert of course, also saw these changes coming. But I had been reading science fiction for over twenty years, if you count the Oz books. I was more at ease than they were, in the future, although I much enjoyed the present and valued the past. About valued pasts: a year or two after Comrie put out the new INDEX he was made the first member of the Royal Society from our tribe. He wasn't keen on honors, but that was one that really counted. He died in 1951.

As soon as gasoline rationing subsided, Dorothy and I began exploring. We had been limited to Long Island and the area immediately around Manhattan even when I had my Farrand C ration, and our 1937 Plymouth had reached a shuddersome mileage. There was lovely country and new experience within reach. I got in touch with Jack Kissner, who designed and built foldboats in Long Island City after the German Klepper type. Ours had been one of the last civilian models he had made in 1941, and he was just getting into production again. He invited us to join the little gang of enthusiasts who went out on weekends to the Housatonic or the Delaware and enjoyed the white water, and camped away from the roads and the traffic.

Along with Jack and his wife and daughter, our particular friends were Ted Beckhardt and Chuck Weiss, who had served together in the U.S. mountain troops. Ted had been wounded at Monte Cassino, and was not yet up to vigorous skiing. Jack, Ted and Chuck (formerly Wolfgang) were all refugees from Hitler Germany. Ted's father left his Frankfurt department store behind and escaped with his large Meissen china collection. This resulted in a family porcelain shop on Third Avenue, well thought of by serious collectors like my Schenectady friend Hans Kraft.

Foldboating was really my first dangerous sport. Following Ted and Chuck I took up skiing; from skiing and a great deal of enraptured reading and book collecting I started mountaineering, and from mountaineering I graduated to the Cresta, which I rode for decades. From sport cars I got into racing, and from that into my third marriage - also dangerous, and also great fun. But it really [-95-] started with white water running. I perhaps ought to mention that I was the first foldboater ever to do the main chute of the enormous Lachine Rapids above Montreal (true, I did it upside down), and that I don't swim a stroke!

A typical boating weekend would involve a hard drive in traffic out of the city, stopping along the way for a quick snack, and setting up a tiny camp on the river. In the mists of morning we would take the cars and folded boats up to the starting point, and a wife or girl friend would take one car back down to the take-out place (we called this the "shuttle"). The heroes and heroines of the day would set up the boats and take off.

Saturday night we would camp again, either out of the boats or where the shuttle car had stopped. This was the night for singing - usually German - and campfire marshmallows, and loud snoring. Sunday afternoon we would stop early to dry the boats and repack them, becoming dry ourselves in the process. The drivers would be shuttled up to get the other cars. If possible we would then go to a nearby restaurant and have a large and enthusiastic meal; there was a big place called Flo-Jean's in Port Jervis on the Delaware that always fitted us in, along with their fancy Sunday-driver customers, even when one of us was in oilskins and a single espadrille, having lost his all in the river. The owner was a canoeist.

For this my wife and I had to become campers. She had done a lot of early-California auto camping; I had hardly slept outdoors. I applied the usual medicine: went out and bought books about it! Then we found postwar sleeping bags - no down ones available yet - and cooking gear, and a very small olive drab tent. To erect it you used a short piece of wood as a ridgepole, strung up the ridge using the lower branch of a friendly tree, pulled out the side ropes, and behold: room for two good friends. After a little maturing we traded up to down sleeping bags that could be zipped together; it was warmer on cold nights, and had other advantages. In later years the combination also accommodated a poodle puppy.

This weekend action was hard on cars. They got into messy places, needed to start easily after a night on the river, were required to hold large quantities of junk, plus foldboats. I took our wartime savings in hand and went looking for a replacement for the faithful Plymouth. "Not possible," said the Long Island small-car dealers, "we have a two-year waiting list of pre-war customers." But this was New York, where people with friends or money had lived well in spite of red points and blue points and gas coupons.

I thought about it. In Manhattan fancy people were lined up outside the Cadillac dealers, just as hoi polloi were queued for Fords in Hempstead. But how about fancy cars, in the boonies? Jackpot! They took my order for a Roadmaster Buick convertible, with every option and accessory in the catalog. Two years for a Chev, one year for a regular Buick, three months for a Roadmaster; two months if you ordered fog lights. Voila!

Dorothy and I had never even had a car radio. We were living in a cheesebox, and heating our hot water with pea coal. But wow! did we have a car! I had vacation saved up, and besides, we astronomers ought as a matter of professional business to attend the dedication of the 200-inch telescope on Palomar. Eckert didn't like to travel, thank heaven.

Dorothy and I planned the trip for a year. I had maps of all the national [-96-] parks and monuments, most of the national forests, special river maps that showed profiles - where the rapids were steepest. Since marriage we had collected an almost complete set of the WPA Writers Project state guidebooks. Gasoline companies gave away - yes, this was a long, long time ago - beautiful highway maps.

I marked places where no Roadmaster, top up or top down, had ever been: a tiny dirt road along the Colorado into Moab, the Escalante Canyon, Devil's Postpile, the back road down from Lick Observatory. We filled the trunk, filled the back seat area, put in our foldboat and camp gear and the very small tent. And away we went.

We saw the American West at its best, with very few Americans yet cluttering it up. We camped, alone except for a few scrawny sheep, at the Black Canyon of the Gunnison. We drove most of the way around Crater Lake, until blocked by snowdrifts - in July. We cruised for hours on deserted roads at eighty miles an hour. We crossed Death Valley in midsummer with the top down.

And we indeed helped dedicate The Big Eye, along with hundreds of astronomers from all over the world. We saw Dorothy's family. On the way back we stopped in Reno, just before show time (Vegas was primitive by comparison, in 1948). Dorothy ordered a trout; the waiter offered to bone it; she sent him away, proud of her own skills - and the lights went down for the show!

About the eighty miles an hour: I hadn't yet gotten interested in sports cars or racing, and wasn't

knowledgeable enough to allow for the fact that the huge Buick straight eight engine was splash lubricated. We burned out the bearings coming up from the Grand Coulee. I sold the lovely beast "as is" in Spokane, where there was a great apple harvest in prospect and no one had yet even dreamed of a Roadmaster convertible, with or without fog lights. We did Glacier by train and Yellowstone and the Tetons by bus, and flew back to New York from Jackson. The Buick dealer in Spokane bundled up our big suitcase of maps, our foldboat, and our very small tent, and expressed them home for us.

No Roadmaster meant problems with our river excursions. I had been in the Blue River above Dillon, and in the Gunnison, in Colorado. And one of the high points of the trip was a day on the Snake, below Teton National Park. So I wasn't exactly hurting for white water. But when the spring runoff started and the sun began to be warm even in Connecticut, we'd need transportation.

It wasn't an immediate problem, because we had moved into town just before we left on the Palomar swing. Dorothy said a reluctant goodbye to her victory garden, I said good riddance to the pea coal supply, and Suzy the cat yowled wistfully for her lost territory. We found an interesting apartment in a Chelsea townhouse, with the owners below to guarantee good heating and garbage disposal. There was little storage space, and the foldboat went to live permanently at the lab, in the storeroom where I used to patch it after the wilder trips.

We could go up to Columbia in twenty minutes on the subway, and that was a real plus; the combination of driving to the Long Island station, changing in Jamaica, battling the crowds in Penn Station, and riding the [-97-] subway to 116th Street had taken an hour and a half each way. I had usually driven, and didn't mind with the older car, but even in the Forties leaving something like the Buick on a New York street all day was asking for trouble. I put a large sign saying "Trunk and glove compartment are EMPTY" in the windshield after the top was slit the first time; I added a note that the doors were unlocked. The police ran me down one day and warned me that unlocked cars were handy privies for bag ladies and such; I left undisturbed the note that the doors were unlocked - but locked `em. Also, although the police were too busy to prevent damage to pretty cars, they were not too busy to hand out parking tickets. Ah, New York!

Another real plus was that Dorothy and I could now entertain - not just visiting Brits, and other friends from out of town, but the youngsters from the Watson Lab and the SSEC. Marjorie was rather busy with her new husband, Jack Herrick, and the natives like Lillian had their own families and friends, but Betsy Stewart, the handsome woman at the SSEC console in the traditional pictures, and Bill McClelland, and a certified Southern Belle named Aetna Womble, and Woody Skillman, and a dozen other bright newcomers used to come to our place, huddle over my von Bayros prints, and Frank Harris and Casanova, listen to one of the first modern high-fi record players in town doing Shostakovich and Benny Goodman, and pet our amiable cat Suzy.

Behind Aetna's charm lay an electrical engineering degree from Duke. Behind my amplifier circuits lay the Watson Lab electronics shop. Behind Frank Harris lay a growing collection of attractive erotica (the Danish pornography revolution was a decade away). Behind the little evenings lay our memories of how observatory people and Cal Tech people used to enjoy each other. The Eckerts and the Thomases lived in a Columbia enclave in Leonia, New Jersey; the IBM executives lived in luxury suburbs like Greenwich. We were central, and liked it.

There were birthday parties for the SSEC. Since it was busy around the clock, and since the No Booze rule was really serious, they were held outside. The second one was in the Dogwood Room on 58th Street, a relief stop for trampled IBM executives not strong enough to face Grand Central. John McPherson and his wife came, much to everyone's pleasure, and I seem to remember Wallace and Dorothy Eckert. Rex Seeber and his wife, who lived up in IBM country, were sort of givers of the feast.

There was a piano player, and much drinking. McPherson pretended not to notice, but could hardly ignore my asking the piano player to do what I christened the Tom Junior Song: "Lucky old sun, with nothing to do but roll around heaven all day." Nevertheless it was a good party.

There was one other social component in our circle; I've hinted at it only slightly. Call it the other half of the Watson Laboratory, or the third part of the IBM Pure Science operation, or call it the electronics group. When Wallace began to hire senior personnel for the lab, he looked also for men who would supplement what he knew as the IBM engineering department. The staff director of engineering was his, ah, monitor, John McPherson; the Hamiltons and the Luhns and the Piatts, and the Lakes and the Dickinsons before them, got their floor space and their people and their paychecks from Endicott [-98-] executives, their detailed technical instructions from John - and their projects from T.J.

Eckert had seen some of this, and I assume was briefed about the 1945 situation in IBM when he came aboard. He realized that the new electronics was not yet represented in Endicott; he was close to Rabi, who was Number Two at the MIT radar laboratories; he had some modern contacts even at the old-fashioned Naval Observatory, and certainly through astronomer friends who were doing war work. One of Dorothy's bosses from Mount Wilson, for instance, turned up doing magnetic mines, and others were in proximity fuses and such. Wallace decided to help.

Through Rabi and other Columbia friends he turned up three men who were ready to leave MIT: By (Byron Luther, a deep secret) Havens, John Lentz, and Robert Walker. To tie them to their later accomplishments in IBM, Havens was the designer and builder of NORC, the Naval Ordnance Research Calculator - the first supercomputer, delivered to Dahlgren in 1954. He later moved to Europe and became a senior manager at the beautiful IBM laboratory up behind Nice.

John Lentz was the father of the early IBM small scientific computers. His work led some years later to the 1620 and its progeny. Bob Walker built an analog linear equation solver, somewhat after the pattern of Clifford Berry, Atanasoff's associate. He also worked with a Columbia math professor named Frank Murray, who was involved with the Cyclone machine (then still analog).

Eckert brought them to Columbia soon after Seeber and Thomas, and set them up as an electronics group; today we would probably say, components group. Walker took over the physical arrangements; there was a major workshop in back of the second floor, with three technicians and an expediter (most supplies came up from Cortlandt Street and the surplus houses, at least in 1945 and 1946). He planned and set up the machine shop in the sub-basement. And later on he helped Havens put a NORC shop up in the Goat Room, a windowless fifth floor space with an elegant floor and finished walls which I claimed was where the fraternity toughs had initiated their new brothers. It was the first space in the Lab to be air conditioned: mid-1947, I'd guess.

There were few links between the Columbia professoriate and the three radar experts, mostly because people like Ray Mindlin had been behind other walls doing other war work. Walker became friendly with Murray, as I said, and saw a little Faculty Club action. Lentz wanted to get his Ph.D., and so in spite of his research record at MIT was in statu pupillari. And Havens was soon too busy to bother - tended to grab a sandwich at Chock Full O'Nuts. Today all three of them would be running work stations: be heavy users of computing. Not in those days! But I was fascinated with what they were doing, and played Mohammed to their mountain for several years, so there was a link.

You have to remember there were no transistors yet. The only semiconductors I had seen were germanium diodes, exotic one-way devices which IBM had not yet dared use behind the plugboards to eliminate back circuits. The SSEC was under construction, using full-sized vacuum tubes. Havens and Lentz were using miniatures. Calculations and storage were decimal; ENIAC used ten or eleven bottles per digit, the SSEC I think seven. Havens was trying [-99-] for four - that is, pure binary coding for each decimal digit. His successes (or initial successes, because it took a lot more than that to eventually build a room-sized NORC) were carried off to Endicott, and later Poughkeepsie, but Havens wanted to put together a whole system, not just furnish ideas or experimental components to the boys upstate.

The electronics shop offered summer assistantships, and early on drew a student from Harvard named Tony Oettinger, who succeeded Howard Aiken when he finally retired, and later still became a president of

ACM [1966].

My side of the house provided postdoctoral Watson Laboratory fellowships. The first holder was a young Belgian physicist named Carl Grosjean whom I met again in the late Seventies; he had the chair of theoretical physics at Ghent, and was on the verge of retirement. Good grief! Another was a chap from Stuttgart named Helmuth Sassenfeld, who returned to the U.S. later and went to work for von Braun in Huntsville. And we had Americans, of course.

I used the term "social component." Bob and Mildred Walker found a place near our little Hempstead house, and we saw them frequently. John Lentz and Alice, who was a niece of Justice Burton of the Supreme Court, found a Riverside Drive apartment through Columbia. It had typical Manhattan advantages and disadvantages; Burl Ives lived across the hall, and there were lots of cockroaches. It was partly envy of their location that drew Dorothy and me into town later, and observation of Alice's problem that made us wary of insect life.

John was an audio buff, in the days before this was common. He had a huge amplifier, built while they were at MIT, and was trying to add a variable-gate preamp to cut the horrid scratch and rumble of 78 rpm shellac records. This is what is inside Dolby noise reduction circuitry today. He never really got it right, but like much else being done at the lab, it was interesting, and it was very early.

He designed a later model amplifier for me, which I built at night in the second floor shop, making the sheet metal chassis down in the sub-basement. It used big black metal 6L6 tubes and a ten-pound audio transformer, and even by today's standards was really very good. Dorothy and I found a Hempstead record shop with a big overstock of classical 78s, and arranged to return albums that we played and didn't like - music or recording or too much scratch. Soon we had fifteen feet of solid shellac, although we never went the Shapley Gilbert and Sullivan route.

John was too much of a purist to have a record changer, but we had an early English Garrard. After some 1946 investigation, he advised me to get a GE variable-reluctance pickup, and it did yeoman duty until I retired the 78s fourteen years later. I still have two or three albums, notably the Szigeti Beethoven and Piston's "Incredible Flutist" (and some vintage Goodman), but don't have the machinery to play them now.

The records and the Lentzes led us to Carnegie Hall, where we had a subscription for two years, but the problem of getting home to Long Island was serious. By the time we moved to Chelsea, we were doing Town Hall concerts and Broadway musicals; the "Oklahoma" revolution was in full swing. Senior IBM executives tended toward the Metropolitan Opera because of the Watson involvement, but I was not high enough in the hierarchy to ask [-100-] for seats in the Imperial Box, and Wallace would have died a thousand deaths if made to go.

About one other Watsonian interest: T.J. was a great believer in education. In Endicott it tied to his job enrichment philosophy. Where industrial engineers elsewhere were trying to break bench jobs and assembly line jobs into tiny specialisms - tighten one screw and pass the gizmo to the girl on your right - Watson went the other way. A new employee was put on a single-spindle drill press, say. After a few weeks he or she would be encouraged to sign up for a course - blueprint reading, perhaps.

Next might come promotion to a multi-spindle machine; then a course in machine tool operation; then a simple milling machine; then a course in measurement techniques (and you got to keep the micrometer and the height gauge). Soon there was a little workshop around the employee; he put the parts in appropriate jigs - and could get awards for suggesting tooling improvements - set up his machine or machines, ran the pieces, inspected the work on his little surface plate, and asked for the next batch. Not at all coincidentally, IBM had no unions whatsoever.

Those who didn't take courses didn't rise. And, just as in the sales force word on white shirts and striped ties soon spread among recruits, so shop people soon discovered the advantages of the IBM education

program. Out in the field it was more difficult, but even there you could sign up for correspondence courses in Business English or Principles of Accounting Machine Operation. World Headquarters was riddled with courses: released time, after hours, recreational.

Didn't look too apposite for an astronomy Ph.D. But I couldn't ask my young people to do what I wasn't doing, so after much thought I signed up Dorothy and me - yes, families were invited to many courses - for Social Dancing I. We learned to tango in the second-floor IBM cafeteria at 590!

Toward the end of my hitch at the Lab I managed to break the barrier which kept all but aspiring customer engineers out of the serious technical courses which described the innards of the machines. I took a course about the magnificent 407 tabulator, and found it very broadening. One or two of the senior youngsters did the same - Eric Hankam of course, and Stanley Rothman, who was to come down to Washington with me in 1950.

Before I leave these small tents behind, I'm going to write just a little about the courses we gave - that is, at Columbia. These were all part of the regular university curriculum, listed in the appropriate catalogs - we had our own special one also - and open to any student with the prerequisites and the money. We did however encourage our own juniors on 116th Street and at the SSEC to attend as auditors if they did not want to sign up for credit. I vaguely remember that Eckert made arrangements to have IBM pay tuition in the for-credit case, but that there were no takers from downtown; the pressures of SSEC operation were too great. But almost everybody did a little auditing.

Most of our offerings were unusual. Thomas did a very good course in theoretical physics, in which he was a world authority. I did a celestial mechanics course one year; it was really a mélange of spherical trig, practical and theoretical astronomy (meaning time and position determination, and orbit computing), and brief mentions of planetary and satellite mechanics.

[-101-] None of my subtopics were taught anywhere else at Columbia; the astronomy department was solid astrophysics. And they were what was needed for astronomy calculations.

Some years later I was asked to do a short piece for the *Astronomical Journal*, the very staid professional publication for non-astrophysical astronomers like Brouwer and Clemence and Herget and Eckert. I suggested that with the missile and space programs booming, there was a place for a master's degree level in my kind of astronomy, and jobs going begging. I was delighted to see summer institutes start up almost immediately, and more carefully considered curricula follow at several universities. My once-around Columbia course would have been just right to start those students off.

Most of our value as teachers, however, came from the computing courses. Eckert gave a two-semester machine methods course, which featured hands-on operation under Marjorie, Lillian and Eric; literally the only place in the world where you could learn in the university milieu. He didn't do much about the Aberdeens, because they were not available out in the world. And he didn't know Pete Luhn's two machines apart. But all the regular machines, including the very newest, and prototypes - those were done very well.

I did numerical methods - classical interpolation and matrix arithmetic and integration of differential equations. Most of my examples, and assigned exercises, were at desk calculator level, but I lectured from the point of view of machine operation; in a sense, I did a Comrie. This was one semester, once a year, and Hilleth did an advanced course featuring partial differential equation solutions and error propagation, every other year.

My classes were small; this was a very esoteric discipline indeed in the Forties. But I had interesting students, and not just the auditors like Rothman and McClelland and Backus and Don Quarles. One year I had an experienced computer from Aberdeen, who could tell us stories about running the Bell Labs Model V. His name was Joe Harrison Junior. Twenty years later he was to take over the computer standards work

under me at the Bureau of Standards.

Another was Walter Ramshaw, who had worked during the war in naval architecture. At the end, although he was married, he decided to become a scientist instead: an astronomer. He took my two courses, and was beginning to run out of money even though he had hardly started on his Ph.D. Walt was extremely good; I suggested he peel off into computing full time, perhaps using his engineering background as well. He disappeared; six years later he surfaced as the number two computer man at Pratt and Whitney, and gave me a terribly hard time as I struggled to get the first 704s for Generous Electric. He was also one of the dozen or so founders of SHARE.

If By Havens had had the time, or if Lentz had had his doctorate, the electronics courses at Columbia would have gotten a great shot in the arm. But Havens already had the NORC bit in his teeth. So it was my side of the house that carried the teaching. It went on into the Fifties, always as part - but a small part - of the Columbia offerings. The hands-on side of the Machine Methods course was unique, not just because of the equipment but because real use-'em-every-day men and women were running it.

I mentioned how IBM treated its young draftees during the war: attention to the families, supplementary money, and so on. One other thing was that [-102-] they were all promised their jobs back, when things settled down. IBM had always used women, and was quickly able to recruit many more to fill in for the missing males. But it took the precaution to ask new female hires to agree to leave after the war if they were married, to make extra room for the returning heroes. I didn't know this, of course, but woke up to it painfully one day when Marj Herrick told me she had been given her congé.

Wallace and I tried hard to get a waiver, because of course she was in a job that didn't exist when the boys left, and that none of those returning could immediately fill. No soap; it was an edict from On High. Marj wasn't too upset; she and Jack were not very fond of New York, and unencumbered. She was snapped up quickly by Ken Arnold, a statistics professor at the University of Wisconsin who was starting a punched card lab, with a machine methods course contemplated. Jack Herrick found a job in Madison and we staged a great farewell party. IBM made a mistake, and lost not only a good employee but much standing with some important observers.

Two notes: Lillian had retired to married bliss in Brooklyn before Marj was beheaded, and I asked Eleanor Krawitz, her second on the Aberdeens, to take over as supervisor. Ellie was attractive - an understatement, pointed up by the Lab story about how she had stomped a visiting Swede who offered unwanted attentions - and she had a steady boyfriend. After the no-married-women clause was revoked in IBM, there was a grand party to announce their marriage - some years previously!

There was a woman executive in WHQ personnel, also attractive, who often brought her "steady" to company affairs. They were sitting next to us in the Hall of Stuffed Birds when Dorothy got the giggles, for instance. She was part of the beheading action that caught Marj. Many years later, long after the edict was abolished, she died. And of course it turned out she had been married all the time. Even Watson Senior, Emperor Of All He Surveyed, could not prevail over True Love - or New York ingenuity!

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11 CONFERENCE, A READY MAN

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In Chapter 11 you will encounter
(in order of appearance):

L.J. Comrie [01](#)

Wallace Eckert [01](#)

R.A. Fisher and T.N.E. Greville *statistical and actuarial computers*
R.V. Southwell *pioneer English engineering computer*
Watson Senior [01](#)
IBM Education Department *ran hundreds of "classes" for the customers*
THINK magazine [01](#)
BUSINESS MACHINES *IBM news for internal distribution only*
IBM POINTERS *machine usage tips for IBMers and advanced customers*
IBM computing meetings *eight, in Endicott, from 1940 through 1951*
WPA Mathematical Tables Project *ended up at NBS after the Depression*
John McPherson [01](#)
Japan *"a very IBM-like country"; I remembered the songbook and such!*
The 1948 conference *dividing line between pre-war and post-war computing*
Bill Bell *one of the new breed, from Lockheed and Telecomputing*
General Purpose Boards *demon board wirers did them for five machines*
Ward Beeman *put Bill's Telecomputing earnings into peripheral hardware*
Maxwell [05](#)
E.C. Bower *an astronomer who pioneered unsuccessfully at Douglas*
John Lowe *he made Santa Monica a leader in tin airplane computation*
Chuck Baker *"head grip" for Lowe, and still programming 50 years later*
The Rand Corporation *think tank spun off from Douglas by Hap Arnold*
Paul Armer *organized computing at Rand, and later helped found SHARE*
Cecil Hastings *the Great Approximator; in L.A., he never had a car!*
Moore School 1946 conference *put von Neumann's seal on binary machines*
Ed Berkeley *he wrote about "Giant Brains" but cared more about people*
The ACM [Association for Computing Machinery] *a world first in 1947*
Grace Hopper [01](#)
The BCS [British Computer Society] *a decade later, a much better name*
The AIEE [electrical engineers] *had a Committee on Computing Devices*
The IRE [radio engineers] *had an Electronic Computer Committee*
Joint Computer Conferences *the engineers and ACM started the parade*
The DPMA [data processing managers] *joined the Joints in the Seventies*
The 1949 IBM conference *Neumann, Tukey, Mina Rees and Tom Junior*
Watson Junior [Thomas J. Watson, Jr.] *a power even in the late Forties*
John Tukey *consultant to the Bell Labs, he ignored the "No Prunes" rule*
IBM dominance [09](#)
Alan Turing *known much earlier than COLOSSUS; his sad death diminished us*
Overseas computer meetings *started about 1953*
International computer meetings *the first one was not until 1959*

[-105-] While Dorothy and I were paddling and camping and driving around the country, a new way of transferring knowledge about computing was taking shape. In the Thirties such knowledge was passed literally from hand to hand; almost nothing was published - indeed, by the formal standards of the time, not much was publishable.

There was a little college of astronomical computers, a little college of statistical and actuarial computers, a tiny group of civil and mechanical engineering computers. Comrie and Eckert were deans of the first, R.A. Fisher and T.N.E. Greville were familiar figures in the second, a pioneer named R.V. Southwell had a few disciples in the third. The members of each group knew all the others in the group; corresponded, traded a few reprints. The day of the intercontinental telephone call, let alone of electronic mail, had not dawned. Only an occasional major figure like Comrie knew of the existence of other colleges.

There were people who needed to do a lot of X-ray diffraction calculations, and people who did airplane wing and turbine bucket shapes, and others in special disciplines like lens design. The slide rule

manufacturers and the comptometer and desk calculator salesmen did not pull them together; I remember with what sad amusement Maxwell and I flipped through a table of trig functions given us pridefully by one of the latter. But, as in many other ways, IBM was different.

This stemmed more from Watson's enthusiasms than from the nature of his customers. Long before scientific and technical applications were recognized as a business area, T.J. was spreading the gospel of better accounting, better bank operation, more use of his machines in schools and hospitals. If he sponsored business arithmetic and typing courses - yes, and tango classes - for his office people, and insisted that factory hires learn to read blueprints, you could be sure he would impinge on the customers.

[-106-] This was originally done by the Education Department, although the lack of a formal organization chart made it simple for T.J. to make special assignments. The little gang that put out THINK, IBM's prestige publication, and the various internal editions of BUSINESS MACHINES, could print special publications, or something like the retouched SSEC brochure; a young engineer who had realized that customer contact was required for advancement in the company could edit POINTERS; the housekeeping departments could put the Endicott Homestead and the country club facilities at the disposal of a customer group.

By the late Thirties a pattern of customer conferences had developed. I have a rather primitive printed proceedings from a 1940 statistics meeting, for instance, jointly sponsored by the Psychometric Society, and including a paper from the man at Michigan, Paul Dwyer, whose punched card installation Maxwell had ignored.

Not much could be done during the war; everybody was madly busy, and there was travel restriction and rationing. But the machinery was kept oiled and ready. In early 1946 Wallace coolly informed me I should think up something to talk about for a Research Forum, a follow-on to the 1940 conference, to be held in August at what was still called the IBM School, in Endicott. I overshot the mark somewhat - the 1946 meeting was slightly less technical than the 1940 one - and did "Harmonic Analysis by the Use of Progressive Digitizing." Wallace described the facilities of the Watson Lab (the SSEC was still under wraps, of course), and was more popular.

There was a 1947 "Educational" Research Forum at which Eckert spoke. The proceedings were a little more attractive, although still in paper covers. Support was not a problem; what our computer friends needed was content.

We looked around. There were two or three dozen punched card shops doing technical calculations. All used IBM equipment; the round-hole boys (Remington Rand) weren't in it, and anyhow didn't put on customer "classes," as the IBM Education Department unfortunately insisted on calling even the most scientific conferences. I called around, and wrote a few letters: the Naval Observatory, the Bureau of Standards (where the WPA Math Tables Project had alighted after the Depression was swept away), Aberdeen and Dahlgren, the Census, two or three tin airplane companies, General Electric; Paul Herget.

Looking back, I'm amused to remember I didn't use the salesman network; these people had all been in direct contact with us at 116th Street. If I had realized then how power flowed inside the company, I would have invited each outfit through its Friendly Local IBM Representative; as it turned out, many of the men and women who came and gave papers, brought their salesmen with them - they knew how the company worked, even if I didn't!

I was sort of the program chairman. Eckert was sort of the general chairman. John McPherson was sort of headquarters representative, although somebody gummy gave the address of welcome. The group - about eighty, including us company types from New York - were put up at the lovely IBM Homestead, at the junction of the two 18-hole IBM golf courses, and not far from the IBM Country Club. Transportation was provided by IBM busses to the IBM Education Building, which had a giant brass THINK sign over the door, featured in the formal portrait of the class taken on the steps by the IBM **[-107-]** photographer and printed in the next issues of the IBM Endicott and IBM Headquarters BUSINESS MACHINES. There was a tour of

the IBM Research Laboratory.

When I first began going to Japan in 1960, I looked at all the company insignias and remembered the Endicott ambience. Japan was (and is) a very IBM-like country. In 1947 in Endicott, the IBM label and the THINK signs and the standard portrait of Mr. Watson were everywhere. And yes, there was a company songbook - but unlike Japan, only the sales classes and the Hundred Percent Club members had to sing. There was an IBM symphony too, which T.J. had commissioned between the inventors' portraits and the ceramics collection, but nobody had to play it.

Even though they were scientists and engineers, the customers were impressed. And they were also impressed by the handsome decor and the excellent meals at the Homestead, and even by the malted milks served instead of nightcaps. They were restive at welcoming speeches, and not too excited by machine descriptions and lab tours; most of them had private lines into one company area or another: Los Alamos and RAND Corporation types directly, GE and airplane company types via their salesmen.

This 1948 conference was the IBM interface between the pre-war and the post-war - the pre-ENIAC and the post-ENIAC - computing experts. Almost all the papers were about the use of standard electromechanical IBM punched card machines, but the ones by oldsters like Gertrude Blanch signaled the last appearance of such people on the scene; they tended to have good pre-war degrees in mathematics, and to do pre-war tasks like table making, or statistics.

The newcomers had degrees in physics or aeronautical engineering, or frequently none at all. They were trying to do hard science, or design airplane structures; they were impatiently waiting for time on the SSEC, or delivery of new IBM equipment, or access to the electronic gear their private lines into Endicott and Poughkeepsie promised them. The old IBM sales apparatus had pretty much ignored the pre-war group; a new apparatus was not yet in place to handle the post-war group, unless you count our amateur efforts at the Watson Lab.

At Lockheed Burbank, there had been a very strong wartime computing shop revolving around an entrepreneurial type named Ward Beeman and a technical type named William D. Bell. Bill came to the Endicott conference, and told us that the group had split off from Lockheed, taken the applicable IBM machines, and formed a technical service company called Telecomputing. They had brought with them a contract from Lockheed to continue doing engineering computations, but were free to take on other work. Because the IBM equipment was rented, no large capital investment was needed, only a certain amount of confidence in their viability by the local IBM sales office. It was the first American enterprise of its sort, and preceded on the wider scene only by Comrie's Scientific Computing Service Limited in London.

Bill Bell was a fine example of the new breed. He was a handsome Californian, with a handsome California wife named Max and two handsome blond California sons (one of whom graduated from Hollywood High, and shortly thereafter turned out not to be able to read). Bill himself had [-108-] no degree; he had worked at an assortment of California-type jobs, including some in or near the movie industry. He was a good swimmer, a fine horseman, and a professional-class photographer.

He had worked himself up through non-scientific punched card operation into the computing group, which was then doing simple stuff like weight and balance control, and getting ready to go into structures calculations; aerodynamics was not yet feasible. He had taught himself the math he needed, including calculus and matrix arithmetic; knew little formal numerical analysis, but all that tin airplanes needed - engineers who had trusted their slide rules worried about loss of accuracy in long strings of IBM calculations, and Bill handled this by perturbing the input data slightly and watching how much the answers were affected.

He became famous among his late-Forties peers as a demon board-wirer. He was the father of the so-called General Purpose Board, which first out-hergetted Herget on 601s and 602As, then in 1949 was redone for the 604, and in 1950 and 1951 was redone again for the two models of the IBM Card-

Programmed Calculator, which I haven't said much about yet. These boards, packed with plugwires and split wires and connectors (and illegal germanium diodes, which had to be concealed from all but the most-trusted customer engineers, whose jobs were at risk if their IBM managers found out), did whole sequences of arithmetic, and in later versions even did primitive floating point.

Telecomputing - at least the business side - didn't want copies made of these confections. But like the atom bomb, the big secret was that anything that complex could be made to work at all. I don't think there was a single man or woman in the regular IBM who had ever wired such things, although the Aberdeen boards at the Watson Lab were just as complicated, and twice as big. The skill spread.

Parenthetically, Telecomputing did very well for several years, until Beeman and others took the profits from Bill Bell's operations and went into the hardware business. In other places I have mentioned a wonderful point plotter that counted the lines on graph paper; they also built a line of chart and film readers which punched digitized readings into cards. In the end that part of the business was bought out (the name survived because it was so attractive), and Bill's computing services became the Mellonics Division of Litton.

At Douglas Santa Monica an even more unusual sequence evolved. Back in 1934 or so, a California astronomer of Maxwell's generation had published some applications of Comrie's subtabulation procedures in, of all places, the Lick Observatory Bulletin. You would expect only the Grosches and Maxwells and Cunninghams and Hergets and Eckerts and Comries to read such stuff. But somehow this man, Dr. Ernest Clare Bower, was brought into wartime Douglas and turned loose in their punched card room. If it had been Cunningham, for instance, remarkable things might have happened; with Bower, it didn't work.

But running a sorter in that shop was a hulking operator named John R. Lowe. He had had a really rough childhood and a terrible education, had been on the road for a while, had had an accident which left him with an artificial leg - and draft-proof. He saw what Bower could be doing with the IBM [-109-] machines if he would forget astronomy and think about the airplane business. By 1947, John was in charge of a special group in Santa Monica almost as large as the one at Lockheed. Like Bill Bell, he taught himself the mathematics he needed, and after the war recruited youngsters who had still more. And, at least as important as his own accomplishments in Santa Monica, he brought along computing facilities at two other Douglas locations, El Segundo and Long Beach, and trained a good number of younger experts who fanned out over the aerospace community. The best known, still active in computing today, was Chuck Baker.

There had been an advanced planning activity at Douglas with connections to General Hap Arnold of the Army Air Force. It was split off and separately funded as the Rand Corporation (Research And No Development, it was rumored). When I first visited them they had moved their IBM machines to the basement of a downtown Santa Monica bank. The key figures were a forceful organizer named Paul Armer, who will appear several times later in this book, and a very strange mathematician named Cecil Hastings. Cecil wrote the first New Computer World hardcover book on numerical analysis, called THE INCOMPLETE APPROXIMATOR: a collection of amazing formulas to replace functions like sines and logarithms and probability functions - they used probabilities a lot at Rand, and still do!

Most of his approximations were what are called rational functions: the ratio of two polynomials. These were computable by IBM machines from the 602 on, whereas looking up the logarithms and such in a big punched card table was a slow process even if you had hundreds of values to pull out each time. Only the SSEC really tackled the problem head on, until the end of the Forties.

You had to be very curly-brained indeed to dream up these strange beasts, and Cecil certainly was that. He did not have an automobile - in Los Angeles! He rode a bicycle to the beach, where he said he did his most creative thinking, undistracted by the pre-Muscle Beach bodies. In the end he married a Chinese-American girl, moved to Hawaii, did a little consulting, and disappeared. As far as I know, he never bought a car.

Armer and Lowe were founders of SHARE. Bill Bell might have been; he would almost certainly have gotten one of the 704s. But as the machines were zooming onto the scene, he contracted multiple sclerosis, the Lou Gehrig disease. He managed nevertheless to produce the first hardcover book on business data processing, which McGraw Hill published. His was the first death among the new computer people, and it was deeply regretted.

About a third of the attenders at the 1948 meeting, which I christened the Scientific Computation Forum (the Education Department called it Customer Administrative Class No. 446) were oldsters; the rest were newcomers. My own case was unusual; I was as young as the new breed, and using the very most advanced equipment, but I also had a decade of desk calculator work and numerical analysis behind me. I was both the youngest of the old breed and a leader of the new.

For the 1948 Forum I did what turned out to be my last numerical analysis paper. I had developed ways of condensing the large traditional printed math tables down to a very few punched cards, starting with reciprocals back in [-110-] 1945 when IBM calculating punches could not divide, then moving to trig functions for the Luhn relay machines and the SSEC, and then to fancier stuff and a general formulation. In the end, each card of my optimum interval tables was a junior version of one of Cecil Hastings' approximations.

The difference was, I substituted routine punched card procedures for his intimate knowledge of the target functions. The paper in the proceeding gave the details, but as I said earlier, the flood of cheap memory made the technique obsolete by, oh, 1954. Cecil's ingenuity was not transferable, and disappeared with him; some parts of what I did survive in a tiny part of present-day numerical analysis called spline theory.

The conference was a big success. I edited the proceedings, and got IBM to put them out in hard cover - a first for the company. I seem to remember the print order was a thousand (copies still survive; not many). Plans were set afoot for an annual event.

When I said this was a new way of transferring knowledge about computing I was referring to repetitive meetings. History buffs know about single meetings of great importance to the art which date back before electronics: the Napier Tercentenary celebration for instance. And the influence of Johnnie von Neumann spread from the Moore School summer conference in 1946. IBM indeed started the pattern of continuing meetings, but as you would expect it was taken over by others, notably the professional societies.

In the fall of 1947 a small group of enthusiasts met in a room of the chemistry building at Columbia. The call was issued by Edmund C. Berkeley on behalf of a half-dozen men he had brought together to start the world's first computer society. Ed was at that time an actuary at Prudential, and had persuaded his company to order an Eckert-Mauchly Computer Corporation machine. He was the author of the first computer book, GIANT BRAINS, and for many years published COMPUTERS AND PEOPLE, the oldest popular journal in our field. He always lived in the future, and he served it well.

Eckert and I attended - he probably had arranged for the room. So did Grace Hopper. There were perhaps sixty persons altogether. We agreed to call the society the Eastern Association for Computing Machinery. In line with what I've been saying, the first order of business was to plan a series of meetings; the 1948 one was to be at Aberdeen, and I have mentioned how Johnnie von Neumann ran one of the sessions. The 1949 one was at Oak Ridge, in Uffelman country.

Grace, at her death Rear Admiral Grace Murray Hopper, U.S.N.R.(ret.), was the most famous and the most respected woman in our field. Of the charter members at that Columbia meeting, she and Ed Berkeley (and I) contributed to the outfit for decades, but only I survive as an active member of what is now universally called ACM. The name is unfortunate; since "Eastern" was dropped repeated efforts have been made to change it to something about people rather than machinery, but it's apparently too late. When the Brits started their outfit a decade later, they called it The British Computer Society, which is better.

The two major engineering groups at the end of the Forties were the Committee on Computing Devices of the AIEE, American Institute of Electrical Engineers, and the Electronic Computers Committee of the IRE, Institute of Radio Engineers. They put on a joint Computer Conference in Philadelphia in [-111-] December 1951, with ACM participation, and from this sprang a long series of conferences and exhibits: the Eastern Joint/Western Joint/Spring Joint/Fall Joint/National Computer Conferences, of which the 55th, the last successful one, was held in Las Vegas in 1986. ACM was a full member from 1952 on, the parent AIEE and IRE societies merged in the Sixties, and DPMA, the Data Processing Management Association, joined in the Seventies.

ACM began its big series of technical publications in the early Fifties, and the other associations and special committees also began to publish. Conference proceedings, usually a good deal less lavish than the IBM versions, began to proliferate. Everybody and his granddaughter wanted to have a meeting; the IBM excitement was immense, and still growing. If you count the 1940 IBM Forum as Number One, my 1948 Forum was Number Four, and four more followed.

The Watsonians reached out expertly. Where Wallace and I relied on our very large circle of acquaintances, the sales people began to make lists; everybody who had IBM equipment and was using it for anything technical, and everybody who was thinking about getting same, was on them. From the other end, the fancy scientific types who had not been interested at the time of the ASCC or ENIAC or SSEC dedications now saw the von Neumanns and Tellers and von Karmans deeply involved, and began to accept invitations to Endicott and Poughkeepsie they had brushed aside earlier.

As an example, the November 1949 meeting in Endicott attracted Herman Kahn, Maria Mayer, Mina Rees, John Tukey, and von Neumann. Tom Watson Junior opened the sessions. The big guns had begun to fire. I remember the meeting for a homely reason. Tukey, who was a world-class statistics theorist, an important consultant to the Bell Labs, and a father of both the Monte Carlo method and the Fast Fourier Transform, liked to sit in the back of the Endicott classroom and eat prunes. Not having as much to do as at the 1948 conference, I sat with him and shared the package.

Next week McPherson, who was now a vice president, had me on the carpet at Galactic Headquarters. Prunes were out, it appeared, even when shared with a customer - the No Booze Rule came to mind. I pointed out rather plaintively that the whole shemozzle sprang from my 1948 Forum triumph. "Herb," said John, "it isn't enough to bat a thousand in IBM. You must also make no errors." I remembered the poor devil who had rejiggered the WCs at the Watson Lab. It was the other side of the shiny IBM coin.

The next Endicott show was even more impressive to us working stiffs. It had what must have been the greatest percentage of the world's senior computer users ever assembled in one place. I have to justify that: I'm talking about men and women who were actually running big problems on big machines at major centers. There were no big installations to speak of outside the United States. Inside the U.S. the one-off machines that were the features of the non-IBM conferences - SEAC, the von Neumann machines, the ones being built at universities and by big amateurish companies like Raytheon and General Electric - were not running even on sample problems. Remington Rand and its Eckert-Mauchly and ERA offshoots were not yet competing.

There were 107 attenders, including six women. There were papers by a dozen men who already figure in my stories: Hamming, Yowell, Lowe, [-112-] Hastings, Herget, Uffelman, Tukey, Bell, Ramshaw's boss, the new president of ACM - and two women. Five referred to my table-making scheme; I was flattered.

Jack Belzer was there, and Marj Herrick's new boss, and two Canadians, and fifteen IBMers - all professionals, not salesmen. Not until the 701 big shots came together in 1954 was there such a powerhouse of IBM users, but by then there were big non-IBM machines working all over the world.

Which reminds me about conferences outside the U.S. There were problems; the British had a cadre of experts, including men who had been deeply inside the American war effort and had contributed to the

new electronics. But as the Forties computing scene developed on both sides of the Atlantic, the people actually doing calculations were using desk calculators and differential analyzers and punched card machines (the British said Hollerith). For every Comrie or Hartree or Southwell we had dozens - and a great deal more equipment for them to use.

There were special cases like Turing, and we now know there were amazing early electronic machines like Colossus hidden away. But by and large, men and women from Britain and the Continent who needed to learn from conferences, came to ours. The first good meetings in England and Australia did not begin until about 1953, and the first truly international one was not held until 1959. Many of us regretted it, especially the scientific types: wanted to see our overseas friends functioning on their home territory. In the end we did, of course, but it took a while.

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12 POUGHKEEPSIE DEFENDS THE COUNTRY, OR AT LEAST IBM

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In Chapter 12 you will encounter

(in order of appearance):

John McPherson [01](#)

Watson Senior [01](#)

IBM printer developments *four at once in 1947, and they all were used*

BINAC *a big come-down after ENIAC, and it ran out of money besides*

Eckert/Mauchly approach *turned down coolly in Watson Lab library*

Jim Rand *Rem Rand accepted what IBM had refused, and got the UNIVAC I*

Bill Bell [11](#)

Northrop *wild-eyed airplane engineers coupled the 603 and the 405*

Fenn, Woodbury and Toben *asked McPherson to do a better job*

The CPC I [Card-Programmed Calculator] *with 64 words of extra memory!*

Brouwer, Clemence and Eckert *if there had been a Nobel for astronomy ...*

Dick Bennett [07](#)

John Lentz [10](#)

Yale Observatory *lent Eckert a giant measuring engine to automate*

Hurd [Cuthbert C. Hurd] *came into IBM to start Applied Science*

John Sheldon *Hurd's brightest new hire, he ran a computing bureau*

The Watson Lab [01](#)

Laboratory science *IBM began its enormous investment*

Ken Clark, Becky Jones and George Samson *held the fort for Eckert*

Jim Birkenstock *an interface for Hurd with WHQ*

Watson Junior [11](#)

The von Neumann Constant *completion: three years from any given moment*

The Korean War *T.J. fanned out his troops*

The Defense Calculator *later the 701, it was the key to IBM futures*

Poughkeepsie *T.J. decided to make it the center for electronic machines*

IBM plant location policy *it wanted to be a major force in new towns*

Ralph Palmer *he ran the 701 project, after working on the SSEC*

Jerry Haddad *Number Two for Palmer, after doing the 604*

Rochester, Astrahan, Buchholz and others *more Radiation Lab graduates*

The RCA labs *Rajchman was trying to make an electronic storage tube*

ERA [Engineering Research Associates] *had better magnetic drums than IBM*

The TPM [Tape Processing Machine] *put aside, it matured into the 702*

The Test Assembly *testing electrostatic storage and Rochester's software*
The Kenyon Estate *bulging with bright young electronics engineers*
Bill McClelland [10](#)
"Wilkes, Wheeler and Gill" *it was the only hardcover programming text*
Copy machines *in that dim, dim, dim past, there weren't any!*
Binary cards *about half the holes in each column got punched*
Octal versus octonary *Rochester and I, purists, preferred the latter*
Floating point *everybody except the cryptologists insisted on it*
An estimate of Watson Senior *"... I shall not look upon his like again"*

[-115-] The Endicott engineers didn't worry much about the conferences being held up and down the United States. For one thing, the senior ones like Lake and Hamilton and Luhn - well, Pete was in Poughkeepsie by 1948 - had all they could handle in their own shops. Each of them had a complete facility: office space, a drafting area, a small machine shop and a fair-sized electronics lab, and an assembly-and-test space. Access was severely limited - officially, only the administrative head of the laboratory, a few WHQ executives like McPherson, and of course T.J. himself, could enter.

In reality a good deal of scuttlebutt was exchanged in the cafeteria, and via salesmen and customers who sneaked in, and over iced tea at the Country Club. But in theory, each inventor and/or project was separate. There was a time [1947] when the same Endicott building held four printer projects. One was developing the vertical typebar idea still further, one was doing a wheel printer for what became the 407, one was doing a horizontal chain type which later went into the 1400s, and one was experimenting with better wire matrix componentry - initially for key punches and interpreters. When Watson had a free day he would tour the various facilities and give his verdict: stop, continue, increase the effort, send it over to the factory. Cynics claimed that the verdict sometimes depended on the shape of the casing or the quality of the paint.

My own view was different, and was reinforced by the fact that all of the printer projects came into production. IBM was sales dominated, and the market was ravenous. Almost anything had potential, and the Blue Suit Brigade could sell it even if it didn't. An engineering or production failure like the 602 could occur, but the lab people and the factory people were very good - and the sales force quickly whitewashed the rare blunder.

[-116-] To shift gears slightly, I have sharp memories of two scenes involving John McPherson as a buffer for T.J. I'm sure he did some of the Endicott tours for Watson and made - well, recommended - decisions, but the two I am remembering were in New York City. Very early in the game, Pres Eckert and John Mauchly wiggled out of their Moore School commitments; the story has been told elsewhere, and frequently. They started a small company and began to build a dumb gadget called BINAC, and what was to become the UNIVAC I. In a way that would become very familiar in the Seventies and Eighties, they ran out of money. And their sponsor died.

They came to IBM. I was not directly involved, but Eckert - Wallace, that is - advised McPherson, and I advised Wallace, negatively. Their application certainly went to T.J., but I never heard the details. Anyhow, there was a meeting in the library of the Watson Lab, and John McPherson said no. The two hopefuls went from that session directly to Jim Rand's yacht in Florida, according to folklore, and signed with Remington Rand. The Old Man didn't have a yacht (he used the Queen Mary), but he had a lot more of everything else than Jim Rand. He made a good decision, as usual.

The second scene was more fun. I've mentioned how clever users like Bill Bell wired up "illegal" plugboards which customer engineers were supposed to report, for extirpation. We were always told it was for patent reasons, which I doubted and still doubt. Well, much greater crimes were being committed elsewhere in California. Observing that IBM connected the older machines together, notably summary punches to tabulators, wild-eyed users in the tin airplane business tried connecting the new high-speed

electronic boxes to the more flexible older machines.

The first venture to do useful work was a 603/405 combination. Northrop had one of the space-heaters, which you remember did six-figure multiplications only, but very fast. They ran long plugwires between the simple 603 plugboard and the complex 405 tabulator board, taking advantage of the fact that no electronic signals were involved (they were all down inside the 603, and never got to its plugboard). Their customer engineer, who must have been deeply involved, had to pretend to be shocked by all this, and reported it up through his channels. Orders came back down to, ah, terminate with extreme prejudice.

I was called down to McPherson's office. He had visitors from Northrop: George Fenn (who later gave a paper about the combo at my 1948 Forum), Bill Woodbury (who soon came to work for IBM, and is remembered by old-timers as the planner of a similar machine called the Wooden Wheel), and Greg Toben. They were counter-attacking; instead of discontinuing the 603/405 experiment, they asked IBM to build them a better machine using the forthcoming 604 and an improved 403 tabulator, and to provide additional storage. They wanted a few hundred bytes (we said "positions" in those days); today, hungry customers beg for gigabytes - same hunger, larger appetites!

McPherson looked down his nose at these importunates. They should be happy that IBM wasn't about to pull out its machines entirely, for gross violation of the terms of the rental agreement; as for the suggested new combination, certainly not.

Fenn looked grimly amused. He produced a personal letter from Jack [-117-] Northrop to Mr. Watson which pointed out that Northrop had several important military contracts whose rapid completion was of tremendous importance to the national security, and asked IBM to cooperate. I gathered the letter was to be carried upstairs that very day if McPherson's answer was unfavorable.

John got very red in the face. I waited for the outburst. Fenn And Co. had been pretty crude; also I knew from my aerospace connections that Northrop was a long way down on the totem pole compared to Convair, say, let alone Douglas or Lockheed or Boeing. Problem was, all customers were theoretically sacred - and those like Fenn and Uffelman who threatened to put the bite directly on The Old Man were more sacred than most. The local salesman was supposed to see that the bite was never put; no doubt an Anchorage transfer would be in the Los Angeles office in-basket shortly. Meanwhile ...

Like all IBM offices John's had an easel. As his choler faded he stepped over to his and began drawing boxes. In an hour we had the outline of what was to be called the Model I Card-Programmed Calculator: an electronic computing box, a flexible tabulator to read programs and data from cards and print answers, storage in the tabulator and in extra electromechanical boxes. Linked together by tidy cables rather than with plugwires, needless to say.

It was a remarkable conference, and presaged a very popular system. There was another novel aspect; not only had a customer dragooned IBM into building a new production machine, but it was agreed that documentation, and maintenance training, should be furnished. Small scale perhaps, but better than for the 603 - and far better than for the Aberdeen machines. And as for me, I stored away impressions of how to make IBM respond.

I inherited one of the last of the Model Is when I was hired into General Electric [1952], but I was so interested in graduating immediately to a familiar Model II that I hardly noticed the exact rental. Somewhere around \$4,000 a month, I suppose, depending on how many boxes of auxiliary storage you had, and on whether you needed to rent support machines or already had them. That means a system would have sold for \$150,000 or \$200,000 if the option had existed. And, to put it in today's perspective, both speed and storage were less than those of a good end-of-the-Seventies hand-held programmable calculator, selling for \$500!

Fenn described his original lash-up, perhaps a little lavishly, as "comparable in programming technique to

current large computer design - a poor man's ENIAC." It programmed a lot easier than the original pre-Clippinger ENIAC; he might better have said "a poor man's SSEC." He could card-program double-accuracy multiplication - decimal, of course, and not floating point - in just over two seconds, and six-figure square roots in one minute; trick wiring on the 603 board was not possible. But he was doing vibration calculations and planning on trying some aerodynamics, in 1948!

About this time an important new figure and a new team came onto the field in IBM. I've said that a post-war sales apparatus was not in place to handle newcomers like Bell and Fenn. I should have moved into the gap. I had a steady flow of importunate visitors at the Watson Lab, and was in demand as a speaker for informal groups, who wanted to get into IBM-style computing.

Sometimes an alert salesman was involved, or the potential customer wanted to bypass a dull IBM local office, but the link to the chain of command [-118-] that produced special gadgets or fast delivery was feeble. I could have strengthened it. I wanted very much to rise in the company, but had not purged myself sufficiently of research and teaching. And my wife Dorothy really hoped I would go back to astronomy, or at least be an Eckert and do some major celestial mechanics on the machines I had such wonderful access to.

Hilleth Thomas was delighted to do his physics, and have a Columbia graduate student or two. Eckert had the IBM countryside spread out before him, and chose to ignore it whenever he could. He wanted to do research, and he did; if there had been a Nobel prize in astronomy he and his confreres Dirk Brouwer at Yale and Gerald Clemence at the Naval Observatory would have won it for the tremendous contributions they made to our exact knowledge of the motion of the Moon and the planets, using the SSEC and later IBM equipment.

An example: Wallace rummaged through post-war IBM and found Richard Bennett, the customer engineer who had made Belzer's Air Almanac master sheets possible back in 1941. He brought Dick to the Watson Lab, partly to help with the Aberdeens when they arrived, but mostly to build a photoelectric reader for the huge glass plates that came out of the Yale astrographic program. The star images to be measured were delicate little things by 1946 standards, and John Lentz was hard put to it to devise the electronics. The gigantic measuring engine, with precision screws two inches in diameter, was loaned by Yale; John put a rotating beamsplitter on the reading microscope, picked off X and Y signals, and with them ran delicate servo motors that improved the settings.

The initial setting was made from a punched card deck, one star to a card, and the final settings were punched on the same card. Further work on standard IBM machines at Yale produced the star coordinates for publication. This monster filled a whole room in the first basement at the Lab - I've neglected to say that "huge glass plates" meant about thirty inches square and a third of an inch thick. It was one of the exhibits on T.J.'s tour of the Watson Lab, and I suspect it confirmed his realization that Eckert was an astronomer first and an asset to IBM sales efforts very far down the list.

The new player appeared. He was Dr. Cuthbert C. Hurd, who had come to my 1948 Endicott Forum from Oak Ridge. He had nothing to do with Uffelman; was head of a small statistical group over on the Union Carbide side, and had access to IBM equipment there. Now IBM never hired anyone away from a customer - or so they told people who wanted to be hired away! But men like Eckert and Hurd popped up through special trapdoors.

Hurd was brought in to head a brand new Applied Science Department, which meant that while he did not capture the Watson Lab or the SSEC, he did take over the Endicott conferences. He and the group of youngsters he quickly put together were exactly what was needed to handle the special customers and the special machines like the CPC, as we had begun to call the Card-Programmed Calculator. He himself didn't know much about hotshot computing, but the men and women he acquired from Seeber certainly did, and his new hires included one of Thomas' brightest students, John Sheldon.

Soon that triage that Eckert and I had performed for three years was being done by Hurd and his staff, and very differently. Problems went to the SSEC [-119-] if they were very large, and either had good public relations value for IBM or were submitted by a rich sponsor like GE; the value to world science which had moved Eckert and Thomas, and to a lesser extent Rex Seeber and me, no longer counted heavily.

Customers or potential customers certified by their Friendly Local Sales Representative were encouraged to order CPCs or whatever, and Hurd's senior people would help. If the customer had only a single problem, the Applied Science Department soon had a technical service arm set up on 56th Street to handle the business; it was run at first by Sheldon, and used the youngsters from the SSEC. If the prospects were patted down and found to have no money, the glories of IBM's Watson Laboratory were paraded. And the fairly large cut of problems that formerly was allowed to die in a quiet corner, dwindled to almost nothing. All, or almost all, was grist if it came anywhere near the Applied Science mill.

I was green with envy on Mondays, Wednesdays and Fridays and livid on Tuesdays and Thursdays. Indeed, it was very different from Wallace's lunar theory, and great lunches at the Faculty Club. But it was clearly needed. There were hundreds, and soon thousands, of computing centers waiting to be born. The wave of the future embarrassed Eckert - probably it is not too cruel to say, much as I admired him then and remember him warmly now, that the wave annoyed him. Celestial mechanics moves very slowly; it is ironic that Wallace, wanting to speed it up a little, helped open the floodgates for this enormous torrent of change. He was too sturdy a rock to be swept away, but the flood washed over him and left the little 116th Street Watson Laboratory behind.

After I left [1951] there was a quiet time. Then another force arose in IBM; call it laboratory science - physics and chemistry and such. It also was pure science, but not Pure Science. In the Sixties and Seventies IBM made earthshaking investments: built big research laboratories in several countries. Before that, and especially before Yorktown Heights was planned, the original Watson Lab was moved to a much larger building at 612 West 115th Street, and the instruction at Columbia and for customers, in machine methods and numerical analysis and so on, was subordinated to bench science.

Havens had moved out to nearby quarters to build his NORC. Eckert and his little band of assistants - Becky Jones, Ken Clark, George Samson - were in titular charge. But the novelty of computing was gone, and when the SSEC was torn out of WHQ to make way for a production machine ten times as powerful [1952], the old Watson Lab era ended. The building on 115th Street drew scientists who did not want to work in Westchester, but it was shut down when the post-Watson-Senior rigidities of a giant company dictated. Wallace retired in 1967, kept on with his research of course, and died in 1971. He and Comrie had revolutionized user perspectives, just as electronics had revolutionized the hardware. I remember him fondly.

About the new player: Hurd was a natural executive. He hired excellent men and women, and he delegated. He was an empire builder - the exact opposite of Wallace Eckert. He mixed easily with the McPhersons and the Birkenstocks, and with Tom Watson Junior. He was great with the customers, except for a few real toughies. I've said in a hundred speeches that the supreme art of IBM salesmanship is to convince the customer that the dumb [-120-] hardware and software the salesman is forced to offer him is precisely what he needs; Cuthbert was a master of the art. And he didn't wear a beard!

He was not himself a computer user. He certainly was not a machine designer. He didn't see the wilder shores of the future. But he saw where IBM could go next, and which customers needed more advanced equipment. And he worked far better with the planners and engineers than I had, partly because he was down inside World Headquarters where it all came together, and partly because he had no component, no architecture, no programming method he wanted to push. I wanted - and still want, after more than thirty years - to invent a solution, to convince my peers of its value, to lead the troops to victory. Cuthbert was looking for battles IBM could win - and he was careful not to get badly shot up while looking, or on the battlefield. I tried to warn the airplane customers that floating point was dangerous; Cuthbert argued inside the company for more CPC production.

Out in the world, there was competition. Not much; we were just emerging from the years of the von Neumann Constant: from any given moment to the delivery of a finished computer is three years. All the real work - what in the Eighties we called number-crunching - was being done on 604s and CPCs, both in heavy demand (and the latter in process of revision). But there were orders for Remington Rand machines; none of the big ones had been delivered yet, and the one-off machines like BINAC were dreadful, but T.J. had been alerted.

And there was fighting again, in Korea [1950]. The Old Man had lost a little of his vigor, but none of his patriotism; he started a Military Products Division, and his troops fanned out. The customers were eager. The electronics that had begun at MIT and surfaced in the 604 was blossoming in several places in the company. As the American difficulties in Korea mounted, and Washington began to pump out funding, Hurd and his people took to the road.

They went to the lead customers - the ones who had several CPCs, and were clamoring for better ones. I knew about this from the men they visited in Los Angeles and Schenectady; Hurd was careful not to involve me in the calls. General Electric asked my advice, and I told them to get in line. The airplane boys were jostling for position. Hurd soon had fifty expressions of serious interest, half of them backed by letters of intent. No machine specification. No price. No delivery date. But lots of customers!

Euphemisms abounded, then as now. IBM would build a Defense Calculator, not a Win-In-Korea Calculator, and certainly not a Knock-Out-Univac Calculator. Tom Watson Junior was the key executive; he could go to his father and speak frankly: talk about General Macarthur's problems, and how Remington Rand needed curbing. He did, and came back with a big dollop of money from The Old Man's shoebox. Published accounts say \$3 million, but that was just for starters; the internal gossip said \$25 million, and was current before the first machines were delivered. Of course both figures may be accurate; remember I said in the chapter about the SSEC that the indirect costs of that machine were never included, or even calculated.

Years later, when IBM was forced to begin selling its machines [1956], it appeared that the selling price was around forty times the monthly rental. The first internal guesses at the monthly rent for the Defense Calculator were \$8,000 or so; the amount I paid for Number Six was \$15,000; the customers [-121-] who stormed the citadel in 1954 to order 704s were told the Defense Calculator rental should have been \$30,000 a month, and would still not have turned a profit. That points to \$1.2 million as the sale price and also the cost, or \$24 million for the program.

While Eckert was recruiting the three Watson Lab electronics engineers from the MIT Radiation Lab, more conventional methods were bringing others from Cambridge and Los Alamos and such, into major parts of IBM. Watson had decided to develop Poughkeepsie, which was making key punches and electric typewriters, as the company center for electronics development and manufacturing. This was partly because there had been a good deal of munitions production there during the war (Endicott was needed to pump out the larger punched card machinery), and there was available space.

Also T.J. had a philosophy about locations. He liked to go into towns like Poughkeepsie and San Jose and Lexington, Kentucky where IBM would be a major force. Later I was to watch GE do the exact opposite; it had had its bellyful of Schenectadys and Lynns and Eries, and wanted to go to places where it would not yo-yo the community up and down. The Old Man enjoyed powering the upswings, and had ordered that there be no downswings.

When I began going up to the first engineering projects in Poughkeepsie from the Watson Lab, to visit Pete Luhn and also to give informal courses in numerical analysis, the taxi drivers who brought me from the New York Central station invariably asked me how they could get jobs with "the IBM." Which reminds me, there was a clutch of employees who had to go up to Endicott frequently, on the Lackawanna Railroad or via Robinson Airlines, who thought it great that IBM was expanding into Poughkeepsie, because the train service was so much better.

The bright young men there worked for Ralph Palmer, who had been a team leader on the SSEC under Hamilton. The Number Two was Jerry Haddad - Jerrier A., to be precise - who had done the 604. The systems architect was Nat Rochester, who really had wanted to stay near Boston after his Radiation Lab days, but worried about its attractiveness as a nuclear target; in those times no one dreamed that Poughkeepsie would some day become high priority. Then there were Mort Astrahan and Buck Buchholz, I think also from MIT, and Clarence Frizzel from Old IBM, and Max Femmer, and a dozen others.

Most of them were clustered around a project called the Tape-Processing Machine, and a test bed for electrostatic storage called the Test Assembly. You have to understand that no one had today's kind of magnetic tapes working yet - Sam Alexander, who was building SEAC, the Standards Eastern Automatic Calculator, in Washington, was trying to use magnetic wire, and Mauchly had talked about metal tape for what was to be the UNIVAC I, as far back as 1948.

In spite of several years of effort, RCA had not been able to make a working tool out of storage on the face of a special cathode ray tube. Successes were just being reported from a different attempt at MIT's WHIRLWIND. And IBM was behind its smaller competitors like ERA in the art of magnetic drums. So the company was not even sure of the componentry for the Defense Calculator, let alone the system structure.

[-122-] The team and the Test Assembly were in a mansion away from the river and the main plant. It was part of the Kenyon Estate, and IBM had bought the property in order to have room for a new laboratory and more engineering buildings. After the lab went up across the road, the big house was remodelled as IBM guest quarters. But it was bulging at the seams with bright young electronics engineers in 1951. Many of them showed up at a plant classroom to hear me talk about table lookup and the convergence of square root iterations, and my kooky way of looking at number systems like biquinary and signed ternary.

Hurd had assigned Bill McClelland, whom he had recruited from the SSEC the year before, and two or three other Applied Science types, to help with programming development. From reading the first hard-cover book on programming techniques, an English contribution everybody called "Wilkes, Wheeler and Gill," from informal exchanges at conferences, and from the aquifer of brand new ideas that was flowing from MIT and Columbia and the Moore School, Rochester and his crew knew that programming in machine language, and with absolute addresses, was obsolete. The next level of sophistication was being established. The New York contingent pitched in.

I was in "wait" mode - very unusual in those torrential times. In fact, it was a new thing for me; I had whizzed from my thesis to the Naval Observatory to wartime optics to the Watson Lab without a break. I could see that the Defense Calculators were going to go to customers who were mostly very different from the scientists we had seen at the SSEC and Columbia. The Applied Science youngsters understood them very well, but in the role of camp followers of The Blue Suit Brigade, not as equals. That meant, because of the gentility expected of all IBM employees, they weren't practiced at saying no, let alone "Hell no!" I offered to simulate a Fenn-type customer; with a faint shudder, I was accepted. Not a formal reassignment, just frequent several-day visits.

I had to stay at the Nelson House, a hotel whose sole distinction was that the swizzle sticks in the Regatta Room were shaped like sculling oars. Many, ah, software conferences were held there, the Even After Work clause of the No Booze Rule having been relaxed, especially if you had been back to work after supper. At the Kenyon Estate, I shared a tiny office converted from a maid's room, and kept my papers in a file cabinet in the bathtub next door. I made a few design contributions, notably to an argument about whether to retain both positive and negative zero, in the pure-binary number representation (simpler souls wanted to sterilize the minus). Somewhere about this time I also made a major selling-type point, that the IDLE lights on many machines be replaced by READY lights - and not red ones, either.

Nat Rochester had hand-written an operating manual, reproduced by Ozalid machine. It described the operations he hoped Palmer would let Haddad order the engineers to build into the machine. The next version was typed, and had lost most of the TPM, Tape-Processing Machine, operations. This came easy,

since these had been business oriented - for sorting, and so on - and the engineers felt a little at sea. The Defense Calculator was to have a fixed length 36-bit word, and extra precision and floating point, dear to the hearts of nuclear physicists and aerodynamics experts, were to be in sub-programs. I helped with that too.

[-123-] Today's youngsters really can't picture how we worked. Not because of the primitive software tools, not because there was no hardware yet to try prototypes programs on, not because nobody had invented terminals - but because there were no copy machines! And if somebody writes a story like this at the turn of the century, I suppose the equivalent remark will be made about word processors. As I said above, Ozalids!

When a gang went out to eat together - there was no dating, in spite of the tempting array of Vassar girls just up the street - each man would keep a mental total of his items. When the bill came, you added tax but not tip and put down your share. If the pile added up perfectly, which it almost always did, you added whatever tip you wanted. If it did not, and postmortem revealed a culprit, he had to pay the total tip. I was the authority on rounding errors. Usually it turned out the waitress had goofed. An innocent pastime - and it took your mind off the food.

There were concentric rings of programming. Right around the machine - or the machine design, at the time I was involved - were small programs written in pure binary, to persuade the ALU (arithmetic and logical unit; the heart of what we now call the CPU) to eat punched cards and understand them. Such bootstrap operations are stored in read-only chips today in millions of small machines, but electrostatic memory was far too small to waste in such fashion in 1951, it woke up empty every day, and it twitched (in the Test Assembly anyhow) when somebody turned on an air conditioner upstairs.

The plan was to start up with a blank memory, by flipping console switches read one card into a corner of memory, transfer control to the first word in that corner, and go. I suppose Nat wrote the first one; the champion of the art was to be FEJ, Floyd E. Johnston, whose meticulous handwork in 1952 was shipped with the production machines. Those so-called binary cards were a far cry from the ones that went into regular punched card machines, or even the CPCs. The Defense Calculator regarded any card as 960 ones [punched holes] and zeros, which on the startup cards were read as 24 binary words plus ignored patterns. What the inner ring of programs did they did with sets of those 24 words, understood as commands. You could tell binary cards easily by the very large number of punches: an average of six per column, where one or two per column was ordinary punched card code.

The next ring of programs got you out of pure binary into octal. Nat and I were purists, and tried to get the gang to say octonary, as in binary, ternary, biquinary (the abacus code). Alas, "decimal" filtered down past nonary and won the day. With octal input, you could not only write programs usefully on coding sheets, which - shades of Maxwell - were being devised and revised and discarded almost daily, but you could punch them on cards with an ordinary keypunch, and reproduce and sort and collate and print with IBM's standard machinery. True to the shoemaker tradition, the crew was very short of such gear, and I invited them all down to my smoothly-running shop on 116th Street; no takers!

One of the binary programs in the first ring taught the Defense Calculator to understand octal, of course. And a small pack of octal program cards taught it to work in assembly language, where the code for operations was **[-124-]** alphabetic/mnemonic and the locations in memory were relative, and given in decimal. Other second-ring octal programs fired up the tapes and drums, giving faster streams of data in and out. Still others operated the card punch and the line printer, which were also being architected by Rochester And Co. and designed for production by some of Haddad's troops by modifying standard Endicott gear.

To break into the programming story for just a paragraph, this was one of the IBM strengths. While Pres Eckert and his crew were struggling to produce the UNIVAC I (and with a considerable head start) they were having to design everything; not just tape drives, but input typewriters and such. They got no

advantage from round-hole cards, partly because there was no Watsonian discipline to force cooperation from the curmudgeons in Norwalk, and partly because the inflexibility of the mechanical Rem Rand equipment made interaction with fancy electronics impossible. The IBM machines, even the older ones, were controlled electrically; sure, you couldn't hook up a sorter to a tape drive, but you certainly could use almost all of the printer unit of a tabulator, and pretty up the results very considerably by retaining the plugboard and the paper controls.

When cards which were punched in octal or in assembly language became re-usable - that is, needed to be run several times before being altered again - a "permanent" first-ring binary card program converted them to binary-card form. These read in about ten times faster than the originals, and all production software was later shipped that way [1953].

Quite a few second-ring programs were working when I began coming to the Kenyon lab. Bill McClelland and the Applied Science men were using assembly language to try out stuff on the Test Assembly (no relation). I wanted to try a few things in the next ring of programming: in my case, multiple precision (I seem to remember someone had already undertaken simple single-precision floating point). These programs would be too big to run on the Test Assembly, which meant they were paper studies. The machine would be modified a hundred times before any of them could hope to be tried. No matter; it showed Rochester where there were lumps in his op codes, and he was not only willing but anxious to be shown. It was understood that everything, including all of the first-ring and second-ring programs, would have to be rewritten for production gear, and modified later besides; the euphemism "maintenance" would not be invented for nearly fifteen years, but the idea was already accepted.

The 36-bit word size was probably unfortunate, and it most certainly stretched the abilities of customer problem analysts and programming experts later. When you chopped off a piece for the exponent (and sign) in floating point - which in spite of my Jeremiads all the customers except maybe the cryptologists insisted on using - there wasn't really enough left for accurate matrix calculations. Or astronomy, but I could already see before the design was fully roughed out that not much of Wallace's stuff was ever going to run on a Defense Calculator! Anyhow, it was too late; looking back from the Eighties, I guessed 48 bits would have been optimal; the 360/370 experience showed us that 32 is not enough, and 64 would have been wasteful.

There was an important difference between the programming crew (and [-125-] me, the simulated hardhat computing customer), the eager MIT electronics group, the Applied Science and Pure Science youngsters back in New York, and all the rest of the IBM apparatus. Every single one of us assumed there was infinite expansion ahead. I saw small waves, and then large waves, and then huge foaming torrents of new science and new technology: science fiction coming to life. The hardware group was perhaps a little more business minded: they saw waves and waves of new machines.

At 590 and in Endicott, and even in the factory reaches of Poughkeepsie, it was not at all obvious. Most of the manufacturing people, most of the planners and factory schedulers like George Richter, most of the salesmen - and, not surprisingly, almost all of those subterranean beancounters - thought the office machines were the way to go. IBM had always followed T.J. into special ventures like the Harvard ASCC with pride, but few of the sales force or the top brass ever thought such stuff could be product lines like time clocks or typewriters, let alone supplement or supplant the punched card equipment.

There was no resistance to electronics, except perhaps from a few discomfited customer engineers; the 604 was a salesman's dream. The CPCs were a different story; if an installation needed help, one of the Applied Science men or women had to be called in. The company had always had a small fleet of systems "engineers" - frequently women, during WW II - who would wire difficult plugboards. But they were part of the local or regional sales teams, and hence floated on the commercial currents. Even after Hurd began to put Applied Science reps out in the field (starting in Los Angeles in 1950 or 1951), they marched to a different drum than the systems bunch, and their services tended to be demanded directly from WHQ by knowledgeable customers.

Everything turned on Mr. Watson. When he said the CPC was a good thing (I suppose he must have), it flourished. If he had said no to the Defense Calculator, as he might well have done if it had been called the Scientific Computer or some such, IBM would not have surged over UNIVAC and ERA and the small specialized companies that were springing up. In the end it would have been a major player, as Rem Rand and National Cash were. But it would never have towered over the information world as it did into the Nineties if it had lingered in those profitable punched cards.

The stories about how the company got into commercial production of computers tend to emphasize how heroic the Hurds and the Birkenstocks were, to have persuaded Tom Junior and Tom Senior to make that \$25 million dollar commitment in 1950. For me, though, the hero is The Old Man himself: 76, an imperial figure secure on his throne, with an heir apparent trained and ready. How many men in that position would have taken such a confident stride into the unknown? And it wasn't luck; his track record at National Cash, his insights in the early IBM days, his backing of research in the company and science and the arts outside, his international successes tell us it was something much deeper.

He was a man, take him for all in all, I shall not look upon his like again.

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13 TOM JUNIOR GIVES ME 24 HOURS

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In Chapter 13 you will encounter

(in order of appearance):

Williams and Kilburn *two remarkable engineers at Manchester University*

Electrostatic memory *the Defense Calculator was to have Williams tubes*

Max Herzberger *Kodak Research Lab expert on optical aberration theory*

"Real Research" [05](#)

Hurd [12](#)

The Blue Suit Brigade *advancement in IBM was through the sales force*

John Sheldon [12](#)

The SSEC [01](#)

A Washington Technical Service Bureau *a special market that I knew well*

John McPherson [01](#)

The CPC II *the hardware was under way, but no one had started software*

Ellie [10](#)

Eric Hankam [09](#)

Red LaMotte *all Washington was the fiefdom of this tough Old Watsonian*

Two 1972 luncheons at the Savoy *Univac had me; IBM had the Duke of Kent*

Grosch's Law *a 1950 afternoon's work and four decades of dividends*

Computer speed *about all we gave the customer for his money, early on*

Ken Knight *did a Stanford doctoral thesis featuring my Law*

Scientific machines for business processing *Lyons in London pioneered*

Access to top management *at Northrop and Lyons but not at Metropolitan*

MONY [Mutual of New York] *their building had a great weather display*

Watson Junior [11](#)

Horace Post *even when Tom was only my salesman, he had a secretary*

John Phillips *president of IBM when I first visited the Homestead*

The Watson Suite *the most lavish bathroom I had ever seen*

MONY directors *my proposal got all the way to the top, worst luck!*

Wallace Eckert [01](#)

Frank Hamilton [01](#)

Ernie Hughes *helping Frank design what turned out to be the IBM 650*

Dorothy [01](#)

Mary Noble Smith [08](#)

The UNIVAC I *the first was for Census and the second, for the Pentagon*

Don Gamel *"a smoothie from the Blue Suit Brigade" who ran Federal*

Scottie *he had spare space on 19th Street until I showed up*

Bachrach *same day service for IBM mug shots*

A small row house *near Q Street, and a big step up from our WW II place*

[-127-] I left the Regatta Room and the rest of the Poughkeepsie ambience reluctantly. The whole bunch, programmers and designers and engineers, and even the few executives who impinged, were working together in great style. We all felt certain a huge success was in sight; the very speed of the current - yes, Dorothy and I were still foldboating - was carrying us past the rocks in the stream.

As one example on the hardware side, it was obvious that the simple storage tube circuitry that went into the Test Assembly was out of the question for the production machine. But behind the arras somebody was dickering with two remarkable Mancunians, F.C. Williams and T.M. Kilburn, and when the Defense Calculator emerged as the 701, the Williams tube technology had been mysteriously incorporated.

My waiting period was over, however, and I collected my much-coveted machine from a swarm of hungry IBM salesmen and set out for Washington. To explain the mysteries in that sentence, I have to go back to "green with envy" in the last chapter, and in connection with that to a changing perception of myself. From childhood I had intended to be a researcher. I had married a woman who wanted me to be a researcher. I had been steered by Maxwell, had admired Comrie and Wallace Eckert and two of the three Great Vons. I was surrounded with the apparatus of intellectation: Columbia, the Watson Lab, the SSEC and its probable successors. I had the credentials, the experience, the opportunity. And I was not doing well.

I had worked up Jupiter VIII, blessings on it - and others were building on my small success. I had done the Kleine Planeten, and the little coterie of orbit computers was impressed. I had done a seminal investigation of a famous lens system on the SSEC, told dozens of lens designers **[-128-]** where their future lay, and turned the results over to Max Herzberger of Kodak Research to exploit.

I was the father of a family of mathematical tables which, while themselves only of temporary importance, could lead to years of approximation theory research and publication, well suited to the rather circumscribed resources at the Watson Lab. And I had a very large and rapidly growing acquaintance among the men and women around the world doing big computations - in fact, I was advising many of them, and enjoying the process.

Note clues in those paragraphs: "told dozens of lens designers" and "advising many of them." I had seen for some time that I was happiest when talking to other people and advising them how to tackle problems, how to set up computing facilities, how to find or train good youngsters. Also I was impatient with the way Eckert turned away from manifold opportunities, more frequent than mine, to do the same - and at the same time to steer IBM through the rapids of technological change. He had done well, but I would have liked him to have done a great deal more.

I was indeed envious of the rapid rise of Cuthbert Hurd. He had taken away "my" Endicott conferences with a twitch of his wrist, hired the best men at the SSEC for Applied Science, cut me out of the Defense Calculator fishing expeditions and from most contact with WHQ. Clearly I had not been ready to do what he was so suavely doing. Not so clearly, but increasingly, I saw I was not likely to be a von Neumann or a Feynman; even in the slower currents of Wallace's celestial mechanics, it didn't look as though I was world-class.

I decided to leave the eddies of numerical analysis and celestial mechanics behind, and paddle up stream toward management. I wanted to stay in IBM; already, although it was barely a billion-dollar corporation, I was completely convinced of its importance in technology, and in the world of affairs. But while I had known for several years that the usual path for advancement in IBM was through sales, I did not want to join the Blue Suit Brigade. I stood to attention very poorly, as my tiny confrontation with Watson Senior on 116th Street showed, and while I had let McPherson chew me out over Tukey's box of prunes, it had rankled for weeks.

I had been managing - well, directing, I guess - a service function at the Watson Lab. I did not have direct hire-and-fire capability, and there were no profits to be made. And, without explicit profit, there was little opportunity for a financial payoff. I could see the large salaries and commissions on every side, and while I was not yet a Big Spender, I had definite interests in becoming one - common in New York City.

John Sheldon and his group were turning away business on 56th Street; the SSEC obviously could be a major money-maker if Eckert would turn a blind eye; the market for computation was booming. Outside IBM, there was the Comrie venture in London, and Bill Bell's Telecomputing shop in Burbank. I decided to start a technical service bureau for IBM, but not under the direct control of the formidable Cuthbert. Location was quite obvious: Washington. Dorothy and I knew it well. IBM was strong down there. There was a huge market for technical and scientific calculation in and near government, and the Feds were moving too slowly to satisfy their needs internally. And although I did not want to be called a salesman, I knew enough about the art to [-129-] realize you had to go out after the customers, and repeatedly, to generate business. Sitting snugly at Columbia or smugly at the SSEC and waiting for government types to beg for your services was not the way to go.

Hurd was shipping work back to his shop as he encountered it, but the latter was already near capacity, and when he wanted to expand he ran into space problems - and into the sales people, who wanted to rent whole CPCs, not just cream off single jobs which would reduce the pressure to start or expand a CPC installation. Also, not a minor point, the big commissions came from sales (that is, rentals). I did not understand the commission plan, but I resolved early on to make sure my new venture paid salesmen handsomely, whether Cuthbert's did or not.

I wrote up some notes, which unfortunately do not seem to have survived, and sent them off to John McPherson. I emphasized the unfulfilled opportunity, especially in Washington, and pointed to the advent of the new model of the Card-Programmed Calculator, CPC II, which was under design at the moment. I volunteered to provide a sophisticated private test of the machine, and suggested that if IBM would give me the prototype, I could not only begin using it profitably (unlike the Watson Lab), but could do so in advance of the, ah, documentation.

Documentation - which was of course not the term I used in early 1950 - was to be not just a simple operations manual, but a description of the tremendously complex plugboards that would have to be wired for the two component machines and shipped to the customers at each installation. I pointed out that no provision had been made in what I knew of the engineering plan, to have these boards laid out and wired, let alone described. I said that the men and women at the SSEC were not interested in stepping down to the CPC (and hinted that the Applied Science activity had kidnaped the likely ones anyhow). I noted that the 56th Street facility which had absorbed some of them was away over its head with profitable business, did not have the floor space to put in an additional machine and play games with it, and could not afford to give up its CPC I.

There were three or four great Pure Science employees at the Watson Lab, I said. Some of them would not want to leave New York - I was thinking wistfully of Ellie Krawitz (now Ellie Kolchin, since the marriage had been happily revealed when IBM's baleful rule had been abrogated). One of them, Eric Hankam, was vital to continued instruction of IBM customers and prospects. But I could easily persuade one or two others to come with me if authorized, and with their help could do the general-purpose boards and write them up - while waiting for a full customer load.

Oh, I was persuasive. And it was all true. Problems were, first, that a dozen CPC I customers were lined up for early delivery of one or more IIs (more than a hundred were delivered before the 701 and especially the 650 shouldered them aside). Second, I was intruding on Hurd's rapidly expanding and well-thought-of department. I had not said I would not work under him, but the tone was obvious; I talked about Pure Science for a starter, and later a new department of computing services to manage a network of similar outfits. I intended to steal away John Sheldon And Co., although I knew better than to say so.

[-130-] And third, Washington, then the fiefdom of a tough Watsonian veteran named Red [Louis H.] LaMotte, showed no signs of wanting such a function, let alone one run by a bearded nonconformist who had once publicly disagreed with The Old Man - yes, such matters soon got around. LaMotte had been king of IBM Federal for some years, and was reputed to go horseback riding most mornings with the Quartermaster General and such. A year or two later he was made Vice President of Sales for the whole IBM - arguably the Number Three job in the company. He retired in the Sixties, but still served on special IBM committees; I saw him last in London two decades ago, and he looked as tough as ever, although more gray than red.

I'll never remember to tell that story in the proper place, so I'll do it here. Sperry Univac was having a fancy customer luncheon at the Savoy [1972], and had shipped me in from the Bureau of Standards to be the guest speaker. IBM was also having a luncheon for their customers, also at the Savoy, also that day. With several company big shots in attendance, they had managed to lay on the Duke of Kent. But just two or three days before, the Duke of Windsor had died, so Kent had to cancel.

My Univac host was delighted - with me too, I think - and sent me off afterwards in his own car. As the chauffeur turned up the road from the Embankment, I saw a straggle of familiar senior IBM executives toiling uphill on foot; leading the pack, straight-backed as ever, Red LaMotte! I stopped my car, leapt out and had a mad embrace with the old devil. It was almost exactly twenty years since he had fired me.

Back in 1950, nothing seemed to happen. No one was angry. No one said no, not even McPherson, who was accustomed to saying no to me. I had told Eckert very little about my plan, just that I was trying to "work out a better way" for the company to handle that kind of work. I couldn't ask him to poke at the system, nor did I think it likely he would be effective. I decided to look at the economics of the service business a little more closely.

One afternoon, sitting comfortably next to my trusty Marchant, I began to lay out some ballpark figures on machine costs. I had the rental prices of the CPC I and the 604, and a pretty good idea of what the rental of the CPC II was going to be. I had the rentals of the 602A, the 602, the 601 for comparison. Making very rough estimates indeed, I converted what I knew of costs of the SSEC, the ASCC at Harvard, and the ENIAC, to monthly figures comparable to IBM rentals. Going further afield, I added unfinished machines like BINAC and the MIT WHIRLWIND, and SEAC in Washington. I had heard little rumors about our Defense Calculator - this was almost a year before I showed up at the Kenyon mansion - and I put in a number based on \$10,000 a month rental, later revised to \$8,000, and then to \$15,000. Two years later I had added guesses at the 650 rental, and about UNIVAC I.

"Well," I thought, "what do we get for all this"? What these gadgets really had to offer was speed; people were still cheap in 1950, and Comrie had told me the economical way for his girls to do a multiplication was on a Brunsviga, punching the result on a card to get back into Hollerith mode (as compared to low utilization on a 601, he explained). Speed for the kind of work I did depended on multiply time; there were only a few divide operations by comparison, and additions and subtractions were much faster. The kind of transfers of control that **[-131-]** are so important (although even today not very time-consuming) in sophisticated programs were free on four-address machines like the SSEC, subsumed in the plugboard wiring on standard machines, and very fast on WHIRLWIND and that ilk. So I used multiply speed as my measure of performance.

I plotted this all up on a casual piece of log paper, cost versus speed. It looked sort of linear. I extended the

baseline: added estimates for desk calculator operation, electric and hand-cranked, and for logarithmic work, and even for Crelle's tables and pencil-and-paper. It still looked linear. I was about to draw a line on the sheet and go back to other work, when I noticed that the probable slope was about one-half. I drew a line with precisely that slope, and it fitted the dozen or so points reasonably well. "Ah," said I, "economy is as the square root of the speed"! Grosch's Law was born.

What I had been looking for was a tool to price computations in a technical service bureau. In order to be practical, especially with lower-end techniques like Crelle, I had added in human costs and computer room inefficiencies. Thus, I got four cents as the cost of a multiplication on my Marchant, assuming a hundred operations an hour, \$350 a month for a diligent clerk (1950!), and reasonable benefits and overhead and inefficiencies. My somewhat optimistic guess at the same operation on the Defense-Calculator-to-be was a hundredth of a cent - I assumed good practice would avoid floating point. Wrong!

I went around for several years telling audiences of all sorts, from the popular (Rotary) to the concerned but ill-informed (banking) to the professional, about this observation. When I published it in 1953 I had enough chutzpah to call it a law. It got a little mangled in repetition, and especially when taken up by others. At that time product planners were hungry for guidance; they had new drums and printers and tape drives ready for announcement as well as complete systems, a short list at best of competitive pricing - and IBM was still only renting - and optimistic stories from the engineers about speeds. So Grosch's Law got used as a tool to derive prices from those speed predictions, for computers and for peripherals. A tape drive four times as fast as last year's? Double the rental!

Moreover, when arguments occurred about whether to use the law in a fresh situation, some innocent would plot up the newest announcements on his copy of my curve and marvel at how well it fell on the half-slope line. Confidence in my insight built up - three cheers for self-fulfilling prophecies! In the Sixties Ken Knight did a careful doctoral thesis on performance calculations at Stanford, and hung medals all over The Law. Even in the Eighties, computer science professors who wouldn't know me if I came to their door with a begging bowl, wrote complex papers about how the law holds within classes of equipment, but not any longer across class boundaries (they're wrong; it does).

I loved it - still love it. There have been esoteric attempts to explain the law; there is certainly something down inside the relationship, although nothing deep-deep-deep like Newton or Shannon had. I do an explanation blithely: when the tall ships sailed in the China Trade, the young apprentices had to be taught to go up into the rigging. If they were too frightened, and hung on with both hands, the sails didn't get worked. If they were too eager, [-132-] and took in or let out canvas with both hands, a gust of wind would drop them to the deck or into the sea. So they were told, "One hand for yourself and one for the ship."

My theory is that when you give a programmer or a planner a big new dose of speed or memory capacity, he uses some of it to play little games: to adopt a fancier language or a more wasteful operating system, or to write an internal package that would otherwise be bought outside. And what is left of that speed or capacity he puts at the disposal of his employer; sail does indeed get worked. With friendly audiences I usually concluded with a mildly scatological formulation: "No matter how clever the hardware boys are, the software boys will piss it away"!

That accounts for only an afternoon or two while I was waiting for a response from 590. I had other irons in the fire. I had observed a few intrepid souls begin to go the consulting route, usually after having advised their original conservative managements to order a computer from Remington Rand, as Ed Berkeley had done at Prudential, or to try to use a scientific machine like the CPC for a business task.

Using a scientific machine was perfectly feasible, and the advice was taken at Lockheed and, miraculously, at Lyons Tea Houses in England. In very early 1954 the Naval Aviation Supply Office in Philadelphia put in a 701 to do inventory control, well ahead of the business-oriented Univac that General Electric installed in Louisville to do payroll. The stuff that statisticians or underwriters did in insurance companies was clearly understood and documented, for instance - and simplicity itself compared to Los Alamos or Hilleth

Thomas physics, or tin airplane structures calculations. What was lacking in such companies was the kind of channel up to top management that George Fenn and his buddies had obviously found in Northrop, or the mysterious Dr. Thompson had opened in Lyons.

I decided that if I had to leave IBM to start a new venture, I would try the consultant route first, and hope either to convert it to a solid operation or use it as a springboard to someone else's installation. I made a pass at Metropolitan, because of its size, and drew a blank; there was no channel upstairs yet, but a Cerberus type was lying in wait, to pick off intruders who attempted to open one. Next I tried MONY, Mutual of New York, mostly because I liked the imagination they showed in building their new headquarters (... "flashing white means snow").

I met with an assistant vice president who was interested in computers. Yes, he would be glad to look at a proposal, and to carry it further up in management. I went back to the apartment and began writing feverishly - not that I was so anxious to leave IBM, or consult for MONY, but because something was at last moving. My idea was to make an investigation of available equipment that could be matched to appropriate parts of insurance company functions - I was careful to say it was too soon to dive deeply into the policy files or even customer billing, though that would surely follow in a few years. I would recommend either a complete system like the IBM CPC, or assembling components from the various small companies that were offering drums and arithmetic units and the like. I took the slim document down to my contact.

[-133-] About two weeks later I got a call from Tom Junior's male secretary, whom I knew slightly. I was wanted on the 16th floor. Tom was by this time executive vice president, and being sharpened up for the IBM presidency whenever T.J. got around to telling John Phillips, the incumbent, that he should retire. I was curious. The secretary, Horace Post, was quite frank: no, he didn't know what the boss wanted, but he was not happy with me.

Thomas John Watson Junior was not a stranger to me. He had just turned 36, four years older than I, and had not yet developed the lines in his handsome face that would soon appear. He was a big man, like his father - two or three inches over six feet. He was an expert pilot, and had had a genuinely distinguished war record, with a good deal of dangerous flying into places like Moscow. Although I did not know it until later, he was a devoted yachtsman - no, that's too mild; he was an expert and daring sailor. In later years he had been up in the Davis Strait and along Greenland, some of the most dangerous water on earth.

When he got back to IBM [1946] he was assigned a territory in the New York City office, and it included the Watson Laboratory. Yes, during the period I was finishing up the Los Alamos work at the 116th Street building, he was my salesman. Didn't last long; he got promoted right after making his first sales quota, and attending the 1946 Hundred Percent Club. But for a while, if I needed ten boxes of punched cards for the shop, I would call his number and place my order.

There were two differences compared to my previous salesman. First of all, I usually got Horace. Tom indeed made genuine sales calls, and handled orders for new machines and such, but his, ahem, secretary took care of minor items. Second, while cards were still on allocation in early 1946, mine got printed up very rapidly indeed, and if I asked for standard stock, it arrived literally the next day, by taxi!

I also saw Tom a few times at the SSEC and at IBM celebrations, and presumed on our rather remote prior connection to talk a little about the lab and the computing milieu. He was reported to have greatly enjoyed the story, quickly recounted to him by Endicotters, about my adventure with Mr. Phillips.

I had made my first overnight visit to the beautiful Endicott Homestead, the guest house near the Country Club. As was the nice custom, the housekeeper put me in the Watson Suite as a new senior employee. When T.J., often with his wife, came up to Endicott he used this elegant suite, with a porch overlooking one golf course, and the most lavish bathroom I had ever seen in my impoverished life. When it was not so engaged, distinguished visitors or other IBMers were given a chance to stay in it.

On my last day, the housekeeper asked me if I could leave the suite early; she knew I was taking the late sleeper back to New York that night, but John Phillips the IBM president was coming up in the afternoon. "Of course," I said. That evening we all gathered for malted milk nightcaps in the Homestead dining room. I introduced myself to Mr. Phillips, and sat next to him at one of the round tables. Perhaps not choosing the most felicitous phrasing, I told him how much I had enjoyed being in the Watson Suite. "They worked the old hot bed system on us, Mr. Phillips," I said. There was a pregnant silence. "Carries [-134-] me back to the railroad," he said. Nice! He had been a conductor on the Erie when T.J. had spotted him, and hired him as his male secretary.

So I was not too ill at ease when I entered the sacred portals. Didn't last long, though; without preliminaries Tom threw my MONY proposal down in front of me and demanded an explanation. Turned out that it had indeed generated interest at the insurance company, and had been passed around at the Board of Directors - and one director was Tom Junior!!

Oy weh, as my Jewish friends would have said. I told my story. No, I didn't want to leave IBM, but I had been unable to push my idea about the Washington Technical Computing Bureau past the Headquarters staff (that was code for McPherson and Hurd), and was looking for another route. I made it clear I had prepared the proposal outside office hours and so on - no mention was made of when I made visits to the MONY assistant vice president.

"They told me about your Washington proposal yesterday," he said, indicating he had been talking to Eckert and McPherson about whether to fire me out of hand, or just string me up by the ankles and beat me with a sjambok. He was not very angry, but definitely not amused; gossip said he had a violent temper, but in spite of the strains between us then and later, I never saw it. He probably reserved it for failed salesmen, or adversaries over six foot two.

He took back the proposal. I wonder if it is somewhere in the IBM historical archive today; more likely he gave it back to MONY later. I still have a copy somewhere. "Let me know by this time tomorrow whether you want to go down to Washington for IBM. If not, Dr. Eckert will discuss your departure with you." No, no, no, I said. "Just point me in the right direction; I have to arrange for the CPC, and two or three people, and talk to someone down there about space. I wanted to do it - still want to do it." Good, he said, dismissing me.

Before the end of the week I had been promised the prototype CPC II, not yet fully designed in Endicott, three unnamed juniors "from Pure or Applied Science," a special customer engineer like Dick Bennett, and space in Washington Federal "to be arranged with Mr. LaMotte at the proper time."

Indeed, the catch was timing. This was the fall of 1950; I was still teaching my numerical analysis class at Columbia. The crucial decision about the Defense Calculator project was about to be taken (if he had not been thus occupied, Cuthbert Hurd would probably have expunged me single-handed). The CPC had to be finalized, and the prototype put through the shop. Late spring of 1951 was the earliest possible date to ship it to Washington.

This explains "wait mode." I had duties at the Watson Lab, but Wallace and I knew my heart was no longer in them. He was pleasant but disappointed; wanted me to do what was best for me, but a little uncertain how he was to manage the computing rooms and the visitors, and who to plug into my Columbia course in 1951. Fortunately he did not have to deal with Mary Noble and the art collections any more!

So as soon as my Columbia obligations permitted, I began going up to Poughkeepsie to help with the Defense Calculator. Often I would go on to Endicott, to look at progress on the CPC II. It was near Frank Hamilton's engineering suite, although under different auspices; I used to drop in on Frank, who was by now a valued friend, as relief after hassling the CPC crew.

He kidded me a lot about my frequent and unproductive visits, and I explained about how anxious many

[-135-] West Coast customers were to steal away my prototype machine. In return he showed me a little of what he and Ernie Hughes, one of the SSEC designers, were doing. They were working on a drum system; today we would call it a minicomputer. When announced in mid-1953 it became the famous IBM 650.

"I may have to come up here and sleep on the joggle board of the tabulator [front shelf], when my baby gets near shipment," I said. "My ticket from Tom Junior is only good for so many rides, and then Cuthbert or North American or whatever will throw me off the train." He said he wished that was all he had to worry about (he was building his system around a big magnetic drum, and hadn't been able to get a working surface on the drum). Frank was an optimist; I was an optimist. Neither of us dreamed that two thousand of his machines would be rented and sold.

Back in our Chelsea apartment Dorothy was facing her first IBM move. We had lots of time, and lots of help. Mary Noble Smith heard I was going down to Washington "for young Mr. Watson"; those things got around World Headquarters like lightning. Why didn't I use the art movers, she said, meaning the special company that had delivered the Syracuse ceramics collection and Isaac Newton to the Watson Lab. I guessed that the charges would be a great deal more than Chelsea Movers, but I was warming up to the idea of travelling first class. Months later, when we asked for them, solemn little men who were accustomed to handling Van Dycks for the Metropolitan Museum came to our place and wrapped Dorothy's jelly glasses. IBM!

I made a trip down to meet the great Red LaMotte. He was abrupt with me - no matter. It was clear that he had never inverted a matrix in his life, and wasn't planning to start in 1952. I worked on him. Yes, he knew about the UNIVAC coming to Census. Yes, he knew about the UNIVAC coming to the Pentagon (he was amazed that a whiskered scientist in a sport jacket had heard about such things). Yes, a little publicity about the new IBM computing facility that was coming to Washington might be helpful.

First he sent me to meet my putative boss, a smoothie from the Blue Suit Brigade who ran the Washington Federal office. There was a commercial office also, and a card manufacturing plant of considerable size, and a Service Bureau; everything reported to LaMotte. Then he sent me to Bachrach for mug shots - for walk-ins, a two-week wait; for IBM, same day appointment. Then he sent me over to the Service Bureau to meet Scottie, a charming but harried ex-Britisher who had just moved his shop into midtown quarters on 19th Street from the card factory. Scottie was luxuriating in his first elbow room since 1940. I told him I would need all his spare space: a separate machine room, a library/conference room, an office nicer than his (which wasn't saying much), and a ladies room for my, ah, staff - he had only men. It had been great the few weeks it lasted, said the poor guy.

Then LaMotte really got up steam. "I have a surgeon friend," he said. "His daughters are getting ready for their debuts, so he has had to take a much larger place for entertaining. His wife has a little row house on Q Street that they plan to come back to in three years or so. Go and look at it; tell the agent **[-136-]** I sent you." The place was exactly what we needed, and quite a step up from a mud road in wartime Kensington. But of course it was promised.

"No matter," said LaMotte gruffly. Next week the agent mailed me the lease. Then all we had to do was wait.

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14 RED LAMOTTE IS NOT AMUSED

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Willy Ley *journalist, author, and former rocket enthusiast in Germany*
Ed Pendray *publicist for Guggenheim's various aerospace activities*
Harry Guggenheim *heavy investments at Cal Tech, and the Goddard sponsor*
Esther Goddard *widow of the pioneer American rocket experimenter*
Wernher von Braun *stationed at White Sands, he was about to join the ARS*
Andy Haley *von Karman's lawyer, and hence first president of Aerojet*
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[-139-] While Dorothy and I, and the jelly glasses, are metaphorically en route to our miniature palace off Q Street, I must take time to explain how I had become involved with the other two Vons, von Karman and von Braun. The stories revolve around my third professional society affiliation, the American Rocket Society.

I had been encouraged to join the astronomers in 1939, and the optickers in 1942. And in 1947 I became a charter member of the first computer society, the Eastern Association for Computing Machinery (now ACM). But in 1946, before Brother Berkeley rallied us to the flag of ones and zeros, I had joined the space enthusiasts.

I was in New York, where the ARS was getting free office space from ASME, the mechanical engineers. I was nicely supported by IBM. I was not affiliated with the contending proto-industrial forces in the rocket

arena (about which more later). And I had served my time in celestial mechanics, one of the underlying disciplines of space travel; doctorates were scarce, and highly valued as camouflage by the backyard experimenters who were firing midget rockets out on Long Island, and in deepest New Jersey. I had studied the literature - Verne, Wells, AMAZING STORIES, ASTOUNDING STORIES, and Ley and Oberth and Hohmann, and the Goddard reports from New Mexico.

I started going to the monthly meetings, and reading the poor little magazine. To do the rocketeers justice, however, I must point out that there was no regular computer society publication until six or seven years later, while ARS, the British Interplanetary Society, and the pre-war German association all had at least quarterly journals in the Thirties!

Soon I met Billie Slade, the part-time paid secretary of ARS, Willy Ley, [-140-] already a well-known science journalist, Ed Pendray, a public relations man for Harry Guggenheim who had funneled the latter's support funding to Goddard in the Thirties and early Forties, and Goddard's widow Esther. The experimenters included a dozen men who became famous post-Sputnik. Wernher von Braun had arrived in the U.S. and was about to join. The academics, very few in number, were mostly from aeronautical engineering. One unusual figure was an Andrew Haley, a Washington lawyer with considerable personal financial resources and a great fondness for Yellowstone bourbon.

Andy was one of my three routes to von Karman. To explain why requires a little industrial history, leading from Cal Tech to General Tire. Theodor von Karman, the greatest name in theoretical aerodynamics worldwide, had emigrated to the United States from Hungary in 1930, pre-Hitler, and ran the Guggenheim (yes, same money) Aeronautical Laboratory in Pasadena. He was much admired and much trusted by the flyboys in the Army Air Corps, and as part of the Cal Tech war effort was asked to take on the development of jet-assisted takeoff devices - somewhat stimulated by the Doolittle attack on Tokyo, which entirely depended on getting off from a short run, and also by other aircraft carrier applications.

He set up a shop back in the hills above Altadena, and after a certain number of unscheduled explosions began to produce JATO bottles. The first test pilot, Bill Gore, later became an ARS president; it was a very tightly knit group, and small.

There had to be a corporation, and Karman turned to his personal lawyer, who had been doing his will and worrying about the family estate back near Budapest. That was Andy Haley, who became the first president of what is now Aerojet, and later arranged to sell it to General Tire and Rubber (for novices, it might help if I point out that solid rockets, including the ones on the ill-fated "Challenger", use a rubber-based propellant!)

A second route in to the great man was my friend Hans Kraft at GE Schenectady, who had been a favored pupil of von Karman's in Germany. This in turn produced my first meeting with Karman, at the SSEC, when I took him on a tour and explained what the big machine was going to do for Kraft. His continuing interest in fluid mechanics calculation after he returned to Cal Tech in the late Forties encouraged the youngsters at the Jet Propulsion Laboratory (which is what his facility back in the hills had become) to be early and vigorous computer users. And that was my third route in to him.

He was a little gray owl of a man, but kinder than Johnnie von Neumann, whom he knew well of course. Johnnie had big warm liquid eyes, but there was ice down underneath; Karman was more tolerant. Kraft said he had been a wonderful teacher. When I took him through the SSEC in 1947 he was nearing seventy, but still interested in my first impressions of the rocket people. He was not particularly responsive to the science fiction side of rocketry; unlike von Braun, whom I had just met for the first time a few days before, he did not want to ride one of his dragons to the Moon or Mars.

Both von Karman and von Neumann were deep-insight people; two tremendous scientists. Wernher von Braun was a super engineer, one of two I have met in my lifetime, and like the other one, Gerry Neumann, also a terrific leader. The two [-141-] great scientist-mathematicians and the great engineer-leader - the

Great Vons, as I like to call them - all put their skills eagerly at the disposal of the military. You thought of this immediately in von Braun's case, because of the V-2s. But I look at it today rather differently. Karman and Neumann had other paths they could have followed; Cal Tech and Princeton could have absorbed them again. Wernher wanted to go to Mars; he had to build monsters to get there, and he built them for Hitler and for Lyndon Johnson, and would have built them for the Russians or the Chinese. All three are dead; from the Nineties, I empathize more with the spaceman.

Haley and von Karman represented a West Coast rocket enterprise. There was strong competition in the East, with a younger entrepreneur instead of the shadowy Harry Guggenheim. This was Laurence Rockefeller, who was backing Reaction Motors in Far Jersey. The two outfits sponsored ARS events, and paid the expenses of ARS volunteers. There were neutrals; I remember a director from Linde Air Products who sported one of the very first synthetic star sapphires, made in the Linde laboratories. And I, as I rose rather rapidly in the tiny organization: IBM supplied both sides, as did the liquid oxygen guys.

I got IBM to take a cheap advertisement in the ARS magazine. I sweated on the board of directors over our painful finances. As a useful writer and speaker, I helped Willie Ley and Ed Pendray on the PR side. All of a sudden, I was president - of about 2500 excited but impoverished enthusiasts. It was a strange feeling. I was 33. I was regarded as a fledgling astronomer. I had already risen to national program chairman for the Optical Society, but in spite of nine years of membership was obviously only at the foot of that rather specialized ladder.

I had made genuine research contributions in astronomy and optical design. I had never seen a rocket fired, let alone designed one. Yet here I was, decked out in my first dinner jacket, welcoming Washington big shots and distinguished foreign visitors to our American Rocket Society annual meeting. And ARS was already much larger than the astronomers, somewhat larger than the optickers, and ten times as large as brand new ACM. My, my - strange world!

Growth was the key, of course. The astronomers are still very small. There are other optical groups now, and all of them together add up to only a few thousand members. The space gang grew and grew, took over the tin airplane society, and today is the American Institute of Aeronautics and Astronautics, with over forty thousand members. And puny little ACM is now up to 80,000 bodies, has a budget of \$40 million a year - and I've been president of that too!

Well, ARS wasn't all Boards and banquets. I cast about for ways of legitimizing its wilder talents. Publications looked like a self-supporting possibility; I found an excellent editor at nearby Princeton, Martin Summerfield, and he planned a JOURNAL OF THE AMERICAN ROCKET SOCIETY, the forerunner of dozens of handsome periodicals now issued by the AIAA. Somebody - Ed Pendray, I guess - found a good printer who was used to technical letterpress and to not being paid promptly, and we were off and running.

[-142-] The Brits had an Interplanetary Society, and it too had a publication which wanted to grow into something technical. Too soon - there was no missile program in the U.K., and their tin airplane association, the Royal Aeronautical Society, was soaking up all the advertising and all the industrial support. The president of the BIS the year I was head of the ARS [1951] was Arthur Clarke, now world famous for his science fiction and his movies, and chancellor of a university in Sri Lanka to boot. We are still good friends, and meet once or twice a decade on the lecture circuit - but I have to get back to computing!

I had told some of the rocket story to McPherson, and when I met him, to LaMotte. John found it disagreeable, I think - undisciplined, which it surely was. LaMotte had an eye on the Washington agencies that were putting money into missiles, and was anxious to support my contributions. Perhaps more important, my wife Dorothy thought it was exciting. She felt much more at home with the astronomers and the spectrographers, but she couldn't help liking Andy Haley and Billie Slade, and besides, it was sort of a family enterprise.

So was astronomy, and a worldwide family at that. But it was old and staid, and it took twenty years and a lot of night observing to really become an insider. Heber Curtis, the observatory director at Michigan who had been so kind to me, was just such a one, but it had taken his whole lifetime. Dorothy marvelled that I had been clutched to the ARS bosom in four years.

We were a little ill-at-ease on the banquet circuit, and especially on the dais, but IBM had polished both of us up better than we knew. I was by this time not only an eager ham, but an experienced one. Dorothy bought some less conservative evening dresses.

My little group of workers was assembling. I had brought Stan Rothman from the Watson Lab, and he had begun in Endicott to wire and test the general purpose boards for the CPC II. Stan was still a bachelor; had a good degree in math from Yale, and was nearly finished with a master in mathematical statistics from Columbia. We laughed ruefully over his inability to write well, or even to spell (although he later became author of a major early social-implications book), and I planned to have someone help him when we got to the stage of writing the documentation. He was hoping it would be Libby Lindberg, a very lovely blonde from the SSEC junior crew.

Libby was about to become engaged, and in spite of Stan's dark masculine attractions was not much at risk. I remember faintly that her fiancé was already Washington-bound; anyhow, there was no relocation problem. She thought my struggles to provide her with a WC were ridiculous; was perfectly willing to go unisex. But I remembered that IBM vice president in 1946.

The third recruit was John Mayhew, from one of Hurd's enterprises. He had been in the wind tunnel business in Texas, and found New York a bit much. He didn't mind the dress code or the No Booze Rule, and in fact was extremely conservative by nature. It was the subway hustle and the discourtesies that got to him; he hoped the Washington pace would be more civilized. I figured he would be my analyst while Stan was struggling with the new machines.

I had been very anxious to get a special customer engineer. With a machine so new there were no manuals, for operations or for maintenance, and with Rothman needing all sorts of inside information about timing to [-143-] make his monstrous plugboards work, I was sure we needed someone unusual. Well, one was forthcoming. His name was Carl Southard, and he was already lightly attached to LaMotte's empire when I hove in sight.

I couldn't believe him when we met. An IBMer? A favorite of Red LaMotte's? He was messy; his shirt was indeed white, but only for an hour or two each morning. He pulled his tie loose at the first difficulty. He was ovoid rather than IBM tall-and-lean. And he always had a bedraggled cigarette hanging from the corner of his mouth.

But he was good. Boy, was he good! He would hang over the printer, his eyelids at half mast, ashes falling into the type bars, and listen to Stan or John, or occasionally Libby or me, describe a problem. He would ask dumb questions in a southern, or Southard, accent. You wondered, at first anyhow, if he had had a bad night and was falling asleep. He would mutter to himself. Then he would open up a relay gate, or a rack of tube assemblies in the 605, and twiddle something, or replace a unit. That was it. Oh, he did hit really tough ones once in a while. But even Dick Bennett back at the Watson Lab couldn't touch him for sheer, oh, insight.

Carl didn't want to go upstairs into design engineering. He didn't like the atmosphere, and he was used to Washington. He went to Endicott for me and helped wire the prototype machine, and marked up a private set of blueprints for use later. I was afraid I'd lose him; in fact, toward the end of his Endicott visits, when I saw how good he was, I worried more about losing him than losing the CPC. But it all worked out. The machine was shipped; Carl understood it better than the designers; Stan was well into the plugboards.

Scottie was remodelling the back of the 19th Street building for me. No beancounting; someone was

getting cost statements, but it wasn't me. However, when my crew began assembling, he started to hand me payroll printouts for them. I was not satisfied. Inquiry revealed they were actually being generated on his service bureau equipment, in the front of "our" building, from cards punched up at Federal two blocks away. I had Libby punch them instead, from my data, which got my guys (and me) off Scottie's timeclock. I wrote a note to my boss, copy to LaMotte, saying that "I was doing my own payroll, with Scottie's help." Nobody complained.

I tried to order books for the little library. I had put my own rather large collection in there, trusting my troops not to abuse it, and solving the problem of persuading the architect to also put shelves in my private office. Wasn't easy; the general feeling was that sales offices didn't buy books. "Ah," said I, "this is a Technical Computing Bureau," emphasizing the capitals.

"Would you like me to have the librarian at the Watson Laboratory buy them for me, and transfer the costs down here"? Good grief, no, said a beancounter I ran to earth. In the end I got an unsuspecting bookseller in Georgetown to open an account "for IBM on 19th Street," and send a monthly bill. It disappeared into the system; the bookseller never complained either.

I began to get business. There was some interest on the part of the older salesmen, and I was doing a small amount of direct contact myself. The word "older" brings up a difference in Washington Federal. The salesmen I had met in Manhattan, and at the Hundred Percent Club I had attended, were young and snappy. They planned to be local managers in two or three years, [-144-] district managers in two or three more, do a tour at 590, and be Golden Boys or at least on Tom Junior's staff, in their early thirties. Some of them made it; the company was expanding magnificently - twenty percent a year. Quite a few of them disappeared, to surface a year or two later as typewriter or timeclock salesmen elsewhere in IBM, or as tab furniture or paper forms salesmen outside the sacred portals.

It turned out that while banks and insurance companies were impressed with these bright young men, federal employees were resentful. So there was a fair complement of low-key salesmen in Washington Federal (Commercial was like New York - or at least Baltimore) who had been there a long time, or who had been successful local or district managers with a lot of government business and asked for a Washington position. They were mostly salaried, which solved my problem of an attractive commission.

Anyhow, I had prospects. One was the Air Navigation Development Board, a forerunner of the FAA development activity of the Sixties and Seventies. They wanted a simulation of air traffic patterns for various sizes of protection zones around the commercial, private and military aircraft. Two dimensions at first, altitude later - and very simple air lanes. Childlike compared to what we do on micros today, let alone in an arcade game, but hot stuff in 1951. I worked on it a little myself, then John and Libby took over. We got ready to send out our very first bills; exciting.

Also I began to get job applications. One interview I remember was with a serious candidate named Sarahan, who was working on a computer construction project at the Naval Research Lab. I sent him up to Applied Science with some pride. Others tended to be Service Bureau types that I could turn over to Scottie or his deputy.

It was a fascinating time. Our move down from New York had opened some seams in my relations with Dorothy, and we were undertaking repairs with some trepidation. The Rocket Society and ACM were exciting, and I still had an involvement with the Optical Society that I hated to let go; for instance, I had been the arrangements chairman at the meeting where Haloid first demonstrated xerography publicly, and the program chairman when Ned Land demonstrated instant photography - black and white, of course. And I was watching the Applied Science incursions at World Headquarters, and participating defensively in the seminars which Cuthbert Hurd was giving for my buddies out in the world.

About Dorothy: from our first years together she had suffered from nasty little fevers and infections, and from depressions that we attributed partly to the other trouble and partly to the problems of wartime. We

had solved the first problem, and had helped with a war problem involving her brother.

I had done a consulting job in 1944 for an ophthalmologist in midtown Manhattan, and we had become friends. He is in his late eighties now, but still in practice; we talked transatlantic a few years back. I had designed a standoff lens for him, to go on the front of a powerful microscope objective and greatly increase the working distance (from much less than a millimeter to about 25). He could not afford to have me do much, even at my low prices, so I could not achromatize the design; he was content to use it with green light [-145-] from a mercury lamp. We tried to get him a patent for several years, which kept the relationship alive.

He was aware of Dorothy's malaise, and wanted to help. Since she did not seem to have eye troubles, we resisted. He said he treated a broad spectrum of patients; all was grist that came to a midtown practice in those days! I did not realize until later that he had a unique medical method; each week he read the Lancet or the AMA Journal, and boned up on one disease or problem. For the rest of that week he treated all his drop-ins for that ailment - not if they had a broken wrist, or just wanted a fresh eyeglasses prescription, of course, but everybody else.

One week he broke the news to me that he had diagnosed Dorothy's problem: she had undulant fever, also known as Malta fever. She should go to a specialist down the street who was an expert in white blood cell analysis and have her opsonocytaphagic index measured [after fifty years I think I still remember how to spell it]. He had never examined her himself.

Well, it was true; she did have undulant fever, from drinking raw milk as a child. She had had it for thirty years. There was a specific antibiotic. She took it. The fever went away and never came back. Now that's medicine!

Second story: Dorothy had a younger brother who was an engineer in Pasadena for the phone company. During the war Bob became a radar installation and maintenance engineer for Western Electric; was catapulted off ships at sea to repair jobs; worked out of places like Newfoundland. Not surprisingly, he developed medical problems, including a terrible case of shingles.

To control this the Navy put him on Fowler's Solution, which is arsenic. He broke his medicine dropper and the Navy gave him a big-bore replacement. He came down with arsenic poisoning; the Navy flew him home to New York, where we tried to help. He was on his last legs; they called it drop-foot. Not to worry, they said, implying it wouldn't show in the coffin.

Enter our, ahem, family physician. "I have some doctor friends working on a top-secret project," he said. "They know how to pump arsenic out of patients, and they are all set if the Nazis use poison gas." There was indeed such a chemical, and it was indeed a secret; it was called BAL, British Anti-Lewisite, referring to a variant of WW I mustard gas which poisons the blisters with arsenic. Today such chemicals make it possible to pump all kinds of heavy metals like lead and arsenic and plutonium out of people; they are called chelating agents.

The project people were delighted to have a clinical experiment, and with the Navy and Western Electric watching. They gave Bob the Secret Chemical, presumably with our friend in attendance. It worked. Even the drop-foot went away. Bob went home to Pasadena and resumed the gentle life; even got married.

Dorothy was ecstatic, for a while. But the depressions continued into the postwar years. We found a nasty psychiatrist who was big at Columbia Presbyterian; we were living in Chelsea by this time. He had his own, ah, chelating agent, sodium pentothal; in a few weeks he had pumped some of the heavy metal out of my dear wife. Trouble was, it was only analysis; he told her what her problem was, but not how to cure it. My hypnotist friend Andy [-146-] Salter said he couldn't solve the problem, which revolved around her parents, but he could make her less aware of it. Would it improve our sex life, I asked. "Always," said Andy. "Get another girl," said Dorothy. And at the height of the excitement, I uprooted the poor baby and moved

her down to Washington. Indeed, seams opened in the relationship.

I've painted a glowing picture of the Watson Empire. Fantastic things could be done, great rewards were on display, the surroundings - art collections, Waldorf parties, Homesteads, Country Clubs, Kenyon mansions - were lovely. There was a dark side, of which the arbitrary expulsion of married women had angered me most; it was an empire, not a democracy, and the imperial rites were sometimes painful. Two of these darker events came close together just as the little Washington shop was getting off the ground, and in the end drove me to rebellion and expulsion.

The first was by far the uglier, although not so important. I had asked for a secretary "after we get going." There wasn't anyone at Scottie's bureau; his bids were sent out from Federal or Commercial. I had heavy Rocket Society correspondence, with LaMotte's approval, and an assortment of scientific and business paperwork besides. One of my predecessors as president of the ARS was an engineer named Lovell Lawrence. He had been one of the backyard rocket experimenters before the war, had been involved with Goddard, and had ended up in 1950 as head of the rather large Reaction Motors activity in New Jersey. He had a falling out with Rockefeller, and left for another job in the Middle West. His secretary, whom I had dealt with many times on ARS matters, did not want to go to Detroit. Would she consider IBM in Washington, I asked?

She was not exactly Washington Federal, or even Washington federal: a very forthright woman indeed, and vividly handsome. I knew how good she was, and Lawrence had of course confirmed it with a written recommendation. I brought her down for an interview. She was sent to the IBM physician for a physical, and turned down cold. After some very loud bitching on my part about my rights as the prospective superior, I got a hushed-voiced personnel guy to say the doctor "had found traces of sexual activity - and the young lady is not married." What business is that of ours, I said?

Well, I took it to my boss Don Gamel, the head of Washington Federal, and got absolutely nowhere. The doctor was Mr. LaMotte's personal physician; the decision is final, he said. I knew instinctively that I had hit another Watsonism of the dark sort. I had been told at the Watson Lab not to protest the expulsion of my married supervisor: "the law of the Medes and Persians, which altereth not." I should have been a Daniel then, for a loyal and long time employee and a close friend. The Washington affair was also an outrage, but my potential secretary laughed it off, and went away.

No doubt a fair number of the IBMers thought I was involved, and perhaps Dorothy did also; at least she seemed less angry than she had been when Marj Herrick got beheaded. Sadly, I wasn't; the young lady didn't need any amatory assistance from the current ARS president, especially in Washington. She got a good job, but in Buffalo.

The Poughkeepsie excitements were mounting. Bill McClelland and the rest of the Hurd contingent were writing working programs; a new set of [-147-] letters of intent had been received; 701 production was about to commence. Cuthbert began to turn his attention away from the Defense Calculator, and toward defenses. His Washington representative was George Petrie, who while personally very friendly had done almost nothing to help build up my shop or my order book. I was sure my rather threatening progress was being fully reported back at Applied Science.

Suddenly I got an official note from Federal. The business demands on Applied Science and its New York computing bureau were increasing, and they needed to requisition Stan Rothman's services for an indefinite period. Hopefully he could return to Washington in six months, but that would depend on business developments. Deliveries of Model II CPCs were soon to begin, and his knowledge of the machine would be used more effectively than in Washington.

Well, that was my weak spot, and Cuthbert had struck it unerringly. I could not replace Stan quickly. I could not finish up his documentation; I wasn't even sure Carl and John and I could operate with his not-quite-finished plugboards. And I had paying customers coming in the door.

I went to my boss. I said that Stan would be just one more body in Cuthbert's herd, while his departure would destroy my little operation. I said I had talked to Stan about the offer, and that he wanted no part of it. "You can replace him, Herb," he said, "and Mayhew will get you through the Air Navigation Board job while you are looking. As for Rothman himself, I'm sure he understands that advancement in IBM usually requires moving; he came down here with you willingly enough," and more of the same.

What was I thinking? Not about Hurd, not about Tom Junior, not about where to look for another job - but about Marjorie Herrick and my almost-secretary. I had stood up to The Old Man, and felt good about it afterwards. Then, later, I had flinched, twice. If I knuckled under this time, there would be a fourth time, and a fifth, and dark events without end. Somewhere another imperial wizard was plotting against Hurd, as Cuthbert was plotting against me. But I would be erased, or reduced to impotence, long before he was pulled down.

So I went to Red LaMotte and told him how I saw the picture. Nonsense, he said, we all just have to buckle down and do what is best for IBM. "I know how to use Rothman best, for IBM," I said. "If he is not protected, you'll lose him, and probably the rest of the bunch - and me." I didn't try to temporize, and I didn't say I'd appeal to Tom Junior. I put it on the line.

And he fired me. He was not amused.

Stan resigned, and went to work for the Rand Corporation in Santa Monica, where he helped greatly with their new CPC II. Libby Lindberg also resigned, and married her young man in the State Department. Mayhew was transferred back to Applied Science; after all, they had said they had to have a man. Southard shrugged and went back to simpler machines, but some years later left IBM and established a successful nationwide terminal and network maintenance company in Carolina, and got rich.

George Petrie took over the bureau temporarily. I never found out if the air traffic simulation was completed.

[-148-]

15 GE PROPOSES AND FORRESTER DISPOSES

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Joint Computer Conferences [11](#)

Jay Forrester *made MIT's WHIRLWIND digital, and invented core memory*

Sam Alexander *building SEAC at NBS, with shuddersome peripherals*

Sam Caldwell and Gordon Brown *two of the outstanding MIT EE professors*

Norbert Wiener *disdained digital machinery and almost everything else*

Doc Draper [02](#)

Core memory *tiny nonlinear ferrites and coincident current circuitry*

MIT *world's greatest engineering school, according to its people*

Signed ternary arithmetic *no algebraic signs, and no rounding ambiguity*

Infallible computing *from highly fallible components: ah, Tandem!*

Bob Everett *Number Two at WHIRLWIND, and Number One later at Mitre*

Irving Reed *an intellectual of the logical design persuasion*

Charley Adams *ran the non-air-defense computing for Forrester*

Cape Cod *a real experiment with real radars and real fighter planes*

Al Perlis and John Carr *three future ACM presidents played softball*
The Appalachian Mountain Club *lots of foldboating*
The ASCC [01](#)
Dorothy [01](#)
Havana *"you can't learn everything from books", I told her*
Déodat [poodle puppy] *focus of our attention and our love, for years*
E.T. [Charles] Goodwin *top computer man at NPL, and Turing's boss*
NPL [National Physical Laboratory] *British equivalent of our NBS*
The Chrysler New Yorker convertible *easily the fanciest car at WHIRLWIND*
Hans Kraft [09](#)
The Hanford 702 *would do multimultidigit decimal multiplications*
Bert Sells *he mostly did turbine design for jet engines, on a CPC I*
GE Evendale *was to install a Defense Calculator, near Cincinnati*
GE AGT [Aircraft Gas Turbine] Division *moving from Lynn to Evendale*
Personnel *staffing the first big machine in the Midwest would be tough*
Paul Herget [05](#)
John the Baptist *GE asked for my head on a platter, and Jay said yes*
"Generous Electric" *and so they were to me, for four years*
A Napoleon quote *"well positioned to attack in any direction"*
Gene Gettel *a serious young mechanical engineer; I swept him up*
George Richter 01

[-149-] In later years I became quite expert at being fired or uprooted, but this first time found me unprepared. I had no plan for a new job, a new employer, or a new location. I was flexible enough; the problem was that the timing was forced on me by New York. Also the blowup itself took less than a week.

The wild reorganizing and job-hopping of the Fifties and Sixties was just beginning. When something like my Rothman crisis came up in those times, the guy or gal under pressure pretended to accept the unacceptable, put out lots of resumés, slipped away for clandestine interviews, and departed in style - with all the ancillary expenses covered. Gamel gave me a month's salary in lieu of notice, and slammed the door behind me.

Parenthetically, the whole little drama was unfortunate - for me perhaps, and for IBM certainly. Hurd probably brought with him from Carbide, and certainly found at 590, the "win 'em all" philosophy and its attendant rough infighting. He was prepared to overlook Eckert, whose desire to go on with astronomical researches cancelled out his ready access to Watson Senior. But Cuthbert wouldn't hold still for the establishment of a rival computing bureau.

He could have co-opted me with a few words: taken me up on a high hill and spread the world of a technical service empire out before me, under him of course. Trouble was, I had much more confidence in that vision than he did. And he didn't trust me. So the company lost three good people and disturbed others, and a promising new IBM entry into the peculiar Washington scientific/technical environment was set back.

I've already said how important the early computer conferences were, as a substitute for today's technical publication and media coverage. Everybody went to every conference (there were only two or three a year, as against the many hundreds we have now). The second of what would soon be called the **[-150-]** Eastern Joint Computer Conferences was held in Manhattan right after my firing, and I found myself there in deep conversation with Jay Forrester, who was building the world's fastest computer at MIT.

That meeting featured peripheral equipment, including such weird novelties as magnetic wire input and output for the SEAC [Standards Eastern Automatic Calculator] which Sam Alexander and his crew were building in Washington. Forrester and his project were long on innards but very short on I/O - paper tape

and clumsy telex machinery, poor devils - so he had come down from Cambridge to hear about possibilities. Indeed, there were even a few primitive exhibits, harbingers of the giant National Computer Conferences of the early Eighties.

Aside from my need for another job, I had been drawn by the set of papers disclosing, and in a professional sense announcing, the IBM Defense Calculator. I'd been out of touch with Rochester And Company for only six months, but all sorts of exciting new stuff had happened in that time, and speeches were revised up to the evening before presentation in those days - and sometimes at the rostrum!

Jay Wright Forrester was already a major figure in our burgeoning technology, in spite of his youth. He had come out of farm country and the University of Nebraska, and had been a prize graduate student among the great MIT professors: Sam Caldwell and Gordon Brown in electrical engineering, and Norbert Wiener of course. He was tall; handsome in a very reserved way; a driven man always rather uncomfortable to be with. Decades later, when I was president of ACM, I needed to reach him; his secretary said that even for a very old friend, and the head of the professional society he had belonged to for thirty years, the best she could do was to slide a note under his always-closed office door.

He was two months older than I, and had had the same sort of struggles with draft boards early in the war. But these soon diminished under MIT pressures, as he helped found the Servomechanisms Lab, and worked on the analog computers inside those same gunsights I was doing optics for on Long Island. He became associate director under Doc Draper in 1944, and was appointed head of a thing called the Whirlwind Project. This was to be a tremendous land-based analog air defense system (too big to be called a gunsight or a gun director), which would aggregate in some mysterious fashion the signals from a network of radars and vector out fighter planes to intercept the attackers.

It was a measure of Jay's vision that he had seen immediately, in spite of his immersion in analog techniques, that the project would have to be digital. Size was a drawback; the arithmetic and control unit for WHIRLWIND I filled a large room, although today it would be one corner of a chip smaller than a fingernail. And in a very real sense, analog was instantaneous; input was transformed into output without the delays of storage and analysis and computation in my kind of machines.

But the arguments for going digital were overwhelming, even when Forrester made his decision in 1949: accuracy first, perhaps, because it was difficult to go much below one percent in complex analog devices. A [-151-] continent-wide air defense needed, if not astronomical accuracy, at least four [decimal] figures - in modern terms, sixteen bits.

I mentioned aggregation. As soon as you began thinking about selecting signals from a variety of radars, perhaps averaging or otherwise smoothing these inputs, and moving data around under a wide variety of circumstances, the need for storage and variable programming pointed to digital - and did so even when the Whirlwind project was getting underway.

And futures buffs knew that analog techniques were near their limits, and that the digital world was in its earliest infancy.

I had heard that Forrester, drawing on the research of a wide variety of MIT people and laboratories, was well ahead of the IBM storage experts. Palmer had needed to go to Manchester for an electrostatic memory system, and Jan Rajchman at RCA Princeton wasn't having much luck either. But Forrester's crew were building special tubes, wiring them into WHIRLWIND for central storage, and running real-time exercises (much more demanding of reliability than what the SSEC or the CPCs were doing).

And history was in the making. Forrester was becoming famous world-wide as the inventor of core memory, which in the next two decades was to sweep aside tubes and transistors - yes, they had just been invented, and computer possibilities had been described the year before at the first Joint in Philadelphia - and delay lines and fast drums, as main storage for all sizes of digital machinery. I had read his article in

the Journal of Applied Physics and understood the basic idea, which in those days was called coincident current technology.

Certain magnetic materials, especially some ferrites being investigated by MIT ceramics experts, had a very nonlinear response to electrical current. A reasonable pulse would cause a tiny magnet made from such stuff to switch polarity, but half that much current had no effect. So Jay had taken a little ferrite ring and passed two wires through the hole. When one wire or the other carried a pulse, nothing happened; when both wires carried a pulse at the same time, the magnetism reversed. In the early embodiments, a 32 by 32 mesh of these rings was woven in a frame, with 32 north-south wires and 32 east-west wires running through the 1024 rings, which from telephone practice were called "cores." In a computer memory, each core stored one binary digit, and 64 switches around the frame enabled you to select any one of its 1024 bits.

A world industry was to grow up around core memory. Forrester assigned his patents to MIT, which got rich from licenses granted to a hundred companies, including IBM. And Jay himself did very well, and richly deserved it. At the time we talked at the JCC, he was considering going to three dimensions, relying on a touchier ratio: that two coincident pulses would cause no response, but three would flip the polarity. I reminded him that the real payoff was how many cores he could pack into a cubic foot, that a 3D structure would be much harder to wire either by hand or mechanically, and that marginal cores would be more frequent.

He already knew all that, of course, but it got us talking. I said what might be genuinely gainful would be to store a ternary digit in each core, and calculate in base-three rather than binary fashion. There were materials - [-152-] some kinds of permalloy, as I remember - that had north, south and neutral stable magnetic states. I told him I had taught my Poughkeepsie evening classes at IBM about a special kind of base-three arithmetic I called "signed ternary," in which zero was in the middle of the number range. In this curious system there was no need for algebraic signs, no problem about the sign of zero, and you rounded perfectly by dropping digits.

Jay being a stiff type, I refrained from calling the ternary digits "tits," a name which had been the source of much boyish amusement in the Poughkeepsie classes.

Twenty years later I was utterly amazed to be asked to comment on a technical letter from two Argentines, who as graduate students at MIT had exhumed the report I had done for Forrester on base-three computing, and were proposing to try it with hardware. It would have been a great idea if something as tiny and as cheap as the core-memory rings could have been made with three stable states; the embodiment with two cores per tit which they proposed was not attractive. And somebody in Kiev had tried it, anyhow.

After I had done strutting about my trick arithmetic I told him I had been extruded by IBM and was, ahem, immediately available. "Come up and see me next week," he said!

In no time at all I found myself a member of the MIT staff - not a professor, but doing something called "industrial cooperation." Jay gave me a salary just slightly, judiciously, below what IBM had paid me in Washington (\$10,000 instead of \$10,200), and made me head of a new group called advanced logical design, which was to explore ideas like signed ternary arithmetic and variant patterns of core arrangement (yes, I had unwittingly hit two jackpots in our JCC conversation). The main task, though, was to think of practical ways of making an infallible computer out of highly fallible Fifties electronic gear. That infallible computer was to be the heart of the production version of the air defense system; we called it WHIRLWIND II but when it finally appeared it was called SAGE, Semi Automatic Ground Environment, a horrid military/academic acronym.

I reported directly to Jay and his deputy, Bob Everett, who became head of Mitre in later years and a major figure in air defense and related areas - air traffic control, for example. Jay and Bob (and I, in the next few

months) were convinced that replication of subsystems, and automatic comparison, and replication of the comparison, and automatic updating of newly-repaired components, would approach infallibility. Shades of Tandem!!

Most of what I did is as dead as mutton today, but it may be amusing to note that my primitive first look at failure rates and reliability requirements led me to recommend five-fold replication. SAGE installations ultimately came out with two machines each, not five, and still filled large buildings. And they weren't infallible, either!

I had a group of three youngsters, and shared a secretary. One of the young men was Irving Reed, who stayed in the logical design business and became an important figure in its more arcane developments. Down the hall was a much larger group run by Charley Adams, which did non-air-defense applications. Most of their customers were MIT professors and graduate students, and it was therefore very close in feeling to my old Watson Lab at [-153-] Columbia. It had to be more closely managed, however, because WHIRLWIND was constantly being improved, and also had to serve as a test bed for future transformations like core memory. And of the time remaining, the air defense work took the lion's share; there was a real-time experiment called Cape Cod with real radars and height finders, and real fighter planes, and real cross-grained military types. So you had to be very careful not to waste WW I time by indiscipline or stupidity.

Somebody brought around a compartmented tray late in the afternoon, and you dropped your little roll of paper tape, held by an approved rubber band, into your assigned compartment. Next morning your run result [teleprinter output] was in your mailbox. Born programmers did quite well; the less gifted took many weeks to get anywhere. Among the more talented paper-tapers were Al Perlis and John Carr, and after the collection we would go out on one of the playing fields and run off a little softball - surely the only time in computer history when three future ACM presidents cooperated that strenuously!

I noticed that, as at Columbia, there were lots of engineering projects in Charley's shop, but no math; chemistry, but not much physics. Inquiry revealed that Norbert Wiener, who had just created the term "cybernetics," never came to our building, and was contemptuous of such foolishness as giant digital computers. I had a couple of disagreements with him at seminars, largely because he kept trying to fit his continuous-math criteria to our discrete-math efforts. I escaped relatively unscathed because I tended to use celestial mechanics examples, and quote Poincaré; also he soon observed I had an uncomfortably frank way of dealing with pomposity. Nevertheless I soon felt impelled to christen him Nasty Norbert. It spread quickly, partly because he was so ugly. What I was referring to, of course, was that other kind of ugliness which was so tough on grad students.

I had known Sam Caldwell, who was somewhat into relay circuitry, from the very earliest post-war days. And I was treated very well indeed by Gordon Brown, then head of the extremely influential EE department; he nominated me for the Appalachian Mountain Club, and gave me good advice about how MIT really worked - not at all the way it looked to most of the industrial types. Forrester knew how, of course, but you didn't talk to Jay about MIT politics (or houses, or sports, or even why Whirlwind didn't get some IBM gear).

I had had a steady flow of visitors from overseas at the Watson Lab, and this had slightly tapered off in Washington. My little shop was not the unique drawing card the SSEC had been, and English friends especially tended to go up to the Bureau of Standards (then still on Connecticut Avenue) and watch the sweat running down Sam Alexander's countenance as he tried to make SEAC work, plan its western successor SWAC, advise the Census people about their always-a-year-in-the-future Univac, and fend off IBM.

Cambridge was again a nexus. Everybody wanted to see Forrester's baby: the military vectored in their NATO buddies, the hardware types wanted to tinker with Jay's core memory, and the academics were accustomed to stop off on their way up to Aiken's shop at Harvard, which was really now a backwater but

of course still a great draw in Bulgaria. I knew more of them, [-154-] at least on the user side, than the rest of the project combined, which certified me to the Caldwells and Browns and Everetts. Jay probably didn't even notice.

About living arrangements: I had moved into a graduate dormitory room near the Charles as soon as Forrester hired me, and cast about with MIT help for permanent quarters. Dorothy was getting ready to move. I found a rental house in Belmont, owned by a Boston University professor going on foreign assignment who wanted someone to take good care of his roses (I displayed pictures of my wife's gardens; it was a drawn-out negotiation). There was a small garage for my prize convertible. And the family had had pets, which my Washington lease had prohibited.

Dorothy and I were doing well. She was delighted to see me go back toward research and Academe. She had forgiven me for tearing her away from her psychiatrist in Manhattan, and indeed after many hours of self-analysis based on the new things she had learned about herself, was trying to be a New Woman. She had cut off her long hair, and wore an attractive short hairdo instead of a chignon. She had bought new clothes, and better furniture for our nice little Washington townhouse.

We had had frank discussions about my frequent extramarital adventures, and as a result she had waved me off fairly gaily when I visited a luxurious maison in Havana on a Cuban excursion we took together in 1951, and later listened amusedly to my tales of the novelties I had encountered. Our sex life, never spectacular, had considerably improved. But after ten years of a remarkably good marriage we needed a new focus, and agreed it should be something we both could love: a pet. We missed Suzy the cat, who had entertained us in the dull war years with her lively litters.

Being scientific types, we started with book research, and moved on to Boston dog shows. Soon we came down to miniature poodles; standards were magnificent, but too large for our small-tent camping and our foldboat, and toys were unimpressive - wrong, but you can't learn everything from books, as I had told Dorothy in Havana.

The Putnams, who were top exhibitors of standard poodles in New England, suggested the Morse kennel on the other side of Boston for good miniatures. We chose a gorgeous little black male, took him home to Belmont two weeks later, and named him Diablotin Déodat de Dolomieu. Diablotin was the kennel name, Déodat means "a gift from Heaven," and DdD was the man for whom Dolomite [rock and mountains] was named. We called the little guy Deo, Day-oh, and he was indeed a focus of our attention and our love for the rest of the marriage.

I remember vividly a drive up into the White Mountains with Charles Goodwin, head of the Maths Division at the National Physical Laboratory outside London, who at that instant in time was Alan Turing's boss. Dorothy was happy, Goodwin was delighted - and Deo was ecstatic.

The beautiful but mistreated Buick of the mid-Forties had been replaced by a little Plymouth station wagon which pioneered the idea of folding up the rear seat for extra space - perfect for our camping and boating, but dull to look at. When things were at their best in Washington I had traded the wagon for a superb Chrysler New Yorker, as big as a house (and almost bigger than the Belmont garage). It had the brand new hemi [hemispherical cylinder [-155-] head] V-8 engine, power brakes and steering - then also new - a power-operated convertible top, and on and on. It was by a city mile the fanciest car ever parked outside the Barta Building, where WHIRLWIND I lived. Everett and Adams had very ordinary transportation, the Perlises and Carrs rode bicycles, and nobody knew how Jay got to work. A chariot of fire, the youngsters would have guessed; I would have voted for a deep subterranean passage.

It was a smooth and lovely interlude. Déodat and Dorothy and I were as happy as could be. The work was rewarding, although I hadn't produced anything earth-shaking in my first few months. Gordon Brown had steered me gently toward trying for an academic appointment in 1954, perhaps in his department (mathematics was foreclosed by Nasty Norbert, and there was at that time no prospect for space science

or astronomy slots). I saw clearly that MIT policy decisions came from the apparatchiks, who were all professors. And I had a very good Ph.D., unlike Forrester, who had been swept away from one by war work. It might mean a slight cut in salary, and as had been my custom since boyhood, I was spending all I made and then some. But Dorothy wanted to go back to work.

Then the heavens opened. As I have mentioned already, I had advised several close friends about whether their outfits should order Defense Calculators from IBM. That kind of informal contact had continued, especially at conferences and by telephone, while I built up the Washington bureau and after I went with Whirlwind - or the Digital Computer Laboratory, as MIT had begun to call it. In fact, I had had almost all my information about how orders were coming in from such people, rather than from Hurd.

The first paying job that ran on the SSEC had been for Hans Kraft of the General Electric Large Steam Turbine and Generator Department, who was continuing to struggle with Mother Nature. She did not want him to find out how compressible, near-turbulent flows went in a rotating lattice of airfoils [turbine buckets and blades]. He had tried using the giant GE differential analyzer, masses of punched card machines, fancy applied mathematicians, and the SSEC; in later years he would go out to Hanford and try hundred-decimal calculations on their IBM 702. No matter where he pushed in, the problem bulged out somewhere else. Clearly Mother Nature knew how to solve it: squirt lots of steam into actual buckets, and watch very closely. Such experiments cost the earth - more than renting a Defense Calculator, for sure. So I had advised Hans to get in line for one.

General Electric was a valued IBM customer - the largest in the world at that time except for the U.S. government and the Bell System. Kraft had introduced me to one of the other major engineering operations of the company, which designed and built jet engines, and which had turbine problems and compressor problems and combustion problems and control problems. His counterpart was one Bert Sells, whose department was located in Lynn, Massachusetts, and who operated a CPC I in nearby Boston.

Sells had told me the headquarters of the engine division was to move to a huge factory just outside Cincinnati, leaving the test cells and much engineering behind in Lynn. He confirmed that the jet engine operations needed computing power even more than the turbine people in Schenectady, and he and Hans planned to recommend that the two groups share a Defense [-156-] Calculator - by this time scheduled to rent for \$15,000 a month for one shift, and \$30,000 or more around the clock. That wasn't a trivial expenditure in 1951 even for giant General Electric.

When they told me this I said, "Your big problem will be staffing. You will need dozens of programmers, and clever numerical analysts, and experienced supervision. None of that will come easily in Schenectady or Lynn, and it would be a real wowser in Ohio." Sells was unhappy; he was pushing for Cincinnati, knowing how conservative Schenectady was, and how union-ridden and space-limited Lynn was. Also he had been thinking of, oh, ten people. I showed him the list of Backuses and Codd behind the scenes at the SSEC, and the list of Sheldons and Kubies in Hurd's New York shop. "When a Defense Calculator runs three shifts," I said, "you will need a hundred bods, and you'll have to train most of 'em on the job." "Jesus, Herb," he said, "I have trouble keeping my CPC busy one shift." "Sounds like you aren't the right guy to run the new machine," I said in my usual diplomatic way.

I turned to Kraft. "Hans," I said, "you remember Paul Herget from the Endicott seminars. He heads the University of Cincinnati Observatory, has just come back from a hitch at the Naval Observatory, and must be itching for a fancy machine. He'll never get even a CPC through the university. And he's terrific. Only thing is, he suffers from the Wallace Eckert syndrome." "You mean he will want to do a lot of astronomical calculations," muttered Kraft. "Watch him," I said.

I was sitting in my cramped but pleasant little office in the Barta Building one morning, thinking about ternary arithmetic, and also about foldboating with the Appies next weekend, when the phone rang. "How about lunch at the Somerset with Hans and me?" asked Bert Sells. Very fancy for lunch in those days, was the Somerset - and I hadn't talked to Kraft or Sells for months.

"GE has ordered a Defense Calculator, Herb," said Sells. "We expect to get one of the first ones, and we are indeed going to put it in Ohio. The costs will be shared with the turbine division, but my department will run it. We're in a new laboratory building; there's lots of space, and good facilities for engineering-type people. The suburb is called Evendale, and we already have six thousand employees there on the manufacturing side."

"Wonderful!" I said. "Did you ask Herget?" "We sure did," said Kraft, "but he insisted he had to have time on the machine to do asteroid orbit calculations, and fancy celestial mechanics later on. We didn't even try to get that past our bosses. Four or five years ago, maybe - right now we have to show results for all that rent. God knows we have enough problems waiting."

"Herb," said Sells, "you got us into this. You've got to come down to Evendale and run the damn thing." "I'd love to, Bert," I said, "but I've only been here five months. I can't possibly do it." "We've already talked to Forrester," said Sells, "and he says you can go any time." Gulp!!

Well, it turned out I wasn't all that unvaluable to Jay after all. General Electric was funding, from Lynn, a very important gas turbine research facility at MIT, and had been doing so for several years. When Sells persuaded his bosses to ask for my head on a platter, like that other prophet John the Baptist, my small current contributions and possible future academic value were shoved briskly aside.

[-157-] I liked MIT. I liked Boston. Dorothy and Déodat liked Belmont. But I was swept away, and not unwillingly. I would be a line manager in an engineering company, the greatest one in the world. I would be using my contacts in rocketry and in the tin airplane business. And I would have my own great big wonderful computer. Also a little green demon kept whispering in my ear that I would be poking IBM in the eye with a very sharp stick.

I knew where the bodies were buried at 590 and in Poughkeepsie. I was good friends with the Rochesters and the Bill McClellands. I knew more about the Defense Calculator than any other customer. All that was to the advantage of my new employers - and my new employers knew it. They treated me well from the very beginning; I soon learned to call GE "Generous Electric." I got an immediate raise to \$12,000 and promises of frequent reviews. I got a great move, much to Dorothy's relief; she had been treated well when we went down to Washington in Mary Noble Smith's museum van, but not so carefully when MIT moved us to Belmont.

On the other hand, I was about to install the very first giant computer in the General Electric Company, the first in the aircraft engine business worldwide, and the first in the American middle west. I knew very little about my new employer, and nothing about Cincinnati. Well, as Napoleon said, I was well positioned to attack in any direction!

I was hired in as a first-level supervisor, and handed the Numerical Analysis Unit of the Aircraft Gas Turbine Development Department. That consisted of a serious young mechanical engineer named Gene Gettel, four attractive women with math degrees who were listed as subprofessionals, and an underutilized Model I Card Programmed Calculator installed in a back room in the office building attached to North Station in downtown Boston.

A few minutes conversation made it clear Gene and the girls were the right stuff. I swept them up - none of them wanted to move to Ohio - bargained briskly with a bemused IBM salesman for two CPC IIs in Evendale (he said the backlog was six months), turned in the Model I, and headed for Evendale. GE had a specialist IBM interface which had handled the big-machine order; I told the people involved on both sides that George Richter would fix up my Model IIs if they could reach him: "If you have trouble I'll call him myself; just let me know." The expression had not been invented yet, but I was On A Roll.

[-158-]

16 GENEROUS ELECTRIC GETS ITS 701

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(in order of appearance):

Pratt and Whitney *almost as dominant in its field as IBM*
Westinghouse, Allis Chalmers, Curtiss Wright and GM Allison *also-rans*
Rolls Royce *they made jet engines too, in Britain*
GE AGT Division [15](#)
GE research *a tradition going back beyond Steinmetz; far deeper than IBM*
GE management practices *organization and decentralization and a lot more*
Watson Senior [01](#)
Ewendale Numerical Analysis Unit *there were exactly six levels above me*
Frank Warner *he smiled gently at my predictions and my needs*
CPC II [13](#)
IBM 701 *there was a new name for the Defense Calculator*
Stan Farwell *my Very Own Friendly Local IBM Sales Representative*
AGT Development Department *several buildings, and acres of outdoor gear*
Dave Cochran *the AGT DD general manager, young and imaginative*
Jim LaPierre *AGT Division vice president, later Number Three of all GE*
Jet engine simulator *a big analog, for Wright Field; I was skeptical*
Marion Kellogg *after Ewendale she became GE's first woman vice president*
Women computer professionals *I broke the ice in GE, with Marion's help*
Ralph Cordiner *president of GE; I forgot to call him by his first name*
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Hopper and Blanch and Maria Mayer, and Dorothy *I reserved Marie Curie*
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Bruno Bruckmann *a graduate of PAPERCLIP, he had the Prussian saber scars*
Union relations *we moved one CPC across town to be ready for a strike*
The AGT Fair *local TV showed our computer working at the Fair Grounds*
Programmer selection *"Do you read ASTOUNDING? And play chess? Great!"*
Jack Hughes *he was to run the GM Research 701, but I was lucky*
The basement of Building 300 *when the Ohio rose, I wanted to be safe*
The open shop *when customers wrote the programs, usage skyrocketed*
Charge-back *I invented my version to make expansion easy, and it worked*
John Lowe and Chuck Baker [11](#)
Bemer and Bozak and Amaya *they averted a disaster at Lockheed*
Harold Smiddy *he propounded the GE company philosophy*
Cincinnati media *I used the ENQUIRER and radio and TV and service clubs*
The GE MONOGRAM *it reached every manager, and turned up Dan McCracken*
The 701 Installation Manual *distilled by Palmer, Haddad, Hurd et al*
The Secretary of the Air Force *his son Don worked for Applied Science*
A Magic Pushbroom *swept me into GE section managership*

[-159-] The jet engine business was wonderful. It put you at the very cutting edge of aerodynamics, combustion theory, mechanical engineering, and controls technology. A host of bright, vigorous men - and a few women - were introducing new ideas and materials, and otherwise increasing the number of design parameters. The market was enormous, and still growing. There were a dozen competitors worldwide, led

by Pratt and Whitney in Connecticut, and including such powerhouses as Westinghouse, Allis Chalmers, Curtiss Wright, GM's Allison - and overseas, Rolls Royce. Smaller engines were being built by AiResearch, Allison and others. General Electric was a relative newcomer, but already the challenger all through the spectrum - the tough new kid on the block.

Moreover, the competition was honestly technical. Sure, the salesmen fanned out in the military and across the airline spectrum. There was favoritism; there were deals; no doubt off in the bushes games were being played. But center stage, the outfit that produced the most thrust for a pound of jet fuel got the business. There were considerations of durability, of serviceability, of company resources and speed of delivery - and price counted for a lot. But allowing for those ancillary matters, the best engine was the winner.

I was soon told that Pratt and Whitney and General Electric were swinging six hundred million dollars worth of business back and forth each year, almost entirely because of performance. Move to a better manufacturing facility? Sure! Build a \$40 million dollar test rig? Right away! Put in one of those big IBM computers? Why not? Hire a bearded ex-astronomer from MIT? Get two, if they have 'em!

It wasn't chaos. It wasn't war time. GE was a carefully organized and closely managed company, very much larger than IBM and with a long tradition [-160-] of genuine research - Steinmetz decades ago, and Nobel prize winners; far beyond what Watson Senior had been able to do. But the engine boys were hot. They could move much more quickly than the lamp bulb boys or the dishwasher boys or even the steam turbine boys. Company rules said you had to have permission of the board of directors to buy land or build a major structure. That applied to the engine division too - but its requests got approved awfully fast!

I knew how strong GE was. Kraft had shown me the huge turbine shops in Schenectady, where the rough forging for a big generator rotor cost \$150,000 and could be ruined by one wrong tool setting, on a machine so big the operator had to climb a tall ladder to look at how the cut was going, and might take his lunch bucket along. I knew the jet engine test cells in Lynn could run only at night because they took most of the power of the area, and that attempts had been made to anchor decrepit naval vessels in the nearby river to supply daytime steam power (and reduce the complaints about noisy post-midnight testing).

Even so, Evendale was a revelation. There were literally square miles of buildings, built at the end of the war for piston engine production. Plant layout was a major operation. Intraplant transport was a major operation. Security was a major operation. Raw material storage was by tens of acres. And they told me most of the division was still up in Massachusetts!

My little band was plopped down in a new-building area across the road from the manufacturing operations. Green grass, nicer cafeteria facilities, snappier guard service to handle the hordes of salesmen calling on the hundreds of buyers; it was industrial but attractive.

There was no art collection, and no Mary Noble Smith to choose curtains and carpets; three years later I put tropical fish and green plants and Herman Miller pretties in my own computer building, but it all disappeared as soon as I left. There was a definite GE culture; I was prepared for it; I was very well treated within it. But The Old Man had been something special, and I often missed him.

I soon found there were organization charts, even if there were no oil paintings. General Electric was an open book, or tried to be. You could trace authority down from the very top through your group, your division, your department, your section, your subsection, your unit - to you. There were tests when you came aboard, entrance interviews, performance (salary) reviews, appeal procedures. And across the road, unions!

One great thing I discovered: the official printed multi-color organization chart (always a little out of date, alas!) said explicitly that while authority flowed down, and via rigidly prescribed channels, information could flow upward and across and leap from block to block. That was why Sells and Kraft could help each

other without getting permission from something like five levels of managers above Bert and four levels down to Hans (they were in different groups), or vice versa.

In Olympian IBM it had been much different; you asked yourself, "Would Mr. Watson want me to say this (or do this, or order this)?" If you thought he would, you did it. If somebody upstairs thought he wouldn't, you were in deep trouble, unless someone further upstairs thought he would - in which case Mr. [-161-] Part Way was in the soup instead, like the vice president who guessed wrong about those WCs at the Watson Lab. In GE you could ask without risk - well, with much less risk.

And if an important customer from the American Airlines engineering department wanted to eat prunes in the conference room, you could share them with him unabashed!

Almost anything - I mentioned real estate deals as an exception - could be done with the approval of two levels of management: your direct boss, and his boss. When I piled up a racing car years later at Willow Springs, and woke up debearded and alone in a hospital two hundred miles from my GE troops in Santa Barbara, it took one call from me to my then boss, Tom Paine, and one from him to his division general manager back in Schenectady, to put me into an air-conditioned Cadillac ambulance and on the road to a hospital where the gang could drop in for advice. So the insurance didn't cover it? Two levels of GE management did.

Well, to work! The Numerical Analysis Unit found itself in basement space in a laboratory building. It was cavernous; chosen to hold the Defense Calculator when it came. There were no windows except into a big areaway through which the pieces of the computer would be lowered. We were promised ample office space on the second floor, but there was no elevator. I emphasized that we were going to be one great big huge bunch of guys and gals; my boss, a veteran GE mechanical engineer named Frank Warner, looked at my little huddle of reluctant Bostonians and smiled gently.

His main worry was not floor space, but floor. I told him there would be hundreds of thick, sensitive signal and power cables running between the boxes of the computer when it arrived - in seven months, we thought. The idea of raised flooring was unheard of in our tiny trade, but of course I had seen Watson order it for the beautiful SSEC room in 1946. "No," said Frank, "the ceiling is too low already for the air conditioning you claim you are going to need; a foot less is out of the question." "We'll have to cut trenches with a diamond saw when the layout is finalized," I said. "Where do you want me to put the two CPCs while that is being done? They can't run in cement dust." "Hmmm," said Frank, wincing.

The first of the two CPC II systems got to Evendale before my troops (but not before me; I was indeed on a roll, and would have come by Concorde if the service had been available. Dorothy and Déodat were packing). Six months? Not for a 701 customer who knew George Richter! The power supply wasn't quite right, but the facilities people fixed it in hours; Evendale Plant was on a roll too. I thought we could get along without extra air conditioning, if the ducts were opened up. "Just call us, pal," said the Evendalers.

Note the "701." My first visitor, even before the CPC arrived, was of course my Very Own Friendly Local IBM Sales Representative and one thing he told me was the new name for the Defense Calculator: IBM Type 701 Data Processing System. Coooo!

About my VOFLIBMSR: he was a great piece of luck for me. Not entirely intentionally, perhaps; although Applied Science was trying to place special, um, agents at all the early 701 sites, and I turned out to be Number Six, I was [-162-] treated differently. This chap was not a techie; Cuthbert And Co. claimed they realized I could do without one. My guesses were, a) they were short-handed, b) they were afraid I would steal away or at least pollute one of their innocents, and c) they could stick a sharp stick in an eye as well as anybody.

Anyhow, my man was one Stanley Farwell, nephew of a very famous early-Watson executive who some years later left IBM to become the Number Three at RCA. Fred Farwell, whom I never met, was about at

Red LaMotte's level in postwar IBM, and had helped Stan find a place in the sales force when he got out of hospital in the late Forties.

Stan was very tall, lean, a wolf with a gentle smile. He had a glamorous society wife who was a little lost in Cincinnati, and a prewar Lincoln Continental that he was lovingly restoring - twenty coats of hand-rubbed white lacquer, as I remember. He was notorious in his IBM circles for taking leave in the summer to go with the circus, or to a logging camp, to work off his tensions. He took great pains to preserve his Continental while away, but I gathered later, not so much to preserve his marriage.

He got away with this because he was almost the last survivor of a Ranger battalion that was wiped out in Normandy. He had been reconstructed physically and mentally, but a lot of Good IBMers like Watson Junior and Garland Briggs were still watching over him. The assignment to help me put in the 701 was a way of getting him away from the rather grinding sales routine of local offices.

He had great contacts back in Watsonland, but he was irreverent about them. He had heard about George Richter, and was impressed with how my CPCs had appeared out of nowhere. I liked him immediately; in spite of the stories about his problems, which I heard from my VOFLCE, Very Own Friendly Local Customer Engineer, he was always around when we needed him. He brought me all kinds of technical gossip from his trips to 590 and Endicott and Poughkeepsie (and was exceedingly sharp about it for a non-techie), and smoothed the commercial relations with a somewhat bewildered downtown Cincinnati IBM office. And he was a warm if somewhat injured human being.

My new boss was in charge of the laboratories and test facilities of the AGT (Aircraft Gas Turbine) Development Department. That meant he had all of the building we had landed in, several acres of outdoor machinery out back, and a sizeable number of engineers en route from Lynn. He reported to the manager of engineering, Neil Burgess, who reported to the department general manager, Dave Cochran, who reported to the AGT Division vice president, Jim LaPierre. The division had 14,000 employees in Massachusetts and Ohio, plus sales and service reps all over hell and gone: in Korea and on aircraft carriers, at a dozen Air Force bases, and at several airline maintenance centers.

LaPierre had two departments in Lynn; one doing small engines and the other, controls and fuel pumps and such. In Evendale he had a sizeable prototype-engine department, and Cochran's outfit. And divided between the two sites he had a huge manufacturing department with over nine thousand union employees and foremen and managers. The division did nearly a billion 1953 dollars a year, made a useful profit, and was growing like mad. In the [-163-] late Seventies it was a group, and had gotten up to 40,000 people. It must be even larger today.

I'll write more later about the General Electric management philosophy, and how it interacted with the three great challenges of nuclear engineering, jet engine manufacturing and computer marketing. One of its tenets was that each department had its own manufacturing, engineering, finance, marketing and employee/community relations sections - and its own bottom line. In Cochran's case the manufacturing was small and specialized, with emphasis on new materials and processes. And marketing was mostly market and product planning. Engineering, though, had nearly a thousand bods, and cost the earth. Adding a 701 was small potatoes - at least, at first!

Our building, for instance, housed a big electronics lab that was designing, and testing components for, a giant analog jet engine simulator. GE was to build this monster at Wright Field (just a few miles away). At the other end of the ground floor was a suite of bench-science labs doing combustion research, and they also had flame tunnels and such out back. Upstairs was a vast open office space, partly loaned out to a preliminary design group which was not under Frank - another part of the Engineering Section. I was offered an adjacent area, and rather shrewdly said we would need it and a lot more "when our Big Computer comes," but wanted to be near our new-model CPCs in the basement until we got used to them.

I went up to the main building and introduced myself to the personnel crew. Their boss was at subsection level, and tended to resist my romantic yarns about the vast hordes of men and women I was going to recruit. But he reported to a woman, unheard of elsewhere in GE but of course familiar to me from IBM experiences. Her name was Marion Kellogg, and in later years she became General Electric's first woman vice president and made the cover of BUSINESS WEEK.

She saw that my curious ads got printed, that my curious prospective employees got tested and "processed," and that the ones I curiously liked got taken aboard briskly. There were no trade papers to advertise in, and no youngsters using computers in their college courses, and certainly no computer science departments, even at MIT. I bypassed Burgess and got Cochran to authorize an open requisition for programmers; he expected me to hire four or five, poor boy!

"Marion," I said (everybody used first names in GE, although I slipped and called the president "Mr. Cordiner" the first time I met him), "about these young ladies I kidnapped in Massachusetts: they all have excellent degrees, from better colleges than most of the engineers they work with. They all are planning on careers in the computer area. They have to make expensive decisions without much guidance. And CPC operation is a damned scarce skill. Can we get `em off the time clock?"

"Your friend Hans Kraft has several girls running desk calculators and punched card machines, and the differential analyzer in the General Engineering Lab has half a dozen. There are others outside of Schenectady; we have three besides yours in 300 [my building]." "Yes," I said, "they're all waiting for some adventurous manager to fire the starting gun. Hans would love to make Bonnie and his other women professional; they have even given papers [-164-] at IBM conferences. But Large Steam Turbine isn't the outfit, and Schenectady isn't the town. The 701 here is going to need dozens of expert females; I can recruit `em a lot easier if you fix up proper status." And I told her about the great gals at the Watson Lab and the SSEC, and about Grace Hopper at Harvard and Gertie Blanch at the Bureau of Standards - and about my own wife, and Barbara Schwarzschild. Before I got through with Maria Mayer and Marie Curie, she said she'd try!

Her boss Dave Cochran was young and vigorous. And although I didn't know it at the time, Marion herself was Jim LaPierre's private high-level executive recruiter, and interfaced for him with senior consultants. She wasn't a feminist, nor had I assumed she was. But she was an expert at professionalism and at fancy recruiting.

I kept bringing in women for interviews, and I told them I expected to hire them in as full professionals, right along with their male counterparts, and for the same wages. And I told my original four, "Hang in there," or whatever the 1953 equivalent was. Marion objected that I was putting improper pressure on her. "I know," I said. "Dave has spoken to Jim about the idea." "I know." "He may not consent." "I know. Would you like me to tell him about Maria Mayer?" "Oh, Herb!!"

It went through, and Marion then did her part very quickly indeed. My young ladies got their notices, and were amazed - I told them to be nice to Marion, even if she was a section manager; she had been a physicist once. My new hires all made it. Kraft put in for his senior girls the day he heard, and while there was some footdragging among the fuds, the women got to tear up their timecards almost immediately. It was a milestone in Generous Electric.

Before I go on about people and buildings and the 701 itself, I ought to write a little more about why the jet engine people were pushing so hard for computer power. It was a matter of complexity. The lamp bulb boys in Cleveland were also struggling to improve their product - make filaments a little more uniform for longer life, make the base a little cheaper for lower price, run the envelope a little hotter for better efficiency - but their efforts were separable. In that sense Hans Kraft's lifelong struggle to improve the shape of his steam turbine blades and buckets was also separable; his changes did not impinge on the system layout, let alone on the specialist who was trying to find a shipping route from the doors of the shop to the customer's power plant which avoided low bridges and narrow tunnels. In the fifty-year

lifetime of a huge turbine, steam generated by literally tens of millions of tons of coal would pass through; a hundredth of a percent of added efficiency was worth struggling for. But it was a lonely effort.

Parenthetically, the medium steam turbine people (who did machines for marine propulsion, and cut huge gears and such) had a man named Allen Keller who was desperate for more computer capacity. He wanted to optimize powerplant systems design: size the boiler and turbines and generators, and piping and cooling towers and so on, and even introduce elements of switchyard location and design. Today we would say he wanted to build an expert system for steam powerplant layout. He became a reluctant customer of my 701, and a familiar figure at IBM and other computer conferences in the late [-165-] Fifties. His was not a lonely effort; it involved almost every element in his department.

But in AGT the very number of parameters was increasing. The first post-Whittle jet engines were simple systems - cantankerous elements, yes, but few in number. Now commercial users were pushing for much greater economy, and the military all over the world were aiming at supersonic flight. So additional combustion methods, such as dumping fuel into so-called afterburners, and bypasses for cool air around the turbine sections (we say "fan engines"), and more stages and new complexities in compressor construction, were being included. And air had to be bled off for cabin cooling, and fuel pump control had to be integrated, and on and on.

About those compressors: down the hall in Building 300 was a preliminary design group run by a fantastic guy named Gerhard Neumann, who soon became my best - and most demanding - customer. He was trying to make the front end (ten or so stages of axial compressor blades) efficient over a much wider range of engine speeds and altitudes. You could fairly well optimize the design for a single stage and a single speed and a single inlet pressure using desk calculators and graphs, and you could test a single stage out behind 300, or in Lynn if necessary. But it was getting beyond the capabilities of Gerry's men and women (yes, he had the three Marion had mentioned) to do the calculations for many stages, and reduce the data from many tests, in a usefully short time. "We got to cut metal, Herb, not push buttons on those damn calculators," he said.

Main thing was, he had a scheme to broaden the efficient regions of compressor operation. Between each row of rotating blades was a row of stationary blades to turn the air flow; the two rows together constituted a stage. Gerry had had the tremendous idea of adjusting the angle of the blades in the stationary row by rotating their bases - the variable stator principle, which revolutionized General Electric jet engine performance and helped them overtake Pratt and Whitney. But, aside from the horrid complexities of mechanism needed (the details of which also had to be calculated, of course), an optimum angle now had to be worked out for each speed and pressure, and was a function of the airfoil shapes of both kinds of blades. It was hopeless without at least CPCs - a hundred girls could not have done it in time.

Pratt and Whitney had chosen to have the front stages of the compressor rotate at different speeds from the rear, running coaxial shafts back to two sets of turbines for driving power. The bearing problems were enormous, and it gave them less flexibility than Gerry's system, but was slightly simpler to calculate. They were in line for the Number Nine 701, and also had hired an astronomer, my best student at the Watson Lab, Walt Ramshaw - unfledged and unbearded, however!

Add to that the afterburner and bypass parameters, whole new kinds of tests as well as larger numbers of old ones, and the problems inherent in dividing engineering and manufacturing between sites hundreds of miles apart, and you begin to see why LaPierre ordered a 701.

Jim was not an emperor in the Watsonian sense, although he had his moments. For one thing, he had two levels of executives above him, a group executive named John Something who didn't exactly throb with brilliance, [-166-] and the president, Ralph Cordiner (of whom more later). They didn't stop him from having his own china and silver - and chef - in his own private dining room, or from having a hot Chrysler Imperial 300 sedan and driver instead of the customary Cadillac limousine, but John S. made him really extend himself to justify the Evendale move and the expensive high altitude test facilities then being

planned.

You met LaPierre very easily; he wanted to know about every new venture in his division. I was introduced to him in my first week at Evendale, and noted the laugh wrinkles at the corners of his eyes first, and then that he had a custom-designed desk with a large round hole [!] in the working surface to facilitate waste paper disposal. He also had a gorgeous and very effective blonde lead secretary, and a string of unusual outside consultants marshalled by Marion Kellogg. About the desk: when he became executive vice president and Number Three in General Electric a few years later, he had the first office I was ever in without a desk - sofas and coffee tables, and unobtrusive stand-up furniture where he signed papers between visitors. And handsome art (perhaps there was a Mary Noble at 570 Lexington), and no portrait of Cordiner!

After the two CPCs were in full cry, and my unit was up to ten or fifteen people, I was mysteriously promoted to subsection level, the same as Frank, but left in Building 300, of course, since that was where the 701 was to be installed. It seemed diplomatic to continue to refer to it as his building, since he had well over a hundred of the people in it, and all that stuff out behind. Its official name was Component Development, which I thought exceedingly glamorous.

My new boss was a section manager named Bruno Bruckmann, almost as romantic a figure as Neumann. He was tall and lean with white hair, had the Prussian duelling scar and a North German accent to go with it - and a lovely wife his own age, who had gone through the last days of Hitler Berlin with him in 1944 and 1945. Bruno had been in charge of the final effort to manufacture jet engines - radial, not axial - in the Third Reich. Each night he and his family and his senior associates retired to a deep bunker to wait out the Allied air raids. Each morning they struggled to repair the damage to the underground factory, and turn out a few more fighter engines.

Bruno and his wife were picked up by the PAPERCLIP sweep which retrieved von Braun and the Peenemunde families, and after months of debriefing they were deposited at Wright Field. There were also lots of papers and engine parts, but nothing like the hundreds of tons of V-2 hardware that accompanied von Braun to White Sands. Bruckmann set to work on engine design, and after his servitude ended with his naturalization, he was caught up enthusiastically by GE for the Evendale adventure.

His section was looking particularly at a future supersonic engine, which meant military in those pre-Concorde days. If it went into production he would follow it over to another department, so he was permitted to occupy a non-standard slot alongside the Engineering Section proper. His men also became major customers of the CPC and 701 services, and I was well acquainted with them before I was switched to Bruno. The operation was painless, and carried a moderate raise with it.

[-167-] I mentioned that, unlike IBM, General Electric was heavily unionized. There was a struggle involving mostly the Auto Workers, who were big locally, but also the electrical union, which was important in Schenectady. We all anticipated that pickets would close off the engineering and administrative buildings as well as the tremendous manufacturing areas. Elaborate plans were made for key engineering projects to move out to office buildings or private homes, and duplicate drafting facilities were set up - including security provisions! It was understood that each night when picketing was imminent, enough data would be taken home so that work could continue if access was severed in the morning.

In the event, our side of the road was undisturbed, and the precautions were not necessary. I was an exception. Since running a CPC was a pretty elaborate affair, and since I had convinced everybody that the whole department would collapse if we were shut down, we had moved one CPC across town to an office site before the strike date arrived. We had to duplicate many files, and transfer programming papers, and initiate security. And half of my gang actually moved, and worked at the new location for some weeks. I struggled with Marion's man for hardship pay, and failed.

Some weeks after the strike was settled, LaPierre and the union specialists in New York came up with the

idea of a fair for GE employees and local supporters. Because of heavy plant security we couldn't do tours or family visits; I had never had Dorothy inside, although my bunch fixed Déodat up with a fake picture badge so he could come to work with me on Sundays. This went over big with Security, and somewhat mollified their anger at my having climbed a ladder to the roof of 300 and entered by an unsecured stair when the guard at 300 had not responded quickly enough to my signals one weekend (I promised never to do it again, or to kick in the plate glass door, provided they never left the 300 desk unmanned in daylight).

GE took over a major hall at the county fairgrounds, and moved in samples of what we did from the plant. This was not just photographs and movies, although we did have some of the latter to provide hot airplane shots. We put in actual machine tools and assembly operations, and a miniature shipping department. Security was carefully allowed for; all the parts we showed were for commercial engines, and Security had a display too!

And needless to say, I hauled that same poor uncomplaining CPC, and a discreet IBM customer engineer, out of the basement of Building 300, and ran a working operation in public view for three days. We were on local television; probably the first time a computer ever came on live in Cincinnati. My troops divided between pleasure at being displayed, and mild contempt for my showmanship. But they all brought their families and friends to the fair!

Jim had me on the carpet before the event. "Herb," he warned me, "that machine is precious. They tell me even a few hours lost time would set back important schedules. And what if the riggers drop the thing?" "Jim, we took that risk when we moved it for the strike, and the riggers are the same; I specified it. IBM would have a new one down here in two days. I'm worried about the schedule too, but some of my guys will work third shift to catch up if there is a real problem" (we were working two).

"And soon we'll have the 701, and it can't be moved to the fairgrounds, [-168-] even for Mr. Cordiner." I thought it better not to say "Watson," and besides, if T.J. had ordered me to move a 701 I would have. No building columns, though!

I was adding men and women steadily, using simple test methods (there were no Programmer Aptitude Tests yet, fortunately). I did the first interview myself, usually, and started by asking if the youngster played chess or Go or fancy bridge. Then I asked if he or she read science fiction. Finally, I watched their faces as they walked into the machine area with me. Had one failure in nearly two hundred such sessions in three years, and that was a nice young guy named Harvey who came to me from Paul Herget and had had Paul's numerical analysis course. And he was a great jazz pianist, professional, besides. Should have worked, and he wanted it to, desperately. But every time he corrected a bug in a program, he left two new ones; the process diverged.

The professional personnel people gave intelligence and psychology tests, and I always looked at the results. But I never used them negatively. A good score I considered a real plus; a poor score - well, maybe a man had had a fight with his girlfriend, or maybe a woman was scared of tests.

I had one piece of good luck very early on. The head of the computer shop at the General Motors Research Laboratories outside Detroit was a Jack (John B.) Hughes, and he had signed up for the Number Seventeen 701 (on which, by the way, GM initiated outstanding development of 3-D graphics - which I call "curly fenders" for short). Jack was originally from Cincinnati, and family problems made it necessary for him to move back. He and his wife Marge must have been devastated. Well, partly through his own connections in Ohio and partly through Applied Science, we got together. I was of course delighted, and put him in charge of operations. Three years later, when I went to the ill-omened GE Computer Department, he managed to get into the we-hire-'em-only-out-of-college Procter and Gamble, which headquarters in Cincinnati, became their top software honcho, and is now retired.

I had continued to fret at the idea of putting my precious machine in a basement. The low ceiling, the lack of adjacent office space, and above all the prospect of cutting those horrid trenches in the solid concrete

floor, stimulated me to action. I found an informant who told me the local phone company had refused to install switching and distribution gear in the basement because of possible flood damage (the Ohio River was just down the way). I went to Bruno. He was favorable, but it was Frank's building; Frank thought it was a criticism and said, "Tell him to stay with the plan." I appealed to Cochran; he took it upstairs to LaPierre, who said (according to Dave), "I leave it up to you. If it bothers you, toss a coin."

I got out of the basement. Two years later, the Ohio indeed rose, and plant areas were inundated. The basement of 300 stayed dry. By that time I had built my own building.

I was already explaining about my equipment, and how others could join the parade, on the rubber chicken circuit (local and regional non-computer dinner speeches). "Order your computer," I smiled. "Get ready for its arrival by choosing profitable applications areas, studying and refining and mathematizing the procedures, and documenting them. Then cancel your computer order." It got a good laugh, and of course once the poor devils had [-169-] done what I advised - and it was very good advice - they would undoubtedly be swept into the maelstrom anyhow. Besides, I wasn't selling computers to Kiwanis and Rotary; I was selling rationality - and romance. Cincinnati was conservative, and GE needed community support.

I set up a pattern to handle Evendale customers while we were still on the CPCs. In a few years it would be called "closed shop," and "charge-back"; the former was common [1952], the latter novel. One of my men or women - and in 701 days perhaps a team of two or three - would work with engineers doing stress calculation, say; another would work with the combustion researchers. The customer explained the problem, and in many cases prescribed the numerical method. My guy or gal might help refine the latter, or even take responsibility if the problem was new - and then code everything for the machine, and run the problem. And present the results (that was shorthand for "persuade the customer the answers are right")!

We kept accurate count of human and machine time expended, and billed the customer group at publicly announced rates. You know, I can't remember having any trouble at all setting it up, although it must have sounded crazy to the accountants. Perhaps the fact that Dave had his own financial section was the key. I did work for other departments, so there must have been many arguments.

Oh, and I pulled out old Grosch's Law to predict the 701 economies as delivery approached. I wanted no CPC-lovers dragging their feet. Reprogramming from a three-address decimal mini to a one-address pure-binary maxi was not going to be free, or why was I hiring hordes of programmers??

Gerry Neumann and I, and several other men in the vicinity - and, who knows, maybe Marion in her secret way - were doing something extraordinary. The trick word is "afflatus": overmastering or supernatural impulse, says Webster. "On a roll" is close, but sounds too short-lived. My surge lasted over three years, until Dorothy's death in 1956; Neumann's carried him all the way to retirement in 1980: a group executive in GE, the leader of the jet engine pack worldwide.

About accounting again: it was not clear how to handle the steam turbine people, since they were to be billed by prior arrangement for part of the 701 rental. But the problem was not urgent, since they had their own punched card machinery in Schenectady and Lynn, and were going to come down to Evendale only after the 701 was usable. They were of course concerned when Stan Farwell brought the word of a two-month delay in our scheduled delivery date, which I realized years later was almost certainly due to the quiet insertion of the National Security Agency order ahead of mine. Who got which machine when, was a secret which Cuthbert And Co. were desperately trying to preserve; when you penetrated to the Poughkeepsie assembly area in spite of them - and they then scrambled wildly to make it appear they had raised heaven and earth to get you in - you found signs on the mainframes saying "WHQ" or "Douglas Santa Monica," but in spite of Farwell's efforts I never got in until after the sign went up for Number Four: "U.S. Govt." The very name and location of NSA (Fort Meade), and even the telephone number, was still a deep secret.

The pattern by the time I could write it down was IBM first (to replace the [-170-] SSEC and provide checkout time), Los Alamos, Lockheed (not, alas, Bill Bell), NSA, Douglas, and then "GE Lockland," which was the town out of which Evendale was carved after the Defense Calculator was ordered by General Electric headquarters. Probably not coincidentally, when I got into the area my machine was the last one carrying a label.

The labels were ostensibly for assembly and test department morale, since it made the team working on your machine realize how important it was going to be in the Korean war effort (NSA lost out on that one). Of course, aside from the connecting cables, most of the first dozen machines were nominally identical, although Palmer and Haddad and Rochester were putting change orders in by the hundred. In a few months weirdos like me would be pushing for an extra unit of electrostatic memory. In fact, it was while I was screaming about that two-month delay that I began bargaining for the first or second "second box."

Stan now brought early word of the testing schedule. Since the machine at 590 would not be ready in time, the customers for the next few systems were to come to Poughkeepsie and use the engineering department 701 for first trials. Two at a time, so that when one team retired to lick its wounds, the other would stride confidently to the console and, ahem, foul up. Our opposite numbers were to be John Lowe and Chuck Baker of Douglas, who had been running a considerably larger group than mine and brought much well-prepared material with them, as well as several youngsters.

The town hadn't changed at all since I had zoomed off to Washington. Both Douglas and GE were super-serious, and this was helped by my insider information about Poughkeepsie excitements: night clubs, good restaurants, fancy hotels - "there aren't any." The 701 was being used to check out changes, and for customer engineer training of course; we users were an enormous nuisance. John was a stickler for neatness, and needed to be restrained from putting the working area in order before starting. Chuck was mesmerized by the power of the monster, and had to be driven away from the console by superior GE force on occasion. My guys, especially Gene Gettel and Jack Hughes, were of course perfect gentlemen compared to the airplane tribe, but I made up for it. Chuck still remembers my reaching over his shoulder and pushing the "get lost" button a few seconds after Douglas time had expired!

As later interchanges occurred between the dozen or so important 701 users, I saw that the division in philosophies, and notably the one between open shoppers (the new wave, they said) and us old closed shop hands, reflected the experience level of the supremos in each installation. If they had built up major operations in the punched card and CPC eras, and successfully serviced a wide variety of customers, and if said supremos were pushing like fury from underneath, large and competent groups of programmers and operators serviced the clients (closed shop).

If an empire-builder wangled control, or if some poor devil was simply told, "The company has ordered one of those big IBM machines, which will arrive in ten months. You are in charge; be ready," the usual strategy was to admit - even, entice - the end users into the act (open shop). That meant a much smaller staff, and a much smaller recruiting effort. It also ran the [-171-] utilization up very quickly indeed, which looked great. And the 701 was so incredibly fast compared to the CPCs that the poorer relative productivity was not noticeable.

I watched Lowe. He was terrific. He ran a very tight shop, serviced Douglas Santa Monica and greatly helped other Douglas locations, and kept his machine so productive that he didn't even need to clamor for a second memory box or a 701A. Lockheed, on the other hand, had depended on an equally good operation, but outside its wall - Telecomputing. When the size and cost of the next class of machines and the central importance of computing to the overall enterprise became obvious, a red-hot who couldn't have collected scrap punched cards in Bill Bell's shop emerged, persuaded top management to order a Defense Calculator, cut the ties to the outside, forced IBM to send Lockheed the Number Three machine (for which they were not ready), and later had to have Number Eighteen as well.

In the event, the two 701s were so powerful that genuine experts were drawn in from outside, notably

Bob Bemer and Bob Bozak and Lee Amaya. But it could have been a catastrophe.

Los Alamos was special. On the one hand, it had terrible problems recruiting people to work on the mesa, and under security restrictions. And on the other hand, its customers were bushy-haired bomb physicists who learned programming overnight - junior Feynmans. They were pioneers in open shop philosophy. Rand was also riddled with proto-programmers, and soon lined up on that side.

Open shoppers used interpreters, programs that lived in the 701 and made it behave like a CPC with a Rothman general-purpose board in it: floating [decimal] point, three-address. Slowed the machine down fifty-fold, but let amateurs learn fast. Lowe had his people writing matrix algebra routines in symbolic. I had my chief software artist doing the first compiler for the 701A. It wasn't grim; it was fun. We did "Jingle Bells" on the console the first winter, and made Cincinnati television!

A while ago I wrote a magazine piece about the history of early computer conferences. In commenting on a paper about the first Los Alamos open-shop language, SHACO, I wrote "I had a great closed shop in Cincinnati and couldn't see why anyone would want the opposite: 'It requires more tactful people', said the Los Alomite. What I wanted was core instead of electrostatic memory; definitely not tact!"

"Jingle Bells" reminds me to explain how I communicated with LaPierre and other very senior GE executives. To get to Jim via Bruno and Dave, whether with a letter or a formal report, was difficult. The path was open, especially for the computer guy, but an awful lot of stuff got pushed into that circular hole in LaPierre's desk top.

Getting to the vice president of engineering in Schenectady (who had ordered the Defense Calculator), let alone to the Company Philosopher in New York, Harold Smiddy, or to the president, was an even harder job. I knew exactly how to do it: for LaPierre I used the Cincinnati media - the ENQUIRER, radio, television - or channeled words through the fancier service clubs and such. If I gave a speech about how romantic our plans were, say to [-172-] transmit data over telephone lines from the Lynn test cells to my magic machines in Evendale, it would be reported in the paper and on the evening news, and get to Jim the next day. Never failed.

General Electric published lots of company-wide publications. I had watched THINK Magazine in IBM; it was obvious The Old Man looked at every issue, and we heard he read the riot act to Dwayne Orton if the flavor was off - or, being Watson, if the quality of the coated paper deteriorated! GE put out an engineering review, semi-technical; they put out a small, more readable monthly news magazine called the MONOGRAM. To reach every senior engineer in the company, plant a piece in the REVIEW; to reach Smiddy and Cordiner, and every manager in the giant outfit (200,000 employees equalled 20,000 supervisors equalled 3,000 managers), plant a smaller and punchier one in the MONOGRAM. I did it several times; one featured a picture of me peering significantly into the innards of a CPC, but the story was about the 701, soon to be delivered.

Next issue contained a radioactive letter from a junior engineer at the GE operation in Hanford saying that Grosch was peering into a CPC, not a 701. By this time the 701 was in, and the next MONOGRAM had a photograph of me peering into same. It was reputed to be the only time a midget manager ever hit three consecutive issues; when President Cordiner - ah, Ralph - came to see the 701 a few months later he recognized me.

Side benefit: the irate junior engineer was named Dan McCracken. I hired him away from his reluctant boss in Hanford, soon made him a supervisor, and encouraged him to write about programming (including a piece in the REVIEW, of course). Twenty-five years later he succeeded me as president of ACM.

I had escaped the basement. There was ample room on the second floor of 300. I took over the area above the simulator lab; we cut holes - lots of holes - in the thick concrete floor over the workbenches of the poor electronics experts, and laid the 701 cables in baskets fastened over their heads. It added

atrocious insult to terrible injury that I was a digital enthusiast, and was (accurately) reported to have said that long before their monster got working in Dayton somebody would have programmed the job on an IBM machine. Ouch! Turned out to be true, I believe, except that it was a CDC.

As I said, there was no elevator. Palmer, Haddad And Co. had proudly designed the pieces of their baby to go through doors and into elevator cabs; alas, I didn't have either! Jack and Gene proposed that our FAGTFM, Friendly AGT Facilities Man, cut a large trapdoor in the Building 300 stairwell landing, bolt a big chain fall - well, big for us; it was dinky to our FAGTFM - to the stairwell ceiling, and presto! instant upstairs 701. I expostulated that if anything came loose, they would bury the remains under the same epitaph used for the evangelist strung up on Boot Hill: "Jerked To Jesus"! Not to worry, said Jack; he would stand underneath with a pillow.

I told Bruno and Dave we needed twenty tons of "local" air conditioning. The FAGTFM recommended Carrier units; we got - guess what - GE! We needed oodles of good power, by CPC standards; turned out to be minuscule for Evendale. All of this came out of an elegant installation manual provided by Palmer, Haddad, Hurd, Farwell And Co. The cables arrived, along with four [-173-] diligent white-shirted customer engineers, and boxes and boxes of beautiful CE manuals. These were to be kept in locked files, also provided by PHHF&Co. But there are some things even the Watsons can't command: neckties get loosened, and blueprints get spread out.

Came the great day, Wednesday May 27th, 1953. A giant Neptune van, with an IBM installation man sitting between the driver and helper, was passed through Security and up to the side door of 300. A load of Poughkeepsians scrambled out of a following wagon, Farwell and his downtown boss appeared as if by magic, and unloading began. The chain fall worked perfectly. Instead of Jack Hughes, the young man named Pete who had ridden in the Neptune van stood under it. When I begged him to watch out, he said, "If a piece does fall, I want to be right underneath"!

We worked like mad for four days, until midnight or later every night. Saturday evening I got everybody together. "We're doing great. We're well ahead of schedule. Go home. Tomorrow, sleep late, or go to church, or make up with your wife. Come in Monday loaded for bear," I said. But the joint was a mess - wrappings everywhere, and parts lying around. And I had barred the janitors, although the CEs had picked a couple for machine-room duty later on.

So early Sunday morning I put on my dirtiest skivvies, drove over to the plant, opened a closet with the building master key I had been presented with after I promised not to climb on the roof any more, and took out a pushbroom. I was working happily away when there was a small commotion in the hall, and in walked Jim LaPierre, master of 16,000 AGT employees worldwide, with two serious civilians, and a gaggle of colonels and generals in full regalia. He was showing the Secretary of the Air Force around his Evendale kingdom.

Bringing his guests over to where I was leaning on my broom, he said deadpan, "Mr. Quarles, gentlemen: this is Dr. Grosch, who is in charge of our computer project." Great scene!

Of course, the Secretary's son Don worked for Applied Science back in New York, and had been in my classes at Columbia. We all had a great time; I was full of the machine, which Quarles knew about through his son, and happy with my men and women, and Generous Electric.

A few weeks later I was promoted to section manager. That broom was a great prop.

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17 A BAND OF BROTHERS (AND A LADY FROM NSA)

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In Chapter 17 you will encounter

(in order of appearance):

The Naval Aviation Supply Office *their 701 beat the Number Three UNIVAC*
LEO [Lyons Electronic Office] *first computer to do real data processing*
WHQ 701 *following the SSEC tradition, the 590 installation was handsome*
Gerhard Neumann [16](#)
Marion Kellogg [16](#)
An Evendale crèche *I couldn't swing it, in 1954*
Jack Hughes [16](#)
Gene Gettel [15](#)
Don Shell *he had the "programmer look", and a fresh Ph.D.*
The Western Joints *wild recruiting, especially in 1954 and 1955*
Charlie [H.G.] Asmus *he taught me about GE, and became a friend for years*
GE headquarters *570 Lexington wouldn't begin to hold today's programmers*
GE management philosophy *Harold Smiddy and Peter Drucker and Crotonville*
Span Of Control *one element of GE philosophy I agreed with*
Professional Management *what it took was leadership, not book learning*
The Psychological Corporation *"Computers bring black sheep to the fold."*
Building 305 *first industrial building in the world solely for computing*
Association Island *it really existed, and Vonnegut lampooned it*
PLAYER PIANO [book] *the oak girdled in the novel was the Island's Elm*
A Swarm Of Sevens *sessions, topics, tents, tables and trainees*
IBM Hundred Percent Clubs *the tents were the same but the Black Cat, no!*
Ralph Cordiner [16](#)
Dave Cochran [16](#)
Myron Tribus *sixteen years later he still wanted to extirpate me*
Duplicate everything *for WHIRLWIND II, I had said "quintuplicate"!*
Bowling alley floors and Herman Miller pretties *and tropical fish*
IBM computing meetings, 1952 and 1954 *indeed, a band of brothers*
Dottie Blum *the NSA sister in a band of brothers*
Nineteen 701s *our parent organizations were a quarter of IBM's business*
Watson Junior [11](#)
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Vin Learson *piled up a pyramid of skulls near Applied Science*
The IBM 701A *Gene Amdahl told us about it; it was delivered as the 704*
Liston Tatum *a humanist from Applied Science to replace Stan Farwell*
The Oklahoma Land Rush *Liston staked out three 704s an hour before P&W*

[-175-] A special issue of the chief computer history journal tells about the appearance and performance of the 701, and boasts about its importance for IBM and in the world of technical computation. Certainly it worked beautifully for GE and for most of the senior shops. Of the 19 that were made, only three or four went to dumb customers - and even there, the one which was allotted to the Naval Aviation Supply Office pioneered useful commercial mainframe operation in the U.S., beating the third Univac (GE Louisville) and the IBM 702s, but running behind the amazing Dr. Thompson and his LEO, Lyons Electronic Office, in London.

Some installations were shoehorned into nasty places. There were indeed trenches cut in concrete floors, and Pratt and Whitney remodeled a huge hangar and put everything in one space. In the pattern of the wonderful old SSEC, the 701 which took over its space on 57th Street was handsome, with a mezzanine staging area overlooking the combat zone.

My second floor shop was better than most, and only unusual because it was installed upstairs without an elevator. I had a glassed-in area for the IBM engineers which overlooked the console, and this made it possible to have a visitor's view without disrupting the machine room itself. Back of that was a giant arena for the programmers, much larger than the other occupants of the building wanted, much smaller than I had asked for. We filled it to bursting in a year, so much so that we seriously considered second shift programming as well as 168-hour-a-week 701 operation.

Couldn't do it; even in a closed shop my guys and gals had to have frequent access to their counterparts. I noticed, however, that several of Gerry Neumann's men would come in at the end of the day, and work on into the evening with their programming group. That posed two problems: [-176-] compensating time off, which was easy as long as morale was high (I couldn't pay overtime to professionals); women working at night, which was safe enough - the parking areas were inside the secured grounds - but prohibited under both state law and the union agreement. I put the lawyers to work on that intricacy, telling them to push "professional" (and that I had seen Marion working late lots of times).

I had one failure. Several of my best women started to swell up. Didn't affect their work in the least; in fact, the ones that were the most pregnant seemed to be the most happy and the most productive. I tried Heaven's hard to get permission to put in a crèche and a trained nurse, and ferry the new mothers directly back to work from the front steps of the maternity hospital - or so Marion claimed, with a silvery but insincere laugh. That, even Generous Electric wouldn't do. Years later, Al Zipf did it at the Bank of America, and today it is commonplace. In 1954, I couldn't swing it.

While I was at subsection level under Bruckmann I began to think about functional organization. On the CPCs, we had arranged ourselves by customer: one small gang did mechanical, one did aerodynamics, one did combustion. I invented some titles, but they didn't matter; we were below official notice, growing like Cincinnati weeds, about to move to new space. But after my Sunday Janitor role brought me to section level, and after the 701 began throbbing and burgeoning, my concerns bore fruit. And I had the men to make it work.

Jack Hughes was easy; he took over operations as smoothly as if we had been in business for a decade. And unofficially he did most of the interfacing with the turbine crews, Kraft's from Schenectady and Keller's from Lynn. Gene Gettel was my front man among the AGT customers, whom he had worked with for some years.

I needed a major software development subsection, and turned to a serious chap whom I had stolen away from the combustion group. His name was Donald Shell, and he was just finishing a good Ph.D. - I seem to remember physical chemistry. He had of course been doing difficult problems for his ex-boss, and you could see the "programmer look" developing. Don't know exactly how to characterize it; you can see it on the Knuths and Backuses, and on lots of bright youngsters: sort of as if they are reading fine print off a screen about two feet behind your head.

Don was more than serious, he was disapproving. Of all my managers, he was the one who least appreciated my antics, even when they turned out well. I wanted to differentiate our recruiting efforts from the other 701 outfits at the joint computer conferences, which were getting pretty wild, especially the ones at the Ambassador in Los Angeles (WCC 54 and WJCC 55). I proposed we serve champagne rather than plebeian booze, and was passing on to whether we dared pay for really good stuff, when Don calmly announced he could have no part in such knavery. He was my best draw; sighing, we put out pecans and cashews instead of Fritos, and lots of elegant mixers - and only brought out the bourbon when Don was off duty (fortunately he went to lots of technical presentations - and so did the men and women he most attracted). Charlie and Jack and I oiled up the working stiffs while the young Dijkstras swotted.

[-177-] "Charlie" was the universal monicker of my most gregarious manager, otherwise H.G. Asmus. He had been assigned to help me when I was a lowly unit supervisor, partly to tell me about the special qualities and opportunities of GE and AGT and Component Development, partly to keep my books straight

as I began the charge-back system. He was one of the graduates of the travelling auditor program by which the accounting network in GE trained its prospects and maintained its grip on the purse, and he therefore had seen other battlefields and been bloodied on a few. We struck it off instantly.

Sample relationship: I look around the horrid scene outside my office. Several newcomers are literally sharing, two to a table - we can get desks, but because only one person can be fitted into desk legroom, Charlie has substituted a few tables. Months ago I had designed translucent fiberglass separators (this was several years before the office furniture people started pushing cubication), and put desks face-to-face, to halve the wasted aisle space.

It was a mess. Outside the windows our own building was going up; there was no revolt, but the inefficiencies were gaining on us, and it was an awful introduction for new hires.

"Chaz," I said, "I'm off to New York. Use your bean. There must be some way we can squeeze a few more bodies in here, or at least desks for the bodies we have." "Have a good trip," he said. My secretary said the limo was outside (yes, just for me - and I had a bedroom on the Ohio State Limited too).

Two days later I got back. The whole bunch looked cross-eyed at me as I wiggled through the maze. Something different? Then it dawned on me. Charlie had torn down my private office and put in four more desks!

It was a great idea. Once the troops saw me laughing and joined in, we had weeks of decreased tension and good feeling. It wasn't the four desks - it was Charlie's insouciance and my dumbfounded acceptance. And it was all over the department next day; great for section morale.

General Electric was at the peak of its organizational philosophizing. There were courses; there was a magnificent set of books; there were expensive consultants, up to and including Peter Drucker; there was a vice president in charge. It was too soon for a computer revolution, although I was rather indiscreetly predicting a future when the GE headquarters on Lexington Avenue would be full of machines and programmers, Mr. Cordiner would have a reception suite on the ground floor, and the Master Of The Computer - guess who? - would have the tower offices. Everybody except Charlie, and maybe Gerry Neumann, thought it was a great joke. In the event, the whole caboodle moved out to Connecticut years later, and my skyscraper full of machinery shrank to a cupful of chips. They couldn't have put all the programmers in today's company in one dinky little forty-story building, anyhow.

One element of that philosophy was that every non-Indian had to have line responsibility and authority - no assistants-to, no staff sinecures except at the very top. And in that connection, responsibility and authority had to match. Another element was that the proper span of control was seven (we will meet the magic number on an island in the St. Lawrence, later in this chapter). Five or six or eight were marginally acceptable; remember, you had to have five section-level functions in a department, and a general manager often had a legal eagle or a tame philosopher to fill up the lifeboat.

Dave had the standard five, plus Bruckman, and now me. And as the value of Gerry's variable stator idea penetrated, and his personal dynamism chewed the system up, he also had been elevated (before me, I think). To balance out, the legal counsel was attached to LaPierre, and Burgess the Official Engineer got promoted across the street to run a department of his own. It was a mighty vigorous bunch; perhaps [-178-] as a reward for hitting seven on the nose, Dave later got the dubious honor of being shipped to the first session of GE's own private internal business school in Crotonville, which I promptly dubbed Scrotumville "because of the firm grip they take on you."

Actually, I rather enjoyed the management course Marion and her organization boys put us local yokels through. I was of course the nay-sayer: "Why did the author of this chapter blow up one simple idea to eighteen pages, and force a thousand section managers to boil it down again, Marion? All it says is, you should have half a dozen rectangles connected to the bottom of your rectangle." "Oh, Herb!!"

The no-staff thing was too rigid. The central Crotonville theme, that a successful manager could manage anything, was balderdash - and the subsidiary idea, that management could be taught, wasn't much better. But I had seen in IBM already, and would see there and in other outfits later, how damaging it was to have one guy in charge of only one or two others. The span-of-authority idea I bought instantly.

As part of my being elevated to Broommaster Marion brought down a consultant from the Psychological Corporation to feel my bumps - a day of written tests (to be scored in his hotel room, when the poor devil could have been across the river - Northern Kentucky was the Cincinnati safety valve), followed by a long interview. I had the ineffable pleasure of being told I had the most jagged "profile" he had encountered; very, very high or abysmally low in every department. "Computers bring black sheep to the fold," I said. "Do you know I have just written the Vassar placement office asking them to send me another counterpoint major? The first one was terrific." He was only faintly amused.

It was summer. Dave and I had gone up to New York and asked the Board of Directors, no less, if I could build my own building. It was to be next to 300, so no land was involved. And it was only going to cost \$650,000, including (although Dave didn't know it yet) the tropical fish tanks in the little lobby. It was probably the smallest request from one of Jim LaPierre's boys in five years; the High Altitude Test Facility was to be \$40 million for the first stage! Anyhow, they said yes. I still treasure the flip charts.

Next I was told I was invited to Session Three on Association Island (this will bemuse anyone who has read Kurt Vonnegut's *PLAYER PIANO*). General Electric had a summer camp and conference facility on its private Thousand Islands island, and each year selected managers - all of the top ones, and most of the section guys (Marion couldn't go, I guess) - to attend one of the week-long shivarees. Originally, as satirized in *PP*, there was heavy emphasis on competitive sports, notably softball. To be on the winning team was important; it was also important to drink vigorously but not get drunk. By 1955 the heart-attack sports had been eliminated, but the expert drinking survived. There was a giant elm in an open space, and in the evening the [-179-] inmates gathered under it to hear words of wisdom from the keepers. The first evening an actor in full Red Indian costume paddled his Genuine Birchbark Canoe up, landed just behind the tree, and told us *The Story Of The Elm*; the last evening, President Ralph flew in by amphibian - I kid you not - and told us we had a great year ahead.

The wives, and a few camp followers no doubt, were left on the mainland where the special trains disgorged the masses of Erie, Lynn and Schenectady victims. There was a bar/night club on the Island called the Black Cat; it opened before lunch, after sports, before supper, and put on a professional but rather tame show in the evening. Since the attractive waitresses were the daughters of attenders, there was little hanky-panky - and the night club artistes were ferried back to the mainland every night. It dumbfounded first-timers, but it was so easy-going compared to IBM Hundred Percent Club sessions in Tent City, Endicott - all that drinking, and pretty girls, and no company songs to memorize - that I enjoyed it more than most.

We lived in floored two-man tents, with facilities down the way (as in Endicott). There were seven meeting tents, each holding seven round conference tables seating seven managers, and seven topics were discussed in seven half-days. Each table selected a spokesman to present its consensus on the current topic (not in rotation - I did three), and at the end of the morning or afternoon the seven reps got together on a sort of dais and beat out a tent-consensus, amid catcalls from the relieved troops below.

On the morning of the last day, Ralph, who had embraced *The Elm* the night before, and the Session Leader (a group vice president until the supply ran out, and then the head of the Research Labs or whatever), and the seven tent-spokesmen for the first topic, got up before all of us in a large wooden church-like structure and worked out the Session Consensus on that topic. Then those seven scooted out, and the next seven came on with Topic Two, and so on. In October we each got a fancy book with the consensuses for each topic, for all the sessions.

Need I say there were seven sessions that summer [1955]? The next year, which I missed, was the last one.

I often wonder what became of the Island and the equipment - and the planners. I would have liked to try the birchbark canoe.

Back in Evendale I restricted my best yarns to my seven (of course) managers, partly because everybody in GE who didn't have a hope of going was supposed to be madly envious, but mostly because my more junior brigade was not bloody likely to believe me. Nevertheless, it was all over Building 300 in a week. Marion scolded me roundly, but admitted in a weak moment that she had indeed read Vonnegut and enjoyed him.

In addition to Asmus, Gettel, Hughes and Shell I now had a shop in Lynn under Allan Benson, and I had been given an Operations Analysis group, and had asked for the Division Technical Library, which I proposed to rehouse in the basement of my new building. Also I was paymaster for Dave's outside consultants, notably one Myron Tribus, who sixteen years later became Assistant Secretary of Commerce when I was writhing at the Bureau of Standards (and who announced in his first interview with a computer trade [-180-] paper that he put getting rid of that *&^%\$#@ Herb Grosch at the very head of his agenda).

The building shot up. I had done first layouts, and had specified two large machine areas with maple floors like bowling alleys, supported on steel beams with open webs, and with airtight sound-absorbing ceiling panels under the beams to form air-conditioning plenum chambers. You could change machines around with a compass saw (remember, no flexible raised floors yet). We were to have two 110-ton steam-extraction air conditioners, either of which could run one machine and cool all the people besides. There were two electrostatic precipitator units - in fact, everything was duplicated except the cooling tower out back, and the main stepdown transformer in the basement.

And I had a pad for a second transformer, and Dave's promise I could buy one if we ever blew Number One, and blank spaces in the switchgear frame to work it in. Also the piping and pumps for the cooling tower were duplicated. Shades of SAGE!

Jack and I worried a lot about checkout. We could not run the air conditioning without a heat load: a real roomful of hot computer. And our schedule was getting tighter and tighter; LaPierre was planning a gigantic show of his whole Evendale plant just days after we were supposed to go on the air. Pushing to finish the building early would be no help, and if the cooling didn't work it would take weeks for a major fix.

Jack came to me with the blueprints one Monday morning. "I'm not the right kind of engineer for this stuff, Herb, but it seems to me there is something wrong. This cold air going into the floor spaces is going to be wringing wet." Well, he was right. We had a fancy architect, and the AGT facilities people, and a man at GE Realty - but it was Jack who saved us from a catastrophe. They put reheat coils somewhere in the system, at no cost to GE for sure, and when we turned everything on it ran smooth as silk.

Well, not quite; all that duplication planning had overlooked a single strainer in the Y where the two cooling-water pumps joined, and it clogged up with construction straw the first day!

Now I have to tell about the Oklahoma Land Rush, but before I start I must talk about those IBM "classes" again. The Hurd seminars of 1950 and 1951 were the last of their kind; we had digested the CPC I and the CPC II, and were agog over the promised Defense Calculator. The joint computer conferences of the IRE and the AIEE and ACM began in late 1951, and the disclosure to other than IBM customers of what was now the 701 came a year later. The production machines were rolling out. We needed to know each other better, especially those who had not been to the 1948-1951 Endicott meetings. We got together first in August of 1952; a wonderful gathering of the old clan, with McPherson and Eckert and Palmer and Hurd, and dozens of IBMers. Sixteen outfits were represented, out of which the AEC and Bell Labs and the Bureau of Standards did not in the end get 701s.

There was a 701 programming course in New York just after the JCC, but those of us getting the first

machines were past that stage. Also there were 701 prospects, most of whom were too late to get in line, mixed in with the real customers. In Evendale we curled the lip.

The flood washed over us. A much smaller and wiser group got together in May of 1954. We gave serious papers about our experiences. This was the [-181-] cream of the cream of the IBM customer bucket; all but one of the nineteen 701s was represented, and by its top man or woman. Yes, woman: the National Security Agency, now admitting cautiously that it existed, was represented by Dottie Blum, who of course stood next to me in the class picture. Allowing for other IBM equipment in our shops, and for extra shift rental, we counted for over 700,000 points - that is, \$700 thousand a month rental. But our parent outfits - General Motors, United Aircraft, Lockheed - had much larger involvements with IBM; GE ran twelve million points, for instance.

Almost every one of us was straining to the limit. I was running two hundred hours a week - round the clock on my Evendale machine, plus all the time I could buy from the GM Research machine, and nearly a full shift from Dan Mason at 590. Lockheed and Los Alamos had two machines each. No more 701s would be built. Not only could IBM do much better technically, but Hurd was telling us the 701 was priced too low by a factor of two. We came to find out about the successor machine, the 701A, and from the lips of its designer, Gene Amdahl. We would in the next year or two collectively order more than forty machines - at 40,000 points apiece, one shift. We were ready.

Nothing happened. We gave our papers. We toured the factory (wrong one; our stuff was in Poughkeepsie). We heard about the 702 (wrong number base; we were binary wizards). We drank malted milks around the Homestead dining tables. Where was the 701A?

I drafted a red-hot telegram to Tom Junior, mentioning that the companies waiting for 590 to get off its, ah, dead spot paid about 25 percent of IBM's rentals - a slight exaggeration, but not too much. John Lowe took it around and got signatures - I still have the sheet. The next day a shaken executive from Galactic Headquarters appeared and passed out the dope - and presented Amdahl for questions. I claim it was Cuthbert, who was reported to be down with the flu when we convened; Truman Hunter says it was Vin Learson himself. We customers were so intent on the message we hardly noticed the messenger.

It was from that considerable success that the idea of SHARE was born. When it was started the next year the dozen or so founding organizations were drawn from our band of brothers, and the lady from NSA. We organized to put concerted pressure on IBM, and don't let anybody tell you differently; when IBM suavely took it over they swore it was to trade information around and to help newcomers. Hogwash! It was to get Tom Watson and Vin Learson and Cuthbert Hurd to come when we whistled. By the end of the Fifties there were mainframe customers everywhere; it took more than a telegram to 590, or knowing how to call George Richter, to move The Grim Gray Giant.

Time wore on. We were eagerly awaiting prices and delivery schedules. IBM had received dozens of letters of intent and a hundred expressions of interest for what was now called the 704 - a 701 with independent peripherals, and core main storage instead of those wild Williams tubes. The whole thing had degenerated into a can of worms. I had lost Stan Farwell; Tom Junior, thinking him ready for battle again, had told him to quit monkeying with that Continental, to quit running off in the summer (and probably to be [-182-] nicer to his wife), and to buy a hat. Stan disappeared into the works, and I believe died fairly soon thereafter. He was a real help; I haven't forgotten.

Cuthbert asked if I had preferences for a replacement. "Yes," I said, "I don't need a hot sales type, and he'd be lonesome in Cincinnati anyway. Find me someone who knows something about our kind of computing, and who has really good contacts in the labs and the factories. I need inside dope, Cuthbert, not discount deals." Much to everybody's amazement, he shipped me Liston Tatum, his right hand man!

We were old and good friends. Liston was a humanist; had a considerable and carefully-considered social

perspective - not of much use in Applied Science, where the win-'em-all ethic dominated, and near where the fierce Vin Learson piled up his hecatombs. Stan had been bright; Liston was brighter, and had a Ph.D. in spite of it.

Soon he brought us early word that all 704 bets were off; that there was so much confusion on both sides as to which orders were firm, and whether the rather tenuous military priorities still held water, that a completely new dispensation was ordered.

Firm prices, some quite different from the ones gossip and eager salesmen had specified, would be announced soon, simultaneously at all IBM offices. The first customer to have a firm, fully priced order at his local sales office would get the first machine (after IBM itself, of course).

I had authority in Generous Electric to commit \$250,000. I had Charlie work me up a firm order for the various pieces of three 704s, leaving the prices blank for Liston to fill in. I took this up to Dave and suggested he might like to countersign it "although it is within my authority." I'd kept him posted, of course, and he had met Liston and liked him. He asked, "Herb, how much are these things going to rent for?" "Something under \$50,000 a month each, Dave. I have a letter here from the Cincinnati local manager confirming that under the GE master agreement back in New York, I can cancel any installed machine on thirty day notice. So we're committing much less than my limit."

He grinned at me. We both knew the new building, the reprogramming, the dislocations of moving out a 704 if we ever had to, would run to several million dollars. We were in the soup together on the building, anyhow. He signed: the best boss I ever had, even if he did make his managers play golf together.

All was in readiness. The announcement was scheduled for a weekend. Everyone was poised. I went off to a conference. Saturday Liston zoomed in to get the word. Signals off! Because of the problem of time zones, the rules now read "first firm and correctly priced order time-stamped in New York after the opening of business Monday." Liston did the pricing exercise and triple-checked it. He flew to New York.

When 590 opened for business Monday, the salesman for our great rival Pratt and Whitney was waiting with the papers for one measly machine, and the order was stamped at the reception desk at 0916. But Liston, an old New York IBMer, had gone to the Wall Street New York office, which opened at 0830. My hero!

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18 RIPPLES AT THE RIVER WORKS

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In Chapter 18 you will encounter
(in order of appearance):

Jack Parker *a replacement for LaPierre who shot Kodiak bears*
Charlie Asmus [17](#)
Charge-back [16](#)
Shirley Hanaford *one of my four originals was now a supervisor*
Payroll *Louisville's was a stupid mess, but Jack did ours on a 607*
Bob Mackenzie *with the 704 we had graduated to full-time operators*
Pukey green paint *cost as much as the 26 colors I had used in 305*
The LaPierre Show *I added Tom Junior and Vin Learson to the list*
A.D. Little *they built early analog/digital converters for Lynn AGT*
Closed-circuit TV *we showed the Lynn test cells in our 704 room*
Earl *the head IBM customer engineer clucked to himself ...*

Jim LaPierre [16](#)
Hurd [12](#)
Stu Crossman and Walt Ramshaw *P&W was going to invoke priorities*
Allen Keller [16](#)
GE Turbine Division *I offered the vice president a machine in Lynn*
Gerhard Neumann [16](#)
Tom Glahn and Bill Dorn *my numerical analysts searched Small Engine*
Bruno Bruckmann [16](#)
Al Benson *he had social conflicts on the mesa [Los Alamos]*
Dick Stark and Preston Hammer *they succeeded Frankel and Metropolis*
Stan Rothman [10](#)
A machine shop simulation *Stan allowed for Monday morning absentees*
McGraw-Hill *published Bell's pioneering EDP book, with Ronnie and me*
Hans Kraft [09](#)
Wyoming, Ohio *lots of P&G people, who liked opera and European travel*
Prestige license plates *none in Ohio; the GE prefix went to Nela Park*
Déodat [15](#)
Ritual Togetherness *golf for Dave's managers, and elegant entertaining*
Black Mike O'Brien *a senior consultant, and patron of the Boston Ritz*

[-185-] Why did I want three machines? Well, I needed one to continue to expand my Evendale operation, one to replace the 701 in a year or two, when we were finished reprogramming and tidying up the work then on it, and one for Lynn - more on that in a minute. Now for the first I genuinely needed Number Two (IBM was to keep Number One, as in the 701 case - and for the same reasons). The others could be further down the schedule, but I now had the theoretical power to insist on getting Numbers Three and Four. In fact, Poughkeepsie got so good at rolling out 704s that a few later recipients had to warehouse theirs for a month or two, at \$1500 per day, because the accommodations were not ready - so IBM would have let me stockpile mine, at the same rate!

Dave would probably have been amused. But Jim LaPierre and his attractive secretary had been swept away to higher office (literally; on one of the top floors of 570 Lexington). His replacement was a tough, tough young hombre named Jack Parker who shot Kodiak bears to keep his managerial eye keen; Jack would have had me stuffed and mounted too, if he had caught me playing such games. Charlie and I had worked out our bookkeeping scheme to perfection, so we would have had no budget problems, but somewhere in GE the cost of excess 704 power would have drawn Jack's marksmanship.

About our finances: I set a 701 rate before the machine arrived, and it included the whole system (integrated peripherals, remember) and supplies. There was a mechanism, seldom invoked, to charge for unusual amounts of punched card use, including keypunching. I set graduated charge rates for people; the poor customer might have to pay Don Shell's rate and only get an operator some of the time, if Don ran his problem. Power and air conditioning (and lots of air conditioning repairs) were paid by the department, and I had a direct budget item from the department for no-charge work: fiddling with Jingle Bells, and going to the JCCs and such. Later Charlie cleverly converted this to section overhead, and freed us from even **[-186-]** that control; from Dave's point of view, we were self-supporting. Needless to say, Gerry felt very differently.

Second and other shifts cost me only half rate: \$7500 a month per shift (there were wrangles with IBM as Dave's finance man tried to play games with the contract wording, over Charlie's and my objections). But time on the GM and WHQ machines cost the earth. Nevertheless, we charged out more than our total expenses, and at the end of the fiscal year we cut our rates and gave back our surplus! Inside AGT it was easy, but to return money to the turbine division was incredibly difficult. I sturdily refused to do it by charging too little the next year, which was the beancounter solution. I wanted my, ahem, superb managerial accomplishments to be on the record. And the 704 was coming.

Everything we did was an accountant's nightmare, because every element of the system was in flux. Jack rented a 607 (like a 604, but with more capacity) and ran the books for Charlie, and one day when Mr. Finance was in despair at the clumsy service he was getting from the Division payroll operation, we persuaded him to let us have a fling. Somebody wired up a big plugboard; Shirley Hanaford, one of my four Boston originals, who now ran a keypunch and data transmission unit for Jack, hired another girl - and Instant Payroll!

Parenthetically, there were errors the first week, and in correcting them we made different errors the second week. Then, smooth sailing. Down the river in a very different part of GE a huge mass of stupidities from GE Louisville, GE New York, Arthur Andersen and Remington Rand were trying to make the Appliance Park payroll run on the Number Three Univac. They tried to write and check out an 80,000-word program written in one piece in absolute! I wanted to send help or give advice, and was very rudely turned away; I've been badmouthing them for over forty years. The central figure, who had published his plans in advance in the HARVARD BUSINESS REVIEW, was banished after two years to GE Realty, where he probably bought swampland.

The 704 made it possible to charge separately for independent peripheral operation, and its hourly rate was higher than the 701, but otherwise our scheme was unchanged. When the Computation Building, the first industrial building in the world designed and built to house only computers and computer people, was ready, we moved all the tattered troops across to pleasant open spaces on the second floor. I put the workers next to the windows, and built enclosed offices for managers and supervisors down the center (the view was dreary anyhow - and I didn't ask 'em)!

We had all new furniture. It was a big order, and Charlie gave it to an outfit - General Fireproofing, I think - who threw in two special desks for the 701 and 704 consoles at cost [high], and decorator consulting for the office space. We ended up with 26 colors of paint. It was very nice; Mary Noble would have approved.

I had a corner office on the first floor, with Charlie next, and with our two lovely secretaries artfully exposed. Then came a small reception area - we did not need separate security - which I outfitted with Herman Miller ultra-modern furniture and tropical fish tanks in Charlie's wall (his secretary's job description was modified to include fish feeding, and professionals came up from downtown to do maintenance). I had a Miller desk and bookcases and [-187-] such in my own quarters, and the end wall (no window) was floor-to-ceiling off-white chalkboard. No chalk rail; when I whipped purple chalk out of my drawer and started writing on my wall it was a sensation.

By the way, I had that end wall made blank, and with knockouts in the cinder block for the halls on all floors (and extra footings outside) so I could double the building length in a year or two with minimal disruption. We had a hydraulic elevator with a special high door in the wall outside; the elevator could be inched to any truckbed height. A portable aluminum bridge was provided. The other side of the elevator opened on to our three floor levels. No more chain falls, and no Pete standing underneath!

I left the 701 in Building 300, and the horrid special air conditioning with it. When Jack moved the data transmission gear to 305 it made room for a couple of desks for the "next up" people to sit at; we intended to keep the programmer/operator concept alive for that machine. But in 305, my new building, he made plans for real operators; the unit was supervised by a nice guy named Bob Mackenzie, who soon became a well-known figure in the trade. We vacated the quarters where my poor office had once stood, and Gerry's people expanded into it with a sigh.

My adventures were not popular with my peers and their jealous minions. When I was challenged in Dave's staff meeting about my wicked ways, I produced figures showing that my own imaginative office furniture cost less than their stodgy walnut desks, and that the fish maintenance was cheaper than replacing the schefflera in the main building lobby. "You don't need to decorate up your place at all, Grosch," said Manufacturing. "Bob, when you have visitors from overseas," (he never did), "they want to go in back and see how you machine titanium. A lot of mine are interested in the building itself; I had a

chap from BASF Ludwigshafen last week who is going to go home and build a bigger version, for the first IBM 709 to come to Germany. The non-Miller furniture is standard, just much better looking than the stuff in 100 and 300; you can have the same when you build a new building." Neumann looked thoughtful. "And two dozen attractive shades of paint cost no more than the same number of buckets of this pukey green."

"Let's go on," interrupted Dave. "Herb is within budget, and the place was finished in time to take the 704; that's what counts." But within weeks after I and my contingent left for Phoenix the next year, the fish tanks were boarded up, the lovely maple floors in the machine rooms were covered with rubber tile, and the whole place was repainted one color. Sigh! The way of the transgressor is indeed hard, or at least pukey green.

The LaPierre extravaganza was really scary: Watsonian, without The Old Man's huge staff and its long experience. And without the Waldorf, for sure! Jim was rightfully proud of the enormous shops he had left for Parker, but decided to focus on the research and development facilities and do manufacturing another time. He invited all the top brass in the services, all the airline presidents, all the aerospace company big shots, and all the big GE executives. I managed to add Tom Watson Junior and Vin Learson, since one of the featured attractions was to be the new Computation Building and the new 704. There were to be six large parties touring during the morning, followed by an elegant catered luncheon in 100. The tour was to take two hours, which [-188-] meant the groups set out twenty minutes apart. They were to have fifteen minutes each in Building 305, so a dull explanation would take too long - and also be harder for us than something lively.

We sat around a conference table and brooded. We knew Jim was upset that he couldn't also display the huge test cells in Lynn, which had now been rigged to run mostly in the daytime. And we had been doing almost-real-time data reduction for those cells since late 1953. The Lynn engineering people had put funny A.D.Little analog-to-digital converters on the sensors, which produced test data on punched cards. A Lynn guy converted the cards to teletype tape and put the tape on a private line to Evendale, where Jack converted it back to cards and stuffed the latter in the 701.

"Why don't we convert the program to 704? It's trivial. Then we can move the tape-to-card punch and the voice link into the machine room in 305," said Jack. (We were still in 300).

"Not enough pizzazz," I objected. "How about closed-circuit TV?" said Chaz. We all started talking at once. Mind you, we had no building yet, and no 704, and no experience [1954] with private television.

I skip the hundred painful scenes over the next months when we accused each other of being crazy. The building got done, on time. The Number Three (Three??) 704 was delivered and rapidly checked out - no pushbroom antics necessary. The day before the great event the TV crews arrived in Lynn and Cincinnati. The scenes to be transmitted were picked out, and checked on the Lynn monitor. Nothing appeared on the screen in the 704 room.

Morning brought no improvement. The TV people said not to worry. "Happens all the time. We'll get it in a minute." My guys were frantic. "They'll never make it," said Jack. "Let me get in there," said Earl, our chief IBM customer engineer.

We had fifteen minutes before the first and most important party was to arrive: LaPierre, Parker, the Assistant Chief of Staff of the Air Force, the president of American Airlines, and so on. I got the gang together - all but Earl, who was deep in conversation with the TV men. "You've done great, guys," I said. "You did all the work. Now it's time for me to earn my keep. Relax. It's my baby."

Earl clucked to himself. The picture flashed up. The TV crew muttered over the voice link. Jack was on the phone we had been holding open for the last hour. "Ready for the test?" he said. The door opened and in walked LaPierre and the first party.

All six demonstrations worked fine, except that the printer ran out of paper once!

Dave knew. Whether Jim or Jack Parker ever did I rather doubt. My little coterie was absolutely shattered, but happy. A few days later Dave said to me, "About that invitation you had to speak at Cambridge..."

We have a lot of ground to cover before we can leave for Europe, however. About that "Number Three," for instance: a month or two after the Land Rush, while I was still gloating over my - well, to give credit, Liston's - victory, Hurd came down to see me. "Herb," he began, "Pratt and Whitney are incensed at that timestamp business..." I broke in. "Cuthbert, if their salesman had been as sharp as Liston, it would have come down to a tie anyhow. And I bet Liston was there at six, and would have won by thirty seconds." "Crossman and Ramshaw say their bosses are going to throw it into a priority wrangle, and that might mean rearranging all the early orders. Mr. Watson (he meant Tom Junior) is very anxious to avoid that." "GE priorities are as good as P&W," I said callously. "Let's wrestle"!

[-189-] "Now, Herb," said the worried Cuthbert, "you don't really want three machines all at once." "We have great big warehouses across the street, old boy," I said. "And I like it when Tom is anxious - it works out well for the customers. But I just might be persuaded. Thing is, my bosses down here are as pleased to get ahead of Pratt and Whitney as P&W is angry at being behind. If we give a little - say let them have Number Three or Four - I have to have some substantial advantage for GE in return." "Of course," said Hurd. "But they want Number Two. We have talked at length with the factory, and they can push Three up very close to Two." (He probably meant they'd slow down Number Two; nobody had firm dates yet).

"Amdahl says they are going to offer a second box of core," I mused. "Paul Armer says he is going to get a production version of the photographic/graphic output unit he has on his 701 when he gets a 704. I haven't gotten over being angry about that, Cuthbert - you never gave us a chance at that gadget, and our money is as good as Rand's." "That's water over the dam..." "Cuthbert, mein kind, I have a memory like The Old Man's. How would you like a brisk rundown on all the dumb things Applied Science has done since 1949"?

He was quiet. "Now," I said, "if you guarantee delivery of Number Three not more than two weeks behind Number Two, and if you guarantee a super installation crew - remember, I will have a brand new building to check out at the same time - so that we won't fall further behind, and if you put on a second box of core, and if you give me the very first production graphic unit, I'll take Number Three. And if you will guarantee to slide me into the queue for my other two machines on very short notice, I'll let you move those two back also."

"I can't tell you now when the second box of memory will be available, Herb, but I'll try to move it ahead. And you shall have the very first one, and the first graphics unit - even ahead of 590." "It's a deal," I said. In fact, the second core came while we were installing the main 704, less than a week behind the main shipment, and was working from the first days.

Ramshaw told The Band Of Brothers how he was getting the first 704. I smiled paternally and told them about the doubled memory. It was 1956 before P&W got one. I told Cochran very privately what I had done. He approved, and I don't think he bothered Parker. Gerry would have been upset, but he didn't find out until the Building 305 dedication.

In the long run the AGT order resulted in Number Three in Evendale, Number Twelve in Lynn, and Number Twenty Or So in Phoenix. It speaks volumes for my concerns in 1955 and 1956 that I don't remember whether the last two had doubled core memory!

Allen Keller of the Medium Steam Turbine department was a fearful thorn in my flesh. He was a customer, yes, but he wanted his own mainframe - [-190-] wanted it day and night, and twice on Sundays. He was a workaholic, and turned out report after report about his wild Expert System plans (he was the expert) and his very genuine current accomplishments. I finally took my own successes in my hand and discussed it

with the turbine division VP - a wonderful man, but very much more conservative than LaPierre (remember, though, he had supported Hans Kraft's efforts for ten years, and chipped in at the very beginning of the 701 deal).

"MST doesn't really have anything like enough work to keep a 704 busy even one shift," I said briskly. "LST is reasonably happy with our service and our rates, and they are nervous about throwing in with Allen's grand project. If it works it will be great for your whole division, but it will take many more programmers than he now has, and more attention from Hundred-Hours-A-Week Allen than even he can give to it, if he is also installing and running a 704 shop."

"I have been cautioned by several of my managers, Herb," he said quietly. "Could he do this on a cheaper machine, if we kept the Schenectady work on yours"? "There is a thing called the 650, an IBM drum machine. Trouble is, it would take more programmers rather than less, to squeeze what he wants to do onto a weaker gadget. The Rome [Georgia] plant has one on order, but no one in GE has any real experience. Drums are complicated; you have to sprinkle the instructions around to reduce waiting for the next one to come under the reading heads. Also, he's really setting his cap for a 704, and his planning revolves around one."

"One of the problems is location," I continued. "He hates having a permanent crew at my shop, and he wants to be right in there himself, at the operating console. Suppose I scout around for more 704 work in your division, and in our Small Engine group in Lynn, which doesn't do much at Evendale. I've been planning to order more than one 704 anyhow; AGT alone will load one to the gills in a year, and I'd like to turn back the 701 and get out of Building 300. You know Dave has been authorized to build me my own building"? "It was a seven days' wonder here," he smiled.

"I'll put up a 704 shop in Lynn, in your space or Parker's, and Allen can have priority, and Hans and your other LST people can transfer their work. And my guys will drum up Small Engine business; it should be very easy to have at least one shift, from the very beginning. I'm not worried about the Evendale operation losing your business; the difference between two-shift rates and three-shift rates won't ruffle even Neumann."

"Could Allen run it"? "Not for me," I said firmly. "He's a pain in the ass as a customer, and would be even if I had a shop in Lynn. As an employee, he'd take more attention than all the rest of a 704 shop. If you want to get him a 650, fine; we'll put the second AGT 704 in my new building. I have a room laid out for it." "He is a very valued engineer, Grosch," he said, forgetting to use my first name.

Small Engine was the problem, really. The Neumann/Cochran writ hardly ran there; they didn't need variable stators, and didn't want to see so much AGT Division money go into huge test facilities for supersonic and very-high-altitude engines. Still, Charlie had lines in, and Jack Hughes was tied to the test cell group, which was Old Lynn but depended on big-engine projects.

[-191-] The word was that there was dirty old unused space, which hurt in the cramped Lynn Works, and nobody in Evendale wanted to spend money shaping it up (the tide was running heavily toward Ohio, and didn't reverse until Gerry took over AGT some years later).

I talked gingerly to Dave about it. There were strong currents swirling at the departmental level. I worked up some back-of-the-envelope numbers. It was going to cost almost as much to gut a Dark Satanic Mill in the Lynn River Works, and build a nice 704 shop in it - without tropical fish tanks, for sure, Charlie said - as it had cost us to build a large new building in Ohio. Gene Gettel and some unit supervisors - we had several engineers, and numerical analysts like Tom Glahn and Bill Dorn, with good credentials - fanned out in Small Engine and looked for work that was well-funded, but whose sponsors would not send it to Ohio.

I thought hard about the manager. Gene was an obvious choice, but he was settled in Ohio, and already at subsection level. I could pay him a little more, but he wasn't the sort of man who was dying for an extra

buck. It was too soon for Dan McCracken, who was busy on his first book, or Bob Mackenzie, who wasn't blooded yet. I had a tough hombre of my own, looking somewhat like a junior Jack Parker, who was struggling with the operations analysis assignment - he was supposed to do technical as opposed to financial audits, and every senior in Dave's outfit was ag'in the idea: "You got to trrrrost me, Dave," growled Bruckmann. He didn't have the gut feeling for IBM and the nutty computer trade I thought the job needed.

I had tried to recruit Allan Benson from Los Alamos, once for Washington and once for Early Evendale. He was the father of SHACO, an early user-friendly Los Alamos interpreter, and with Willard Bouricius had taken over the computing shop on the mesa from the founding fathers, Metropolis and Frankel. B&B in turn passed it on to Dick Stark and Preston Hammer, and then the techno-bureaucrats stole it away and never let go. It must have been rough duty; Frankel ran into security problems in the McCarthy era, Metropolis went back to Academe and tried to out-Goldstine Herman (no easy task), Stark turned up in an ungenerous part of GE, and Hammer spent his later years trying to look more and more like Santa Claus.

I tried again. Yes, Benson was having a personal problem: his ex-wife and his new wife were in too frequent contact, trapped on the mesa. "Generous Electric will relocate you nicely to Lynn, dear boy," I said, "and one bedmate." For sure, only one, he said! We put them up in a expensive hotel suite while their duffel slowly wended its way to Massachusetts, gave him a Grand Tour of AGT Evendale, had Marion's people work him over, and forwarded him to the Lynn River Works. With Audrey.

He did beautifully. Getting away from Los Alamos - he wasn't really a Bomb Type - released all sorts of energies. I had to sit on his head a few times; he was determined to beat my record, and I was having a rough time even sustaining it myself! And Lynn, unlike Evendale when I arrived, didn't really want to be computerized. He recruited like mad, and got some excellent men and women (and a married team: new problem) who would not have come to Ohio. Some of them looked up from their coding sheets a few months later and found they were in Arizona!

[-192-] There were plant architects and similar obstacles at the Works, but Allan had Charlie and Jack Hughes, who genuinely sympathized with his problems, and I could help with or through Dave. About then Stan Rothman came back to me for a third hitch, this time spliced to a nice Jewish princess who hadn't adjusted yet to the problems of being a Tishman. Louise took up metal sculpture; Stan was full of Rand model-building but didn't find supersonic flight all that compelling.

I was forestalling a lot of Lynn groups from getting their own computers - shades of the Eighties. In a guarded way their general managers were grateful, because a mad scramble had been averted. That didn't make them really, really love me. I said, "Let us tackle something for you that needs a big computer and some expert programming. Your own people are handling the straightforward stuff nicely" (well, some were).

Soon I had a project for Stan. He wrote a pioneering simulation of a major machine shop, with probabilistic elements like machine tool breakdowns, Monday morning absenteeism, stock inventory deficiencies, and so on. There were of course skintillions of routings possible - the computer chess sort of thing. He started with an intuitive plan (which meant they wouldn't be tempted to fire the human planners - I understood the River Works) and made random permutations, retaining those that improved the flow [few] and discarding the others. I helped him cost up a proposal to do it in real life; his experiments made it likely that we could save fifteen percent of shop time for computer costs of six percent, and the time element was satisfactory; runs could be easily sandwiched in on Benson's 704 and finished overnight.

They turned it down cold, and bitched to Parker about how much we were charging them. In a few days I came to realize what had happened. The planner in charge was unsettled by the prospect that his bosses could see he had been costing them fifteen percent for years, with his best manual schemes. And the general manager had been hoping we would fall on our faces, so his people could take over the 704! It was all my fault. Stan had done a fine job. I had been mousetrapped.

With a little help from Hans Kraft I got a hint of this up to division level, and the grumbling died down. But they never tried Stan's program, and that hurt me almost as much as it did him. It is described briefly in Bill Bell's book on electronic data processing, the first ever published by McGraw-Hill, and illustrated with a photograph of me talking to Ronald Reagan in the 701 room!

Hans had become a family friend. When I went to Schenectady his wife fed me wonderful tortes made with ground hazelnuts instead of flour - the best I have ever had, even counting the great places like Demel in Vienna, or Sacher. His son Franklin was learning to be a liberal - not easy so near Albany - and enjoyed my often bizarre perspectives, and the tale about how Dorothy and I had been amateur lobbyists for the Federation of Atomic Scientists in 1946. Hans seldom came to Ohio without bringing lily bulbs for Dorothy; he was an expert gardener.

My dear wife was enormously supportive, and in an ambiance she did not completely approve of. We had rented a simple little house when we arrived from Belmont, and in the slivers of time between my hundreds of trips, and long hours at the plant, she and I looked for a permanent place. There was a [-193-] village north of town, popular with Procter and Gamble people, called Wyoming. It was the closest place of its sort to Evendale - "its sort" meaning classical music and summer opera and European travel, and not just the Cincinnati Reds.

We found a funny old house set 'way back from the road, on four acres. The root cellar, where the oil burner now lived, and the central rooms, were a hundred years old, but a kitchen had been pushed out in the back, and a pleasant dining room to one side, and one of the two bedrooms upstairs enlarged and given a porch. White clapboard, of course; in fact, much of Wyoming had a New England flavor. I put a big, slow-moving window fan in the smaller bedroom, and with help from the many trees around the house controlled the oppressive summer heat. It was just what Dorothy wanted.

There was a tiny brook at the bottom of the steps up to the house, and beyond it a cool glen where she put primroses. Across the drive in full sunshine she had lilies. When her parents came for a long stay in 1954, her father built a small greenhouse on to the back, facing our little locust woods, and I put in heating cable. The garage, which was really more of a barn, was just right for my great New Yorker and a tremendous industrial-type lawnmower.

I had a fun victory with the convertible. There were no prestige plates in Ohio in those days, but the state pattern was XX xxx. I wrote to the DMV and asked if there was any way that I could get GE 701, explaining why. They replied that all prefix GE plates had by an old tradition been reserved for Nela Park in Cleveland, the famous General Electric light bulb plant. I wrote to the Manager of Employee and Community Relations (Marion's official title also), explained my great hunger, enclosed a spare copy of the "701 is coming" MONOGRAM, got a charming letter back, and when the proper time rolled around, received Ohio license plate GE 701. How the Band Of Brothers kidded me when I drove it to one of our IBM meetings! In Evendale, everybody was vastly impressed except Don Shell - and I imagine, Jack Parker.

Against this minor pleasure, I had a tragedy. Deo loved the new place. Dorothy trained him not to wander up to the road, or to bark at the cow next door. He was a great favorite at our parties, and when he came to work with me in Building 300 on weekends. He fell ill - desperately ill. The vet immediately diagnosed hardpad, a form of distemper which the usual vaccines did not protect against. He will be happier at home, he said, meaning that the little boy was going to die (we found out later the mortality rate was ninety percent).

Dorothy and I did not give up. She nursed him carefully; we loved him dearly, and told him so in every way we knew. He survived, although it was a month before we were sure he was out of danger. His little black nose and the pads of his feet, and in later years his corneas and his kidney tissue, deteriorated. He could never catch a ball again. But his spirit and his sharp intelligence were unimpaired - and of course we both loved him more than ever. For my next birthday, which did not come for some months, Dorothy bought me a small female standard poodle, chocolate brown. Deo was delighted, and immediately took charge.

We named her Carole.

Generous Electric had elaborate rituals. Not as unorthodox as the Olympian ones of Old IBM, but fascinating to somebody like me who had been, ah, out in [-194-] the world (I was a child compared to Neumann and Bruckmann, but I indeed had seen more than GE). One ritual was Required Togetherness, of which Association Island was a variant. Once a month in season Dave and all his managers took an afternoon off and played golf together at a very fancy country club in which Jim LaPierre, and probably Dave Cochran and the other three local department general managers, had GE-paid memberships. Fortunately I had played a little in college - it had been nice to be almost alone on the wonderful University Golf Course in the morning, after working all night on my thesis! There were small side bets; like drinking on the Island, you had to indulge, but not too much. I was third worst of the seven (Marion was exempted, although I'm sure she would have been welcome).

Another form of Togetherness was entertaining. Each section manager - or, to be exact, each wife - put on an elegant party once a year. There was a bachelor and a spinster among us, and they took us to restaurants. Dave and his wife Rosemary entertained last and threw a big bash, with a small orchestra for dancing, at the country club. Dorothy had brought nice china and family silver to the marriage, and both by natural bent and scientific observation had over our years together become a rather skilled hostess. And I, in my travels up and down the U.S. for IBM and GE, had become somewhat of a gourmet; Dorothy and I took visitors to the Maisonette downtown, and not to Midwestern steakhouses.

We bought elegant Ohio crystal, and served aperitifs and two wines and espresso and liqueurs. I became a fair host; Dorothy, an even better hostess. I would bring back curiosities from my travels; I remember Norwegian flatbread and - this was 1954, mind you - smoked whale meat. Hans was a mine of information about German cuisine, and liked Veille Cure with his coffee (I had to bring it in from Manhattan); we had parties for him and for our many Wyoming friends.

I remember with much pleasure a picnic for my gang and their families, at the Wyoming house. We hired a pair of ponies and a groom, and turned our shady glen into a pony ring. Even Don and Alice Shell approved of that, although they stuck to ginger ale.

I assume LaPierre, and Parker in his turn, entertained one level up, bringing in the general managers of the AGT departments and the division lawyer and one or two of their very fanciest consultants - Black Mike O'Brien, dean of engineering at Berkeley, was the one I knew best. "And so on," as the second half of the Augustus De Morgan verse says.

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19 GE MOVES A FIANCÉE AND A 190SL TO PHOENIX

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Q clearance *Oppie was being burned at the stake, and I might be singed*
Martin Summerfield 14 H.S. Tsien *he picked up his marbles in disgust at McCarthyism*
Maurice Wilkes *the last of my three Great Englishmen*
T.R. Thompson *he had built Maurice's technology into LEO*
A Cavendish seminar *I was to tell the Evendale story in Cambridge*
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The Atlantic [hotel] *I had flown to Hamburg on SAS*

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The SCCA [Sport Car Club of America] *new friends and a new sport*
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[-197-] The fabric of the giant company had a few lumpy places. In talking about country club memberships I said "three other local departments." Two were AGT; the other was the ANP Department, which was suspended between the jet engine and the nuclear businesses. The initials stood for Aircraft Nuclear Propulsion, and that stood for designing an engine where the combustion section was replaced by a small nuclear reactor, running very hot. Infinite range - but what if the dumb thing crashed and split open, or got so crunched up critical mass was achieved? Cochran had been involved, and had escaped to our side. It was especially hush-hush, with AEC security and Q clearances and so on.

I did work for them, carefully sterilized so it could run in our relatively open environment (secret clearances only). I had a top secret clearance for other reasons, and the ANP security men got me a Q just in case - although I never really used it. One day our AGT security manager told me in hushed tones my Q clearance had been suspended, and there would be a review. He was careful not to say it, but one security suspension often led to another, in those disgusting McCarthyite times.

"Haven't needed it so far," I said carefully, "but let's set up some informal talks and see what the problem is." I had no Dark Secret, except my rather extensive address book, but I knew Frankel of Los Alamos and Clippinger, who had converted ENIAC to non-plugwire operation, were having severe career setbacks due to security questions. Oppenheimer was being burned at the stake as we talked [1954]; I was aware of danger.

When I was president of the Rocket Society in 1951 I had appointed Martin Summerfield, a distinguished young aerodynamics professor at Princeton, to reshape and edit our journal. He had done a fine job, and I **[-198-]** continued to feel good as each issue came to me. He had a fairly close professional connection, directly and through von Karman, with a brilliant professor in his field, at Cal Tech. This was H.S. Tsien, who

had just picked up his academic marbles in disgust and departed for Red China.

Anyone who had ever known Tsien was questioned. I said I had never met, talked or corresponded with the man; that I was confident Martin was "as clean as General Groves," and that as a former president of ARS I thought our editor and our member (Tsien, of course) were being treated shamefully. I also made some vigorous comments on the persecution of Oppenheimer. The AEC security man did not care for my frankness, but said the important thing was that I had had no contact "with this man Tsien." My Q clearance was restored. It was an ugly, ugly time.

Maurice Wilkes was in full spate at Cambridge University. He had built machines that worked, he had coauthored the first book on programming techniques, he had founded (and named) the art of microprogramming. He was already, in my early-1950s view, one of the three Great Englishmen (the others being of course Babbage and Comrie), well ahead of Hartree and Turing. It was his technology that the amazing Thompson was building into LEO; Maurice was, and still is today, a towering figure.

He had invited me to tell some of the GE story at the Cavendish Lab seminar (his place on Corn Street not having a good lecture room). After the dramatic events at Evendale - the building, the 704, and the closed circuit cliffhanger - Dave gave his OK to a long European trip "to survey recent computer developments and speak at Cambridge." Wow-wow-wow!

Dorothy's parents would take care of Deo and Carole and the garden. I hired a strong man to run the lawnmower. We had been planning for some sort of European trip for two years, and now we could take twice the time, and have half our expenses paid. I wanted to conserve my time for the other side, and chose to fly, but Dorothy, who like me had dreamed for years of great ocean liners and the broad Atlantic, chose the French Line Liberté. I put her on the train; she was thrilled but just a little apprehensive. Having lived in Manhattan, and having been to several sailings of IBMers in Watson Lab days, she had no trouble - and some of our old friends showed up and gave her an impromptu farewell.

Three days later I flew to Idlewild, then a pretty primitive operation as regards architecture, but much more pleasant nevertheless than today's JFK. I transferred to Scandinavian. Next morning I was in Hamburg, and at my very first great European hotel, the Atlantic. After a cautious night on the Reeperbahn, which was even more wide open then than it is now, but much more German, I upped anchor for Paris, where I had a leased car reserved. Next day I drove in solitary ecstasy to Le Havre and picked up my delighted wife.

In the early fall of 1954 Europe was magnificent. There were as yet few tourists; in fact, still many traces of the war. And those few tourists had gone home. The roads, while narrow, were wonderfully empty. We drove toward the Alps, stopping at the behest of Michelin for star lunches and red-labeled inns. We went up over the Little St. Bernard and into Courmayeur; the Mont Blanc tunnel had barely been dreamed of.

[-199-] I found a guide with a few words of English, and he and I did three climbs together (I had brought boots and parka with me, and Dolonne, a tiny cluster of houses across the Dora Baltea, made the best crampons and ice axes in the world). We were behind our plan, and scrambled over the Grand St. Bernard and across Switzerland and into the Grisons, then down the Inn to Austria. We took hundreds of slides, wrote dozens of postcards, enjoyed ourselves as never before. Even our western trip to Palomar paled, although I yearned daily for the Roadmaster or the New Yorker (but not in the narrow village streets). It was the high point of our marriage.

I had a list of computer people who had visited me at the Watson Lab or the Barta Building, or in Evendale. The one on the continent I remember most vividly was the king of Dutch computing, Aadrian van Wijngaarden, whom I saw occasionally for the next three decades. He had built a little machine, the X-2, with production in mind for 1956, and had already selected a managing engineer. And as was common in those times, he had built pieces himself, although he was a mathematician; he had the fastest photoelectric paper tape reader in the world, but looked with great care at my photos of the 701 and the

704, with their card readers and line printers and magnetic tape units.

Perhaps more than the technology I remember the warm brown pub he took me to, with a rug for a tablecloth - thirty years later, after having lived in the Netherlands, I had one on my most-used coffee table. The Mathematisch Centrum was fine, but the pub was better. We headed regretfully back to Paris to turn in our car, and celebrated at the Tour d'Argent, where I managed to stave off an importunate captain and get our duck à l'orange instead of bloody.

London was a revelation. There were boarded-up bomb craters near St. Paul's, where I climbed all the way to the ball below the cross. There were great-looking whores on every Piccadilly corner after dinnertime, and Dorothy on my arm made little difference, but I reluctantly agreed not to experiment. Fortnums was in bloom, the famous restaurants were as represented, and General Electric of New York, so named because there was a British GE unrelated to the American one, came through with a much-needed cash advance in curious black-and-white banknotes, at its office in Aldwych.

I had reserved an Austin A-40 at Godfrey Davis - no Hertz or Avis in those days - and went to Buckingham Palace Road at the height of the late-afternoon rush to get it. I knew about driving on the left in theory, but oh! the practice. Took me an hour to get back to the Grosvenor House, and I had to lie down before dinner!

I went out to the National Physical Laboratory in Teddington and met Charles Goodwin, who had been Turing's boss in his last days. He was head of the Maths Division, and he and his lead analyst Jim Wilkinson had visited us in the U.S. several times. Charles proudly demonstrated the Pilot Model ACE, which had only recently been unveiled.

He told me a great story: when the Duke of Edinburgh did the honors - ah, honours - they were somewhat at a loss for a demonstration, not having much I/O gear and precious little memory. Finally they coded up a day-of-the-week calculation, which allowed for the full leapyear business of the Gregorian Calendar (you know 1900 was not a leapyear?). The idea is to enter a date, [-200-] and the program instantly produces which day. The only remote date most victims can give the day for is their birthday. Goodwin explained this to Prince Philip, and asked for his birth date. The guest drew himself up, gave the requested date and then, with a barely visible grin, added "Old Style"! He had been born in Greece, which didn't go off the Julian Calendar until 1923, two years after Philip was born. Score: Royals 1, NPL 0.

Isobel Goodwin was a confirmed gardener, and took Dorothy off to Kew Gardens, with an insider tour of Hampton Court Castle for both of us after I had done enjoying the Philip story. Nothing would do but we should stay with them when we got back from Cambridge - I'd guess Isobel thought we were in the London equivalent of the Wellington in New York, where unfortunates like Charles and Wilkie and Les Fox were incarcerated by the British consulate when in Manhattan.

We stayed at the Garden House in Cambridge, and loved it and the town and the Cam and the colleges from our first glimpse. My talk went well by my standards, with distinguished professors from several colleges besides Trinity, and outside visitors as well. I had been wary of English lantern slide projectors, and brought portfolios of photographs, and drawings of Building 305, and even an organization chart (the latter, very bad taste, I'd guess today). I don't remember the exact title, but it was something like "Industrial Computing in the U.S."

Val Cleaver, an early American Rocket Society member who was doing British military stuff at De Havilland, sent a young man who asked me how many "staff" I had. I said we were still growing, but when Lynn levelled off and I had filled out the technical library, which was just moving into handsome quarters ("see the photograph in your portfolios") in the 305 basement, we would have 175. There was an audible gasp. I explained that this included secretaries and keypunchers, and two special janitors, but that made things worse; there was one "young lady" in Wilkes' whole lab, and the researchers punched their own paper tape - and very badly, Maurice said later: "the most frequent character is all-holes" (no-op; used to blot

out a mispunch).

Dorothy and I drove on to Oxford, mostly to enjoy the university but also to see Leslie Fox again. Les, a survivor of the Southwell civil-engineering computing group of the pre-war years, was now planning for a mainframe and teaching numerical analysis to his own disciples. We argued about which of us was the last to use addition-subtraction logarithms; we were both young undergraduates in the Thirties, but I had Maxwell to rescue me.

I had seen my only surviving uncle, in hospital in London, and my mother's old, old godmother for good measure. I had done my talk. The Austin had survived a glorious trip to Cornwall, and back by way of Stonehenge. It was time to return to Very Different Ohio. Dorothy packed carefully for the Liberté at the Goodwin's - too carefully, as it turned out. Isobel went in to town with her and put her on the Southampton boat train, and that evening I discovered she had packed my air ticket! But in those days air travellers were treated well - Scandinavian reissued the ticket instanter, even without a computer.

When I met Dorothy at the train a few days later I had very bad news for her. In the six weeks we had been gone, a developer had started major land [-201-] fills on the property north of ours. Her tiny brook was already ruined with mud flows, and her lily field was threatened. I had already begun complaints, first quietly with the owner, who lived only two miles away, then with the town, but it appeared useless. The brook was too small to invoke riparian rights. Yes, we could sue for damages, but aesthetics were not very persuasive against the property rights of a very rich long-term resident. That part of Ohio was Taft country, very conservative indeed, and young GE executives were not yet particularly welcome.

Neumann's wife Clarice was a lawyer, but as a liberal not very heavy on the Cincinnati scene. She did her best, including personal appeals to Mr. Rich-Rich. I had aerial photographs taken, and we tried to get an injunction. Hopeless!

Dorothy's parents went sadly back to Pasadena. Carole and Déodat tracked sticky red mud up the nice long flight of steps and into the house. Dorothy found another psychiatrist, and wept a lot. I tried to get her interested in my newest hobby: sport cars. It helped a little - got us away from the house on weekends, if nothing else.

I had been watching the MGs and the older Jags, and now interesting cars like the Austin-Healey and less-hot-rod American specials were appearing. Then like a vision from Heaven Mercedes brought out a stunner, the gullwing 300SL. Oh, how I wanted one! And I was right; over the years that car has remained a collector's dream. Well, it wasn't possible; even with my Elfun Trust bonuses and several nice raises, one of them cost a good deal more than I earned in a year. Besides, with Dorothy so miserable...

After we got back, however, the Masters Of Stuttgart announced a 190SL. It was less than half the price of a 300, and it was a rag-top - a lovely thing, really prettier than the gullwing but of course much less muscular. I rushed out to the local dealer, who mostly handled Lincolns, dropped to my knees and begged him for Number One - shades of the 704 race! Well, it turned out that very few midwesterners had gotten the message yet, and I got the first one from the Chicago regional importer.



We had gotten used to having two cars around when Dorothy's parents were with us, and now I could take my pride and joy to work and leave giant GE 701 for Dorothy. It helped. And she enjoyed our new Sport Car Club of America friends, and the rallies and concours, and a bunch of fresh magazines. And we were unique; Daimler Benz didn't fool with its serial numbers: we proudly displayed 000221. Every screwhead slot was lined up. The shiny black leather upholstery was stitched like a Hermès saddle. After a couple of months the dealer called and said The Factory (you could hear the capital letters) wanted to replace my carburetor with an improved version - "at no charge of course, sir."

The New Yorker had been a prize car as well, and I had had favors from Chrysler, but those favors depended on my knowing Paul Nims, who ran their first engineering computing shop and a CPC. He had arranged for the company Road Test Garage to look at the unusual semi-automatic transmission when the Cincinnati dealer was baffled. Now, I was just a very remote owner to Stuttgart - about like the ones in Kenya, I'd guess - and still they worried [-202-] about my carbureter. I can't afford a fancy Mercedes any more - but I haven't forgotten.

I haven't forgotten the GE scene, either. Benson was getting his 704, and of course I had lots of concern with how to give the bride away - how to make the AGT and non-AGT general managers in Lynn happy at the new facility in their River Works, while fending off Keller from too intimate an embrace, and evading some Young Turks in Small Aircraft Engine. There seemed to be a lot more frictions than under LaPierre, but Dave pointed out I was up among the tough players now. I said they didn't hold a candle to Neumann, but we both knew Gerry always played fair.

Before I bring on Doc Baker, who kept a coiled bullwhip over his office fireplace [!, for the fireplace], I should tell an important story about Cochran. Like all his peers and superiors (and like me, as a matter of fact), he travelled all over the GE map. But unlike me, or Jim LaPierre, he had small children. And he loved his wife Rosemary very much. One day he went to LaPierre, just before the latter's elevation to executive vice president, and said, "Jim, I enjoy working for the company during the week. I don't mind travel - lots of it. But the kids are at that age... I'd like to arrange things so I have weekends at home most of the time." "I understand, Dave," said Jim, "I lost track of my own youngsters, and Mary had to play my role as well as her own. I'll ask Parker to see what he can do." And he did; Dave had a much happier home life - but he never made Division!

Neumann made Division, and Group, and ended up with ten thousand signatures in his goodbye book. But he swept Clarice along with him, as he had swept her off on their honeymoon, driving overland from Bangkok to Jerusalem in 1947. I had no chance to sweep Dorothy along in that fashion, even in a 190SL, and I guess Dave didn't want that for Rosemary. I don't know; I didn't hear the story from him.

As I said, I travelled all over GE. There was a special aura to Syracuse. The plant was called Electronics Park, and it was the fiefdom of a tough old guy named Dr. W.R.G. Baker - the Schenectady radio station WRGB was named for him, uniquely in the U.S. He was resisting the new Management Philosophy, which said the Park should be three divisions, not one - his!

A laboratory there was building an unbelievable computer for Wright Field - a copy of Howard Aiken's last monstrosity at Harvard. Not only was the design bad, but it was several years out of date. Syracuse didn't know beans about how to use a computer, let alone build one. After I found out some of the facts I began to agitate to do over the whole shebang, and my cries mounted in intensity as I heard horror stories by dissidents, and was shown a large box of mangled germanium diodes which had been replaced by good ones in one of the, ah, improvements (the old diodes were made by GE; the new ones I have forgotten - but not GE!) It was to be called the OARAC, as I remember.

All this would have been ignored if I had been a competitor, but everybody knew I was the top user in Generous Electric, didn't claim to be a designer or builder, and wasn't in line for Syracuse money or position. I got in to Baker. He didn't like me. But then, he didn't like many people, starting with Harold Smiddy, who wanted to trifurcate his empire, and ending with the local [-203-] unions. The bullwhip was an obvious Island present from groveling managers. The fireplace impressed me, and I told him so, mentioning my fish tanks with some pride. He looked a little less sour. I told him his computer project was dreadful. He began to look positively pleasant; I realized he was thinking of the guillotine he could set up near the flagpole.

He grumped that there was a study going on about what GE - he said "The Park" - should do in industrial electronics. He would have the man in charge send me a copy. "Don't show it around," he said. I told him I had a Q clearance. He didn't laugh.

Very soon a messenger [!] delivered my numbered copy, including a computer study by one Claire Lasher, a marketing manager somewhere in the bowels of Doc Baker's domain. I read it with great excitement; it focussed on IBM, said computers were the way to go, and that the time was ripe. I wrote Baker, copy to Lasher, saying I agreed but that the predicted total business was low by a factor of three and the recommended buildup by GE Syracuse was low by a factor of ten. I also said Syracuse was an impossible place to start the business - IBM was too close, the unions would kill everybody dead, and the failure [!!] of OARAC would cast a long shadow. I was summoned to the presence.

"Cordiner has given us an OK to prospect," he said [not true, as it later turned out]. "Lasher here says his predictions are all the brass in New York will buy. As for support, I'll give the new bunch what they need." "If you start a department I'd like to help," I said. "It ought to be useful to have someone around who has seen a computer close up." Lasher gave me a slow smile; Baker ignored me (he was very good at that). I made it clear I was thinking of the general managership; he ignored that too, and Lasher looked blank.

I talked to Dave. He wasn't too upset to have me consider moving on; he had asked me to do two private technical audits for him - that is, involving outside consultants like Black Mike O'Brien and not my own Operations Analysis group - and had not been impressed with the quality of the work. Parker was a very tough boss. What Dave worried about was that I would strip the two 704 shops.

I said that New York would expect other parts of the company to help, especially if the new outfit was ever to get out from under Baker. "If Baker asks me, Dave," I said, "and if I decide to go - and I'm not considering Syracuse or Erie or such - I'll want Asmus, a couple of operations people, and a couple of programming people. Also if a few of the juniors want to come I'd like to be able to accept them, either Evendale or Lynn. We are in great shape; business is booming; we sent a performance bulletin on the new engine out to North American the other day as a deck of binary cards, and it ran." "Have you talked to anybody yet?" "Only Charlie and Jack Hughes, and Jack can't leave Cincinnati."

I poured out my plans and hopes and worries on Dorothy. She wanted me to fix the muddy mess in her garden, not drag her off to some new and less attractive GE community. I was being openly unfaithful to her on my many excursions, our sex life having vanished with the sparkling brook and the memories of Europe. Her sessions with the psychiatrist were going poorly. And it had been a long winter, and the primrose seedlings in her greenhouse were not prospering.

[-204-] One morning I missed the dogs, who normally slept with me in the larger bed. I found them huddled next to Dorothy in the small bedroom, trying to warm her or arouse her. She had taken twenty sleeping pills, and had been dead for several hours.

Everybody was supportive - too supportive. I was as guilty as a husband could be. I had brushed aside her needs, threatened her with further dislocations, ignored fifteen years of a remarkably close marriage. And our friends were sorry for me!

Her brother Bob came for the service - he and Clarice Neumann and I, on a warm spring day. In a week or two it was as if she had never been, except that the house was empty, empty. A close friend who was now in my library subsection took Carole, and a year or two later moved her with the family to a GE location in Santa Barbara, where I saw her again. I still needed Deo.

When the primroses in the little glen looked at their best, I scattered Dorothy's ashes among them.

When I sold the house some months later, her greenhouse was a major attraction. She was never happier than on the day she went to Kew. I remember her a hopeful at Harvard; I remember her pushing cards with me at midnight, in the Watson Lab; I remember her at her lovely parties. But mostly, I remember her in her garden.

I was not quite 38. I had liked being married; it never occurred to me not to marry again. It was a positive

thing, not that I disliked being alone; in many ways I had often been a loner, in childhood, in college, in IBM. Wyoming was a small enclave, and while friends produced a date for me at swimming parties and such, the supply was limited. I had those great gals at the shop, but that way lay all kinds of trouble - although my lovely secretary Jean Miller gave me fits when she came to work turned out like a model, and sort of moving inside her then-fashionable sheath dress. She was divorced. But what I really wanted was to have her come along with us if a nucleus went off to the computer wars. And we had a great relationship already, which monkey business could only hamper.

When I lived in my Ann Arbor boarding house, one of my mates got married to his high school sweetheart, just before graduation. She had been going to Ohio University, in Athens, and her attendants were not Ann Arbor girls. I found myself paired with a gorgeous creature who lived in Wauseon, a little Ohio town not far south of Ann Arbor. I managed four dates, borrowing my father's car on one occasion. She was a drama and journalism major, and had been the lead in the senior play just before I met her; she had a difficult love affair going, but found the world expert on Jupiter's eighth satellite meager relief. Something might have come of it, but Harvard and Dorothy and Washington and the war intervened. Her name was Elizabeth.

A few months before Dorothy's death I found myself at loose ends in Toledo. I had given a speech or whatever, did not relish going down alone to the hotel bar, was feeling inventive. More than a decade had gone by since we had exchanged letters or Christmas cards, but I remembered. "Operator, do you have a listing for an Elizabeth Yeager in Wauseon"?

I stayed over one more day. Next night a very different woman showed up - not the campus queen of East Lansing. The face was sharper, more classical, [-205-] under a black Garbo slouch hat. She wore a black raincoat, and gave the impression that there might not be anything under it (there was - but then, it was our first date in over fifteen years). High heels, which turn me on. The hair was either platinum or prematurely gray. And I was also changed; success had marked me, and not only with a beard.

It was intense. There was no flirtation. We exchanged data: I was married; a scientist; a manager; an experienced traveller. She was unmarried; a teacher; living with her aunt; hungry for adventure. She was most definitely not a virgin, nor was I.

Shortly we found ourselves sharing an elegant room in the Waldorf Towers. Elizabeth loved New York in spite of the heat. I loved Elizabeth because of the heat - her heat.

After Dorothy's death, I played Young Lochinvar: rode out of the south every weekend on my trusty 190SL, with tales and trophies of my latest conquests. Aunt Grace was urging Elizabeth, I was urging Elizabeth, sex was urging Elizabeth. Then Baker struck. There was to be a Computer Department. It would be located in Phoenix, Arizona. Phoenix urged Elizabeth. She capitulated; I had a fiancée.

It wasn't going to be simple. It soon became obvious that I was not going to be the general manager, and that the choice, one Homer Oldfield (inevitably, in an American company, known as Barney) was not anxious even to have me around. He had appeared unexpectedly from the military side of Baker's empire, and had negotiated a strange deal with the Bank of America which was to be the dubious foundation of the new GE venture. I pointed out that he could not operate a computer department without a computer, and that I just happened to have one of those scarce IBM 704s in my coat pocket. Lasher must have taken a more conventional route; we were both accepted as section managers in the new department - he as Marketing; I, Applications (today we would say "software").

There were warning signs. Barney, Claire, and the others who finally sat around the departmental table in Phoenix, had all been promoted a level; I was going sideways. Most of them were Syracuse or General Engineering Laboratory [Schenectady], and so were the other transfers, down to unit supervisors. Nobody knew much about computers, and the manager of the engineering section was an analog man!

But my gonads were saying "Yes, yes, yes!" even as my IBM and MIT and Evendale experiences were saying "Watch it!"

I had talks with Dave and Marion. AGT would initially pay for relocation, and for that of my small cadre as well, because the new department was not yet announced or even funded (CD would reimburse most of the costs later). I would take Asmus, Benson, Mackenzie, McCracken, six others from the two locations, and Jean Miller. Hughes couldn't come, Shell wouldn't come; Gettel was an engine man.

I could indeed have the rights to the third 704, which had so far cost AGT nothing. And as a wedding present (said Dave) I could take my Herman Miller office furniture, and the IBM typewriter I had had painted to match Jean's dark red hair.

Marion agreed that she would ask Parker to permit my move to include [-206-] my fiancée, since we wanted to be married in Phoenix - and if married first it would have been legal. She probably didn't tell him my fiancée had a whole Victorian mansion full of antique furniture. We covered transport for Aunt Grace by Elizabeth driving her car West; my precious 190SL was to be shipped. Finally, Dave gave permission for me to give a speech on computers and space exploration at the Rome meeting of the International Astronautical Congress, which just happened to fit between my leaving Evendale and the time Barney Oldfield was arriving in Phoenix.

In other words, a honeymoon. I had done well by Evendale and its enormous tasks. They were saying thanks, and good luck. It was the best job I ever had - and you can see why I still enjoy calling it Generous Electric!

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20 BILL NORRIS WAS RIGHT

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[-209-] The General Electric Computer Department was a big, big secret. And the biggest secret was its location. After Baker picked Oldfield, and after serious negotiations had begun with the Bank of America, but before the final decision to go ahead was taken, a task force from Electronics Park and 570 Lexington began the search. I never knew whether outside consultants were involved; by the time the good doctor and Brother Barney made me an offer the location had been chosen - and indeed I would not have accepted without knowing. I was not about to plunge my hoped-for bride into a Utica or an Oxford, Mississippi.

Before the team (and Oldfield) got to grips with special computer requirements, there were some broad guidelines. The company was very anxious not to encourage further unionism, and was moving existing departments south and new ones west, away from the baleful glare of the Lynn, Syracuse, Schenectady, Erie, Cleveland and Evendale unions. Also, as I mentioned in talking about Watson Senior's very different views, GE did not want to dominate any more communities. That ruled out towns like San Jose or Rome, Georgia where they had a considerable presence; in fact, it also made the smaller towns a difficult choice even when GE was not already on the scene.

When you add to that a general feeling even in 1956 that electronic futures were rosier out toward California, and the specific desire as the search wore on to be close (but not too close) to the Bank of America headquarters, the number of choices narrowed very rapidly. There were several good possibilities, I heard later, in Texas and Oregon and California. After appearing to work assiduously over the thick reports, and making appropriate visits to chambers of commerce and building sites, Barney chose what he had intended to choose for family reasons from the very beginning - Phoenix. The team and the GE authorities may well not have known of his preference. I found out because when I began to burrow into the community I heard that Barney **[-210-]** had been in and out of Phoenix for many months, and even before the formal survey had been chartered.

After I had accepted, Barney and I talked about dates. I needed to go early, I said, because I had to figure out where to put the 704; the lead time was much more than for a building to (temporarily) house people. "I think you will want to be close to the college in Tempe," said Oldfield. "Come out with me next week and meet President Gammage and some of the Phoenix people who know about us."

The trip was a revelation. I knew the naked desert from western trips, and thought it magnificent, but I knew little about Phoenix and Tucson. The college was Arizona State, with buildings going up in every direction, a student body at 12,000 and growing twenty percent a year, a rivalry with the older University

of Arizona in Tucson, and - need I say - great enthusiasm for athletics. The library was punk, the Ph.D. level among the professors low, and the research capabilities microscopic; there was a scorpion laboratory. Really! Great competition swimming pool, though.

The other side of the coin was Grady Gammage, in his sixties but with a thirty-year-old spirit - and a younger wife, and a little boy who was the apple of his eye. Over the next months we became firm friends. He was enormously proud of his school, which he had built up from a poor little teachers college over a span of nearly three decades. Before that he had headed a still smaller college up north (which in Phoenix meant Flagstaff). He was the longest serving college president in the U.S., yet a lot livelier intellectually than most of his vice presidents and deans. He was a key figure in the community both because of his position and his seniority, and was tremendously excited at the GE entry.

While Oldfield went off to look at real estate, which was the most popular outdoor sport in urban Arizona, Grady showed me around his campus. He knew every palm tree, and there were thousands. And every student knew him, and there were thousands of them too. He focussed on the new engineering building, just undergoing checkout; some classes were already using it, for classroom space had been tight all over the college. He startled me by saying, "Mr. Oldfield has arranged to use some of our surplus space when the building is open. He plans to put his engineers here in Tempe for a year or two, until General Electric offices are ready."

In no time at all we were grappling. I had a huge computer, more powerful than all the others in Arizona put together. I had money for the equally huge rent. I was planning to recruit lots of the kind of young men and women he yearned to have at the school. My personal credentials, and the recent Rocket Society presidency, impressed him. He wasn't sure at first whether to believe my wild yarns about Evendale and Lynn, but I had brought photographs, and blueprints of Building 305, and the 704 installation manual. Not one of his senior faculty had even visited Cambridge - and I had lectured at the Cavendish!

He had a three-wing three-story engineering building with an enormous air-conditioning plant. And he had uncommitted building funds; large lumps of money. We sketched an agreement at that very first meeting, before Barney even got back. I was to have space for sixty people, and a nice office suite for [-211-] Jean and me. The college would install the 704, including a big electronic precipitator for desert dust. I would pay the monthly IBM rent, and for power and supplies. I would buy the furniture, which would belong to GE. We would look at janitorial and guard services later, and perhaps split them; the arrangements for the GE Engineering Section were not far advanced, since the manager had not been announced. Also when I got Grady and his wife Kay away from Oldfield, I told them about my Great Romance, and how Elizabeth and I wanted to be married in Phoenix and then leave for our European honeymoon. "How wonderful!" said Kay, "I can't wait to meet your fiancée. Just think - after fifteen years, to marry your college sweetheart." I thought it was pretty great myself.

And Barney grudgingly agreed that the 704 would be the centerpiece of "The Arizona State College Computing Center, Operated By The General Electric Computer Department." As I had pointedly remarked to Gammage, it would give Arizona State the most powerful university computer installation in the world, at least until MIT or some such got delivery of a 704 or an 1103. After that, the precipitator was a cinch.

I drove all around the area, checked on housing, took lots of pictures for Elizabeth and my little band of supporters. It was indeed a paradise, if you liked desert. For a New Yorker, say, it lacked certain amenities. Later on, when Elizabeth had become a committee chairman in the Symphony Guild, I used to sit in the poor auditorium (right behind Barry Goldwater and his wife) and think wistfully of Carnegie Hall.

Housing was simply unbelievable. You could buy a small new tract house, with full air conditioning and an in-ground swimming pool, for \$12,000 - on a quarter acre! True, the construction was tacky, and the pool was tiny, and you were a long way out of town, and the cheap plantings would probably die. Still...



I got the flavor of how insiders lived from Lew and Elizabeth Haas, who had a lovely older



place on the corner of Mummy Mountain. There was an L-shaped pool with a magnificent palm at each end, a connected guest house, a tiny citrus grove with underground irrigation laid on, and a small corral and tack room. It was out in the open desert, with a view of the mountains to the east where Frank Lloyd Wright had his winter quarters, Taliesin West. To the southeast were the wild Superstitions, and four miles to the southwest, the landmark of Camelback.

Lew was the paid head of the Phoenix Chamber of Commerce, and one of the very first people to know about General Electric's interest. I sat next to the pool and told them about my conversations with Grady, and about my plan to bring my fiancée out. Lew of course was wired in everywhere; he and Elizabeth began talking about the chapel of the Episcopal Cathedral, and whom we should meet before the ceremony, and where we should live.

Elizabeth Haas was in her fifties, a bit leathery for my taste but still attractive. She was an amateur artist and patron of culture. "I shall introduce Elizabeth to all our friends," she said. "I know she will like the Herbergers, who came here from Minnesota a few years back, and are very active. And Lew must introduce you to Dan Noble, who is the reason for Motorola being [-212-] here. His wife was also a newcomer, and the pictures of your Elizabeth remind me of how Doraise looked when Dr. Noble brought her out to the house."

It was the first of many exciting Phoenix visits. In the end Grady and his staff offered my gang a small frame house with humidity cooling, adjacent to the campus. It was to be torn down at the end of the year for further Arizona State expansion. We were to occupy it from late August until early November; as we acquired our own furniture and built up our staff, the college would finish up our area (and my office). The computer room and associated spaces would be ready when IBM sent the 704 (Liston was aiming for December).

Even Charlie, the optimist, thought the schedule impossible. But I now understood from Grady and Lew and other new acquaintances how fast construction could proceed in Phoenix. Grady, on the other hand, accustomed to the leisurely - and I suspected, rather difficult - recruiting for faculty, was startled at the figures I gave him for projected hiring. In the event, we recruited very rapidly, and Grady's people matched us with space, even to having handsome drapes in my little office by the time Jean arrived. IBM was slightly late, but they were now used to putting in 704s in the Wild West, and we easily made the date for Grady's rather elaborate dedication.



It was a very comfortable feeling to have a Manager of Administration and an expert secretary. All the details of moving me out of my building in Evendale [sob!] and my house in Wyoming were taken care of, including shipping the precious 190SL. At the same time somewhat more orthodox arrangements were being made to get the rest of the Evendalers and Lynnites out to Tempe; that included a great deal of computer duffle for the third 704, as well as families and furniture.

That left Elizabeth and Grace, up in Northern Ohio. It was arranged that a different crew and truck from the same outfit that was taking care of me, would pack and move them and coordinate everything so the two vans arrived at the house I had rented in North Phoenix the same morning. I would fly; the ladies would drive. Chaperoned by Aunt Grace, we would stay at the major downtown hotel (the Westward Ho, inevitably known throughout the southwest as the Ho House), while straightening out the conglomeration, and get ourselves rather elaborately married at the cathedral chapel - with Charlie Asmus and Elizabeth Haas as witnesses, and the Gammages, and my troops and their wives, and a couple of society reporters, to help.

Alas, no Déodat. I had shipped the little boy, now in vigorous form and good coat again, off to Dorothy's brother Bob and wife Pat. He was to be shipped back to us when we returned from the honeymoon. Grace was dubious; there had never been pets at the Yeager mansion. To jump ahead, both women fell madly in

love with the little guy, and he was the center of the household until his death in 1962.

Everything went as planned. It was an afternoon affair. Elizabeth looked stunning in a short beige lace dress and sleek little hat. We changed, put our fancy duds in with the rest of the European luggage, picked up the troops, drove hilariously off to the airport for a wedding supper, and an excited Elizabeth and a horny bridegroom flew away to Los Angeles. There we boarded the SAS Transpolar Express, still in its first year of operation, and took off for Copenhagen.

[-213-] We were in first class, and immediately recognized other ARS members, led by Krafft Ehricke, also on their way to the Rome astronomical congress. But we had a berth! The broad seats of the DC6-B made up into a fine bed, much wider than on the railroad. The airline assigned two pairs of seats in tandem. They were designed to lay flat; a double mattress came out of a cupboard and was unrolled as the working surface, and a curtain was hung from rails on the overhead. Quelle luxure!

Several airlines offered the service on very long overnight flights. You paid about \$100 over first class fare - I think that was per person. Of course the economics worked only if first class was not full. And the whole lovely custom disappeared instantly when the jets came in.

Takeoff was at midnight. After a luxurious champagne-and-foie-gras service, we waved to my envious friends - and believe me, it wasn't the berth they were envying - and retired to our bridal couch. There is a small but happy society called the Mile-High Club; we joined it on the way to Edmonton!

After Greenland Ehricke bustled up to me and with European savoir faire asked my help. It seemed that the rocketeers had a pool going on whether "the lovely lady" and I were married, or just very good friends - and needed to settle. "Yesterday," I said. This was passed to the cabin crew, and a night-long celebration ensued. We rolled off at Kastrup at 0700 feeling absolutely no pain - and of course I was anticipating further festivities in Rome, as Ehricke was sure to pass the word.

Rome was interesting. It was my first visit, and we had to go down to EUR for the conference itself. Elizabeth and I opted to pass up a papal audience with the hundreds of other attendees, and took off for Capri, where Elizabeth's friend there introduced us to Gracie Fields - much more rewarding than the Pope. Somehow or other I found the Applied Mathematics Institute in central Rome next day, and had an amazing time looking at the Ferranti Mark 1 Star, one of the first mainframes installed outside the country of origin (another copy had gone to Kelly Gotlieb in Toronto). The director, Mauro Picone, had put his car and mad Sicilian chauffeur at our disposal, and we saw the Eternal City as an Evanescent Blur.

I was much impressed with the two engineers in charge, Paolo Ercoli (now a very senior IFIP dignitary), and Roberto Vacca. The latter came to visit us in Arizona next year (and again in Manhattan later). He had a blacker beard than mine, a lean body that looked great in our pool, and spoke six languages well - so well that he wrote science fiction (and in the Seventies, futurology) in English! His father had been professor of Chinese language and literature at the University of Rome. Roberto could read a few ideograms, and also was studying Russian - all this after a good degree in electrical engineering.

We went back to honeymooning. Elizabeth had found Roberto, ah, stimulating; she was magnificent in Venice. Somehow or other we found ourselves in a rental car, and drinking triple brandy Alexanders "for the road" in Merano. And after a while, in Amsterdam, where we took Canadian Pacific's flight to Vancouver. I had tried, but they had no berth service. Ah well, we now belonged not only to the Mile-High Club but to many, many lower-altitude versions, notably the Black Marble Bathroom Club of the Danieli. Believe it or not, the flight put down at Churchill on Hudson Bay. Our connection to San [-214-] Francisco was Qantas, and it was delayed; their agent put us up in a lovely room at the Clift to await a morning flight to Phoenix. I decided I really liked honeymoons.

Now the serious work at the new department began. Oldfield and his henchmen had draggled in while my bride and I were enjoying Europe. Our section grew smoothly; we were used to each other, used to our

work, accustomed to our levels in Generous Electric. My peers had problems. Perhaps it gives a perspective on Phoenix to tell about our Employee and Community Relations chap. He bought a very fine new house, twice the size of what he had had in Syracuse. It was fully air conditioned, and had a lovely lawn - he was "in irrigation," which meant that twice a week in summer a secret agent crept near his house after midnight and flooded his super-level lawn two or three inches deep with water from the nearby canals. One awoke to lots of floating steer manure, the universal Phoenix fertilizer!

Art did not get a pool with the house, and having kids, immediately signed with a contractor to have one put in. It was great. The bill was only \$3000; he paid willingly. A few weeks later he was hit by suits for payment from the subcontractors. It turned out contractors were not bonded in Arizona, and his had skipped town. He paid a second time; it was a great way to treat GE's professional interface with the community.

Dan McCracken was setting up to do programming for whatever hardware the Computer Department chose to build, and also (since he was becoming well known around the computer community as the author of the first U.S. textbook on how to program) as my manager of training. About this time we all began to encounter Barney's management method, which was to pit against each other the people who worked for him. Dan discovered that he had a rival in the engineering section, and another much more capable one in Palo Alto.

Palo Alto? Well, it turned out that while the Computer Department had an engineering group in Arizona - in fact, just one wing away from my 704 in the Tempe building - most of the actual work on the Bank of America contract was being done elsewhere. The bank was represented by a strong guy named Al Zipf, who over succeeding years rose to its highest operating levels in San Francisco. He had hornswoiggled Hayseed GE into a weird deal that I never fully understood - it speaks volumes about Barney's style that repeated requests to him, to Lasher, and to the poor dumb Finance man never produced a copy of the contract for me to look at.

Roughly, the bank had all rights to MICR, Magnetic Ink Character Recording, the ugly little numbers and symbols that lurk along the bottom edge of your checks. This had been developed by the Stanford Research Institute over several years; that story has never been told in full, but I suspect it is fairly dreary. The package as the Hayseed Boys first saw it was an ink with magnetic properties, an eyeball-wrenching font of the ten digits and four special characters, and (as the Patent Office might have said) electronic means to read and interpret a line of MICR type.

An amazing effort on the part of the ABA (American Bankers Association) was on the verge of getting all North American banks to accept the shape of [-215-] the characters, their placement on the check, and the magnetic properties of the printing ink, as an official standard. I was a major figure in computer standards eleven years later, and nothing I saw or did in that horrid arena lessened my wonder at the ABA achievement; it was not far short of a miracle.

Well, Zipf looked first at National Cash and IBM, both heavily involved in bank hardware. They listened to his proposals, snickered gently - they were wrong about the technology, tacky though it was, but right about the terms - and shooed him away. Several companies later he tripped over GE Syracuse, which had been ordered by Doc Baker to put IBM out of business. Soon! In spite of the assurances he was giving me, Baker didn't want to spend much up front, either. My idea would have been to build up a powerful mainframe capability, hiring outsiders like Haddad or Amdahl, and absorbing the first dozen machines into GE enterprises.

You could figure on a big drain - a commitment of 'way over a hundred million pazoosas before the first successful dinosaur was hatched. And IBM was rolling, and even Rem Rand was selling everything it could make, whether in Philadelphia or Minneapolis. A large part of Baker's personal earnings would go down the tubes. Sure, a decade ahead, GE would make a fortune, maybe. But WRGB would be retired, clutching his diminished sack of doubloons to his still-vigorous bosom. Not bloody likely, as my British friends would

have said.

Now, a Gerry Neumann would do it in a minute. A Jim LaPierre might do it - he was very careful about overall company finances. I would do it in six seconds. But none of us were involved. Oldfield, or more likely a consultant or one of Harold Smiddy's spies, brought the word about MICR. The bank had gotten its act pretty well together, after several rejections; what they proposed was now rather attractive on the surface. They would give the new General Electric activity a contract for the first twenty MICR systems, and then allow GE to sell on the open market to other banks and financial outfits. There probably was a clause about California competitors; I never knew.

In return, GE was graciously permitted to buy the rights to the MICR technology, probably for more than the Bank of America had paid. I came late to the fray; the contract signing was in final stages before I almost accidentally tripped over the Palo Alto shop and saw the ink, the font and the readers. In my usual suave way I said to my host that it looked nutty. "The coming technology is optical, for Gossakes, and the next tribe of computers will be fast enough to analyze any reasonable font, not just this hunchbacked thing." I was right about optical, wrong about analysis; it was the end of the Sixties before a single-board microcomputer got both powerful enough and cheap enough to read, oh, defective typewriting.

The SRI stuff did not include a dedicated computer. GE would develop that, and have the rights to its probably rather primitive innards. And since delivery of the first system was less than two years away, there would not be time to build up a mechanical design and manufacturing group; the check handling equipment was therefore subcontracted to Pitney-Bowes, rather secretively. They were children compared to IBM, I said; the comment was not well received.

Obviously it would help the GE group to be near Stanford, but Barney [-216-] wanted the main operation to be in Phoenix. So he set up a shop in Palo Alto to do the MICR work and plan the computer, with the intention to move everything to Phoenix two or three years down the road, and to do all the manufacturing and assembly and test there. When the time came, almost all the good people protested vigorously, and many of them left. For one thing, many of the group had joined because they liked the San Francisco area, and especially the Peninsula. And by that time - it was more like five years, as I remember; I was living in Europe - the sharper individuals could see, as I had seen in 1957, that poor old General Electric was not going to put IBM out of business, or even scare them as they had in the beginning.

There were a dozen reasons why the GE entry was doomed. A great deal depended on Oldfield, and he was a disaster. Money was needed in much larger quantities, especially to build up marketing and sales. Lasher had hired a former taxicab radio peddler to run the latter subsection, having found him in one of Baker's remoter enterprises, and the next year sent him and his people out to call on some of the most sophisticated banks in the United States. In competition with Watson's Best!

Two central elements of the Smiddy/Cordiner philosophy were especially damaging. One was decentralization; the tiny department had to pretty much fend for itself. In the Watson empire, or in many other large companies, a venture as important and as vulnerable would have nestled in the bosom of a rich part of the corporation, and drawn on mature services already established. For instance, a really major press campaign would have been mounted at announcement time, and again, separately, when the story of the Bank of America contract was ripe. Barney had neither the personal inclination, the staff or the money; there was a poor little press release in October or November [1956], which nobody except IBM paid much attention to. There was no computer press as yet, which made it worse.

Mostly as a consequence of the GE philosophy, Baker was retired from his Electronics Park and other fiefdoms, and his realm split into three standard GE divisions: industrial electronics, military electronics, and controls. The first was awarded to a Harold Strickland, who also turned out to be a disaster - and the Computer Department was in that division. Harold was nervous, financially conservative, and knew absolutely nothing about digital computers. He didn't even get what was left of the two Wright Field projects, the analog jet engine simulator or the Aiken Mark IV replica, OARAC.

There was another element of the GE credo that had far greater consequences for the huge company than decentralization (which indeed was a very good thing for most parts of the outfit). It was that there was a professional skill called management, that it could be taught - the MBA frenzy was well under way - and supremely important for computer futures in General Electric, that a trained manager could manage anything.

The company was now committed simultaneously to three enormously difficult technical ventures: computers, jet engines, and nuclear energy. In the difficult, and in the end humiliating, years to come a succession of expert managers were given control of the computer enterprise. Until the end, not one of them knew anything at all about the field when he assumed the [-217-] mantle - not design, not construction, not utilization (and in a world dominated by IBM, not marketing!)

When it was almost certainly too late, at the end of the Sixties, somebody up topside recruited John Haanstra from IBM. John was great; would have been just the guy to lead us in 1956. He was killed in an airplane crash not long after the appointment - a very considerable loss to the trade, as well as a human tragedy. He was succeeded for a few months by Stanford Smith, out of the New York staff function, whose earliest management success was transferring the Outdoor Lighting Department to Carolina. He sold the operation to Honeywell.

The pattern repeated, not quite so disastrously, in what was in those days called atomic power. The competition was not as overwhelming as IBM in computers, or even as strong as Pratt and Whitney - only Westinghouse and such. But the same kind of certified managers with no real knowledge of the business or the technology held GE back badly in that field also. They still have a presence, but of course the prospects have dwindled away.

The kind of special skill that is taught, in Cambridge and Stanford and Crotonville, is the less important part of management. What both Watsons had, what my nemesis Vin Learson had, what John Haanstra had, was leadership. The men selected to run the computer and nuclear businesses in GE were certified managers in the Smiddy sense, but they couldn't - and didn't - punch a way for their troops out of a paper bag.

Which brings up jet engines, the first of the three challenges. There was a Maximum Leader (we will meet another one in the next chapter). He was in his own right the best designer of his thunderous beasts in the whole world. He was a fantastic leader; many of his managers refused promotion up the professional management ladder in GE to stay with him, and some of them were still there when he retired over twenty years later. This was of course Gerhard Neumann, who features so often in this book not only because I admired him as a human being, but because he remains to this day the key to how General Electric could have succeeded in computers.

Pratt and Whitney was tough, and had almost as firm a grip on the engine business worldwide as IBM did on computers. Gerry shouted "Charge!", and the whole bunch - subsection at first, then section, then department, then division, and in the end a forty thousand man group - followed him cheering up the steep hill. In mid-charge GE tried to take him away for better things: Crotonville, a major staff job, a promotion into some other division or group managership. He refused pointblank. "I am going to build the best engines in the world," he said, "and right here in General Electric, by God!" And with backing from Jack Parker and Jim LaPierre, he hung in there.

My dream for over thirty years, from 1954 or so, long before it was possible, to this minute, when it is thirty years too late, was to do the same thing for GE in computers. I had the simple management skills, I had the gut knowledge of the technology and I was, on a smaller scale than Gerry perhaps, a Great Leader. There were two reasons why I never did so; the minor but not negligible one was that I was a hedonist. I loved my pleasures dearly, from reading about bookbinding in the Widener Library to making love to exciting women - wives and lovers and casual acquaintances and professionals.

[-218-] Neumann lived with enormous gusto, had a wonderful wife (but only one - there I bested him), but his drive to be King Of Jet Engines was paramount. Perhaps if I had gone up a notch further, perhaps if Dorothy had lived, I too might have come to put computers first.

But there was something else lacking, and that was not at all my fault. What GE needed in 1956 and 1957 and 1958 was a powerful hardware man. Gerry could lean over a drawing for a minute or two, and then say to his engineer, who had spent days of effort and a great deal of expensive 701 time on an important engine bearing, "Jim, that doesn't look right. Check it again, right away!" If the Computer Department had had a man who could have done the same thing with electronics, and if he had been a leader strong enough to get rid of the Barney types and commandeer the department, GE might have made it. I was, unfortunately for General Electric and for me, not such a man.

I tried to persuade Oldfield to bring in a really powerful designer, and actually got so far as to ship in Ralph Meagher, the father of the ILLIAC I (the first of the von Neumann machines to do useful work). Ralph was no longer at his best, and Barney didn't think he needed more top engineers when he had Ken Geiser, who ran the Tempe crew, and Bob Johnson, who was designing the bank machine in Palo Alto. I should have tried with Gene Amdahl or Jerry Haddad. At least I could have been more supportive of Johnson, but Barney had set me against Bob by setting Dan McCracken against Joe Weizenbaum, and I was a detractor instead of a supporter.

Some years later one of the Founding Fathers of our business coined an aphorism - not at all a part of the Smiddy/Cordiner lexicon - that caps the story of the GE failure in computers. This was Bill Norris, boss of Control Data and of several predecessor outfits before it (he figures prominently in my stories). He said:

"A necessary but not sufficient condition for succeeding in the computer business is to be completely devoted to it."

Generous Electric made steam turbines and nuclear reactors and jet engines. It made electric blankets and refrigerators and a thousand kinds of light bulbs. It had a major financial operation. In later years it even got into mining and such. No management apparatus could give enough attention, and enough funding, to something as specialized as computers, and also operate the rest of a gigantic, diversified company - at least, not unless it had a Gerhard Neumann.

RCA failed. Siemens failed. Hitachi goes very nicely indeed, but Japan is a very unusual milieu - and even so I place Hitachi well behind Fujitsu and NEC worldwide.

To have half of your business in computers is not quite enough. Xerox failed. Sperry failed. Honeywell failed.

Complete devotion is not enough; ICL is a case in point. Norris' own Control Data came down with a crash after the beancounters drove him out. Thousands of us waited with bated breath to see what Boomtown Blumenthal was going to do with Berry (or was it Spurrroughs)?

Anyhow, as regards GE Bill Norris was right. It never gave undivided attention to computers, **[-219-]** and in the end it had to give up. I was to come back again [1965 and 1966]; I was to have a chance to look at their Bull and Olivetti ventures from the inside. I still liked the parent company very much - but I could see it was hopeless.

[-220-]

21 IN VON BRAUN COUNTRY

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Computer Department utilization *use computers to design computers??*

Barney Oldfield [19](#)

ASC registration *we tried to automate their process in 1957*

Harold Strickland [20](#)

Technical service work *Comrie in London, and Bill Bell, and Washington*

Barry Goldwater *there was an upper crust to the Phoenix power structure*

Motorola, AiResearch, Goodyear and Hughes *all had enough computing*

Fort Huachuca [Army Electronics Proving Ground] *the scale was wrong*

ARS [14](#)

ABMA [Army Ballistic Missile Agency] *von Braun, and a swarm of Alabamans*

Helmut Hoelzer *he had lots of computers, but no Civil Service slots*

Wernher von Braun [14](#)

Facilities management *I pioneered an idea whose time was approaching*

CSC [Computer Science Corporation] *lurking in the Huntsville bushes*

IBM [01](#)

Dick Porter *had run the GE shop at White Sands when Wernher was there*

Sputnik I *at the IGY meeting [4 October 1957] the Russians announced*

The Arizona media *I talked about Russian technology and baton-twirling*

Helmuth Sassenfeld *not from PAPERCLIP, he had been a Watson Lab fellow*

Erwin Rees *I asked him to tell Wernher I was going to make waves*

General Medaris *emphatically not "the model of a modern major general"!*

Explorer *it was launched after Sputnik II but well ahead of the Navy*

GEISCO [GE Information Services Company] *Huntsville was its cornerstone*

A 1958 epilogue *IBM wanted to show Wernher its superconductivity work*

Charles Benton *manager of the IBM Military Products Division*

The IBM Convair *a family party and a comfortable trip to Poughkeepsie*

The von Braun lecture *dull, but Wernher was really glamorous*

"No Booze" at the Kenyon guesthouse *even for Wernher, ginger ale!*

[-221-] I had done what I promised Baker and Oldfield I would do. I had brought a hard-to-get 704 out to virgin territory. I had installed it in an elegant but practical setting at the college, the center of intellectual excitement in the Phoenix area - which, with all due respect to my new friend Grady Gammage, was not saying much! And I had done it without spending important GE money or time.

I had staffed it, in an area where computer experience and professional expertise were as scarce as forest glens and sparkling brooks. And not just with Evendale veterans like Charlie Asmus and Dan McCracken, or Lynn veterans like Al Benson, but with sharp Easterners who had not worked for GE before, and with a little group I had stolen away from Tucson (and in a sense, to Grady's considerable pleasure, from his rival institution).

The computer and the people were ready to go - ready to do heavy design work for the Computer Department's engineers, ready to help Arizona State in administration and research, and to contribute at least some specialized instruction.

And when we were ready, Oldfield and his poor second-rate crew didn't want us! The engineering gang in Tempe hadn't the faintest idea how to use a computer to design another computer, and were too busy doing it by hand to find out. The group Bob Johnson had pulled together independently in Palo Alto, which included the young and pugnacious Joe Weizenbaum (and Arnold Spielberg, father of "Jaws/Close Encounters" Steven Spielberg), was a different matter. Egged on by Oldfield, they regarded us as competitors rather than as a powerful and friendly asset. They used local 650-size computer facilities at

SRI.

So here we were, costing the earth - \$43,000 a month IBM rental, just for starters - and producing almost nothing. We did a few things for the college, notably a very early automation of their convoluted fall registration process, [-222-] and tried to do a traffic flow simulation for the community, but those were gratis. It was clear Oldfield would like to shut us down, and eliminate my croaking about IBM research and IBM design techniques and IBM marketing skills, and Computer Department deficiencies. He was waiting for his boss, GE Industrial Electronics Division vice president Harold Strickland, to order him to do so for cash-flow reasons, thus avoiding any suspicion that Barney had hung it on one of Jim LaPierre's bright boys.

I had brought all those great guys and gals from Evendale and Lynn, and had hired several dozen more, and uprooted them from mature communities. Now they were all out in the desert, light-years from computerdom. If GE shut us down, yes, almost everyone would get another position somewhere; a few would be transferred to Palo Alto, probably, and our two loveliest secretaries would have many offers - some, even, of jobs - in the Phoenix area. But I had promised something a lot better.

Toward the end of the Evendale operation we had been doing a rather sizable service business for other departments of GE, and (cautiously) for a few outsiders, mostly educational or governmental, and often gratis or at special rates. And for many years I had been aware of Comrie's London outfit, and of Bill Bell's Telecomputing shop in California. Based on that awareness I had proposed the Washington operation to Tom Junior and Red LaMotte. So... could I dig up enough service bureau business to support the troops and the 704?

I would get little encouragement from Oldfield, clearly, and nothing from any other section of the department, even Marketing and Accounting and Legal. On the other hand, Strickland would never let them actually turn away money! And the charter I had written for my outfit clearly envisaged service work, and for a fee - although I had expected it only as a filler while the design boys in Tempe and Palo Alto got up to speed.

I first looked around locally. Elizabeth and I, with support from the Gammages and the Haases, had moved quite a way into the social scene, and were doing for GE in that milieu what Barney Oldfield and his wife had to avoid. Barney was of course burrowing into the business power structure, the all-male, hondo-wearing fraternity: Ford dealers and other merchants, and real estate sachems. There was an upper crust to this structure, however, notably two or three bankers, Barry Goldwater and the mayor and the governor, and one or two old-settler families, and Grady was a much-liked but unconventional member (unlike the others, he was not a millionaire; had been too busy building up the college and interfacing with Frank Lloyd Wright and the few other winter intellectuals to make money). So I had an independent entree upstream of Oldfield. Cautious inquiries, though, soon made it clear there was little big-computer work to be had locally, or elsewhere in Arizona.

Motorola, which was in Phoenix because an early-hi-tech executive named Dan Noble liked it better than Chicago, was making simple solid-state devices. Goodyear and AiResearch had aerospace activities nearby, and Hughes was in Tucson. They all had small computers and needed little more. Fort Huachuca, from which I had extricated Fred Thompson And Co., was so remote in every sense from the MIT/Rand/Lockheed kind of excitement that [-223-] only the most persevering courtship was likely to produce contracts. Also the scale was wrong. We needed something massive.

General Electric itself was sort of out-of-bounds. I had left two strong shops behind in Ohio and Massachusetts, with the tacit understanding that the new outfit in Arizona would not compete, at least for eastern business. True, I was in another division now, but there were people like Gerry Neumann and Jim LaPierre high in GE whose opinion I much valued.

Aerospace was booming, as I well knew from Evendale experience. And Phoenix was close to the

California centers. Problem was, those production and development and research outfits were well-equipped already, and leaders in 704 and pre-SHARE circles. I and my people were as good as the best of them - but not outstandingly better. What I needed were potential clients who had giant growing pains, enough sophistication to recognize our expertise, but not so much as not to need it!

I had kept a few warm friendships from the early American Rocket Society days. I had started the first ARS professional journal, I had broken the deadlock between opposing industrial outfits, I had linked us more firmly to the Brits - and gotten friendly with Arthur Clarke and Val Cleaver in the process. There were a few tattered IOUs still extant. Figuratively speaking, I leafed through them.

Soon I found myself in Huntsville. Sputnik had not yet gone up. The American space program was all askew. Wernher von Braun and his Germans, aided by thousands of confused but enthusiastic Alabamans, mismanaged by the Army's Ballistic Missile Agency, and hemmed in by interservice rivalries, had designed and built, and to a degree tested, the big Jupiter missile (later to be called Redstone, for the Huntsville facility). With relatively inexpensive special stages, it could put a simple satellite in orbit. But the mission had been assigned instead to the Navy, which was fuddling with a much smaller rocket and, inevitably, a much smaller satellite. Without the V2/White Sands/ABMA infrastructure, and without von Braun's leadership and the talents of his team, the Navy was falling behind. (And that October [1957], the Russians would win).

Helmut Hoelzer, who ran the big ABMA computer shop - IBM 704s, with 709 horsepower on order - took me aside. "Herb," he said, "the boss and I have a problem with the Army and the Civil Service people. I have money to rent computers and pay operators and programmers, but they won't give us the civil service slots to hire any. And Dr. von Braun has this problem everywhere, not just with my place, so I can't beg slots from other laboratories or the test stands."

"General Electric" (I probably said "Generous Electric," although Oldfield was rapidly souring my enthusiasm), "is a very attractive employer. Suppose the Computer Department were to hire away most of your present computer people, professionals and keypunchers and janitors alike, and with them - and a few old hands from Phoenix - operate your laboratory as a contractor. We would give pay raises on merit, instead of by the calendar" (that was code for "we'd pay `em all more"), "and we have extremely good benefits for those who like such things, and a chance to be promoted elsewhere in the giant company for those who are more ambitious."

[-224-] "It would have to go out for bids," said Helmut somewhat doubtfully. "Think nothing of it, old friend," I said. "I write great proposals"! We talked it over with Wernher, who looked a little owlish - he had not survived Peenemunde and PAPERCLIP unscathed - but admitted it was worth trying. I took my tapemeasure out, so to speak, and with cautious help from Hoelzer made estimates of how many and how much.

"You mentioned needing 704 time while IBM ships you more stuff," I said. "Now, I have spare capacity on the Tempe machine, and pioneer experience at sending data by transceiver. If we make you an acceptable facility management offer, I'd want to sell you some 704 time at standard rates. Needn't be part of the operations contract - just a time-and-materials sort of deal - but I'd want Wernher to understand the arrangement."

That was code too: it said that I would bid carefully for the main contract, but wanted a short-term sweetener to dangle in front of my bosses. I assumed Hoelzer knew there were problems in Oldfield Country, or would soon find out.

The idea had real merit, entirely aside from my personal necessities. What von Braun could do was to take the slots freed by the new arrangement, fill some with new hires for, say, Oswald Lange's big analog and controls lab next door - I had my eye on that too - and use those slots with less specialized labels elsewhere. Both he and I wanted the number to be as large as possible, and I also was hoping to shift a

few bodies out of Phoenix if I could find any who preferred Alabama to Arizona.

It was not only a real solution to a foolish but pressing problem, but the upheavals that such an idea would normally produce were avoidable. Years later, when the horrid Computer Sciences Corporation wrested the contract away from GE, there were mass defections and huge losses of efficiency. But the Hoelzer/von Braun/Grosch plan intended only those who were happy with the switch, to shift to General Electric. Those who preferred Uncle Sam would keep on doing what they were doing, and their old friends at adjacent desks would just change hats.

Moreover, it was a very well run shop. I didn't have to send in a wrecking crew, or ingenious repairmen, or a great many new people. There would have been no reason at all for Wernher to play such a game, and spend a lot of extra money, if the Civil Service had had its head screwed on straight. While I was putting away my tapemeasure I was looking for potential GE managers among the Huntsvillers, and even that didn't look too difficult, in a successful operation. In disaster areas, as many latterday facilities management situations turned out to be, finding good supervisory people is tough. It would be quite possible at Huntsville.

I went back to Arizona and set to work. I had the jump on other potential bidders - and fairly, since I had been in at the conception. When the request came out, it did not even hint at the slot problem, and some of the less appreciated contenders never found out. IBM did, of course, and was in the long run the only other bidder that a substantial number of the better ABMA youngsters would have considered working for. The state universities knew, but were not attractive in that context. The aerospace companies already on the ground in Huntsville knew; the carpetbaggers flying in from L.A. did not.

[-225-] Wernher and Helmut ended up with thirteen bids, of which IBM was highest and not very explicit ("trust us!"), I was next high, and the others trailed off to obvious buy-ins and total misses.

My document said, tongue in cheek, that there was, ahem, just one hitch, "Because of the urgency of establishing the new operational method, General Electric would like permission to hire a number of civil service and other-contractor personnel while appropriate recruiting is under way." No limit on that number was specified, needless to say.

Just a few days before Sputnik went up, we were notified we had been chosen. By coincidence, Strickland had already called a divisional management meeting at Camelback Inn for the next weekend, and a very senior internal consultant, Dick Porter, who had succeeded me several terms later as Rocket Society president and who knew von Braun much better than I did, was to attend. He had managed the Bumper shots at White Sands, when his General Electric crew put upper stages on some reassembled V-2 rockets as the climax of Wernher's efforts out there. He was to comment, presumably unfavorably, on Huntsville and on my attempts to get in bed with the von Braun team.

This would have been undercut by my success in any event - counting quite a bit of 704 time I intended to sell to Hoelzer, the first year was scheduled at \$800,000 and looked very good to us impoverished Arizonans. But Porter came red hot from an International Geophysical Year meeting in Washington the night before [Friday 4 October], at which the Russian attendees announced the successful launching of Sputnik I. Fantastic!

Porter was devastated; he was deeply involved in the U.S. effort, and somewhat on the Navy side. I was enormously excited as a spacenic, as an old ARS president, and because it was clear that von Braun would have to ride to the rescue of the American space effort with his big Jupiters: Baron von Lochinvar, forsooth!

Phoenix was in an uproar next week, as were most cities with any kind of link to aerospace or advanced technology. My efforts to publicize the computer at Arizona State and, more broadly, the GE presence in Arizona put me high on the media shopping lists, and I gave half a dozen interviews, much to Elizabeth's

gratification and Barney Oldfield's disgust. I said the Computer Department expected to conclude a contract with ABMA, the people who were likely to launch the first U.S. satellite, and if so would be furnishing computing services and people to assist that effort. This was imbedded in interviews about satellite orbits, Russian science, rocketry - and education.

The major point I made was that we needed to greatly improve the quality of high school and even grade school teaching in the United States, and certainly in Phoenix: more math, more science, more English, and less baton-twirling and mental junk-food. It would never have made the papers or the interview programs without Sputnik; I had tried milder versions in describing the computer "revolution" and gotten nowhere. It was the first such call in Arizona, and was quickly taken up by a dozen voices in Phoenix, Tempe and Tucson.

One reason I had publicly described the Huntsville arrangement was that internal sabotage was a clear possibility. Oldfield had had the temerity to say [-226-] at the closing dinner of the divisional meeting on the Sunday that his department was not interested in facility management or in selling services. I had said afterwards to Strickland that if he wanted me to, I would transfer the incipient contract to one of the departments of the Military Electronics Division - and as expected, he had bristled at the very thought (and at losing all that fine money)! Still, there were a dozen ways Barney could trip me up. Community expectations were good insurance, and publicized enthusiasm on the part of the Valley Bank officers and Good Old Grady was useful. I sent clippings of their press interviews, and my own of course, off to Strickland and LaPierre back East, naturally marking Oldfield for copies.

My own troops were delighted, and to my surprise I had several good volunteers for a well-cushioned transfer to the Huntsville operation. I put Asmus and Benson on the nasty Phoenix/Memphis air trip to get things started (I seem to remember DC-4s), and went to work ardently on the contract itself. Fueled by Barney's announced distaste for the project, the sales and finance people kept scooting off in weird directions, but they were too hungry for the money to completely refuse help. Things moved ahead.

I had decided to offer the Huntsville Operation management to a bright young German named Helmuth Sassenfeld. He was not one of the Peenemunde tribe, and hence was not completely bound to Wernher's wheel, but he had been a Watson Lab fellow [!!] and was a valued member of the ABMA crew. He had a good doctorate, which along with the language made him stand high with von Braun And Co. Also he was married to a handsome Alabama blonde, who was producing offspring at a rate which would soon outstrip ABMA salaries! He was already providing useful intelligence.

One day he called me, from his home of course, and warned me that competitors, led by Computer Sciences people already working at Redstone, were going to try to take away "my" 704 time sales. They would underbid the rate, or point to existing data links back to California - we had to install one, of course, and the local phone company was lethargic. "But Helmuth," I said, "Dr. von Braun has understood from the beginning that we need that money to make the deal look good to the parent General Electric management." "Yes, I know," said Sassenfeld, "but these people have lines in to General Medaris, who doesn't think much of the GE thing anyhow, and likes to be spiteful to us [the Germans] on little things."

I called a chap names Rees, a senior PAPERCLIPper, who was Wernher's top administrator, and asked him to set up an appointment for me with General Medaris "to discuss the General Electric facility management contract," and told him to warn his boss privately that I was going to "make waves" - a new Americanism for him. I flew to Huntsville.

Medaris was not "the very model of a modern major general," but a real stinker. He had his big desk and throne-like chair set up on a dais, and there were no seats below. I put my hands conspicuously in my pockets and leaned into my act. "General, ABMA is going to have a problem. The civilian personnel at your computer installation are excited about getting out from under Civil Service restrictions on salary and expense accounts and such, and I have been encouraging them because it would have made the transition to the facility management milieu easier. I'm afraid that when word gets out that GE [-227-] isn't coming,

there will be mass defections. Most of the Germans will stay, of course, but the market for regular computer people is so good, especially in California aircraft and missile activities, that you will probably lose quite a few. In fact, I will alert my own personnel people in Phoenix, so that we can pick off some of the best ones ourselves as they go by."

Medaris reared up. "What do you mean, General Electric isn't coming? Of course you are coming! You have a contract..."

"General Medaris, we have not signed a contract. You can easily verify that my boss, the manager of the Phoenix department, does not want to do so. It is only my private assurances to him and to the division vice president about the promised arrangement to sell you surplus computer capacity while more ABMA machines are on order, that have kept the arrangement alive. Your financial people are double-crossing me. So I have stopped pushing, and the deal will die. No doubt other bidders like, ah, Computer Sciences will be glad to take over, although that will take a while. I'm sorry this came up just when your opportunity to launch Explorer with your Army missile is so attractive, but no doubt Dr. von Braun will overcome this new handicap."

Some fairly vigorous shouting ensued. Rees adopted a suitably lugubrious air and confirmed that the current load in Dr. Hoelzer's laboratory was very, very heavy. Dislocations would set back some of the satellite project calculations quite seriously. Medaris looked daggers at me - he had not risen to senior officership without learning to listen between the lines. He said I should put the contract matter on hold until he could discuss the time-and-materials buy with the procurement division. I said I would do so, but that even word of that hold was likely to cause problems, so fast action was indicated. More glares from the dais. I strutted out.

Wernher called me privately. "Rees said you grabbed him by the whiskers, Herb, instead of the other way around! I would like to have seen it." "Well," I said, "I hope I haven't kicked over the Explorer bucket. I want you to get upstairs; I want to be on the team. But I won't be shafted by the good general or by CSC." Not to worry, said the amused Maximum Leader.

The very next day a grumpy Alabaman called me at home after working hours and said that the requisition for 704 time had been signed, and that Dr. Hoelzer would begin drawing down on it immediately. He said nothing about the facility contract. Neither did I.

The rest of the Huntsville story is routine, except to note that the von Braun team did indeed launch Explorer the next January, considerably after Sputnik II and the dog "Laika", but six weeks ahead of the Navy's Vanguard. I saw it orbiting overhead from my marvelously dark cactus garden outside Scottsdale, and rejoiced.

The contract was renewed for several years, long into the NASA era. Before von Braun got very far into the Saturn program, however, General Electric moved the work to another department, and soon lost the job to Computer Sciences, which was still lurking in the bushes. It was one of my firsts, and a foundation stone under the GE Information Services operations which are all that remain today of the foredoomed General Electric effort.

As a coda, another story about Wernher. When I was well into my second IBM hitch, in the fall of 1958, I spent a good deal of time hanging around the [-228-] Military Products Division, later euphemized as Federal Systems. One day the general manager, Charlie Benton, who had heard my Huntsville stories ad nauseum, challenged me. He wanted von Braun to look at the superconductivity work going on in Benton's Kingston shops, and had found out that Glamorous Wernher was giving a popular lecture at the IBM Country Club in Poughkeepsie (for a fat fee, needless to say). "See if you can work on him to come over to Kingston, Grosch," he said.

I knew something about the corporate airplane (IBM then had only one, a Convair). I put a tentative hold

on it for the appropriate dates. Then I called Hoelzer. "Helmut, old buddy," I said, "I want to do you and Wernher a big favor. But I need something in return." And I described my plan.

"You should to talk to his aide," said Hoelzer. "He's just a kid, but you can be free with him, while the boss is a little hard to get to these days." I could imagine! So I called the aide and said, "I have picked up the word here at IBM Headquarters that my old friend Dr. von Braun is to speak to an audience in Poughkeepsie next month. Mr. Watson - who unfortunately as you know is going to be in Europe that week - and our other executives would like to be welcoming. How about having a family party, since the affair is not business anyhow? Wernher and the baroness, and you and your wife, and Helmut Hoelzer and Cristel, and maybe one or two other couples, can come up on the company plane, which is very comfortable. The autumn foliage will be at its peak here, and our Kenyon Estate guest house is much nicer than the local hotel. We'll organize something for the ladies; my wife wants to help."

"But lieutenant, my boss wants to show the good doctor some of our advanced research - some new stuff on superconductive computer memory that will be important for big space station computers ten or twenty years from now. While the ladies are touring West Point Saturday morning, or whatever, we'll take a limo over to the Kingston plant, see the demonstration, and return for lunch or to catch the plane back to Huntsville."

"I'll check with Dr. von Braun and get back to you, sir," the aide said. Soon he accepted for everybody, and I tied up the plane, notified the lectureship people, and set the well-greased IBM wheels in motion. Time passed, as it eventually does even in Poughkeepsie.

Just before the great day, the aide came on the phone. "Doctor, one of the von Braun children is running a temperature, so the baroness does not want to come up to New York. Dr. von Braun says that you should send the plane a little later, just for him, and plan to fly him back that night after the lecture."



"Young man," said I, "you tell Wernher for me: no visit to Kingston, no plane! He can fly commercial. The lecture people will meet him at LaGuardia, of course, and arrange to put him up at the local hotel." "Jesus - I can't say that to Dr. von Braun, sir!" "Start by saying that Dr. Grosch seemed, ah, a little upset. If that doesn't work, try mentioning General Medaris."

All the men came. The ladies, poor victims, got left in Alabama with the baroness. Wernher charmed everybody half silly - he was at the very peak of his physical attractiveness. The lecture was dull; no matter. The audience stood to applaud. We adjourned to the guest house.

"Herb, for God's sake get me a drink!" "Wernher, this is IBM. How about a malted milk??" Great scene! He settled for ginger ale.

He couldn't have been nicer. Kingston was a big success. The engineers and scientists got to touch their hero - and he really was, to many of them. Charlie Benton was happy. My wife Elizabeth was absolutely gaga. We put him and his troupe on the plane around three o'clock. I never saw him close up [-229-] again.

I think I understood him. He wanted to go to Mars. Not into orbit, not just to the Moon, not via robot vision. He, he himself, in an Arthur Clarke space suit - he wanted to go to Mars. I hope his ashes make it.

[-230-]

22 HERB, HAVE YOU CHANGED?

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Jack Ahlin *a sea of programmers and SOS [the SHARE Operating System]*

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[-231-] The von Braun venture didn't really improve things much for the Computer Department. It got my troops off the hook; no one had to be laid off, McCracken could finish his second book, Benson had real work flowing in from Huntsville to keep his 704 busy. But the central tasks of the new department were not affected. In Palo Alto, Bob Johnson still had to finalize the system design for the Bank of America, and the detailed design of the central computer. Joe Weizenbaum, who had clearly won the battle with my section to do the software for the machine (now christened ERMA), had to write and check out the key programs. My guys offered to help and were turned away. In fact, as I remember it, we were never able to

get an instruction set or timings, so Dan could not even offer free samples.

While Johnson was ferociously busy, the Official Engineers next door to me in the Arizona State building were trying to find something profitable to do. For a while there was talk at Oldfield's staff meetings of putting out a line of analog components, in competition with a tiny firm back East called Philbrick Associates. I kept reminding the uneasy group that Baker - and now Strickland - wanted us to put IBM out of business, not overwhelm a fifty-man shop nobody in the IBM universe had ever heard of. Lasher, reluctant to admit that the analog section of his secret study the year before had been beefed up to get Schenectady support for creating the new department, admitted the analog market was dwindling.

Then a strange portent appeared: National Cash Register. They knew more about us than most of the other established firms in the arena because they had turned down the bank contract, and had watched to see who got suckered into it.

To explain how they were involved I have to backspace a little. The group from Northrop who had faced down John McPherson and forced IBM to bring out the original CPC did not disband, or turn back to using the Model Is and [-232-] Model IIs as they became available. Instead they added new partisans and moved into computer design. Northrop had ample Korean War funds; for a year or two the little cabal stayed hidden among the computer users.

They came out with a curious machine called MADDIDA: Magnetic Drum Digital Differential Analyzer, as I remember; it was in a sense a digital simulation of an electronic differential analyzer like the ones the Phoenix General Electric engineers wanted to build. The group, now led by a chap named Floyd Steele, split off from Northrop and became CRC, Computer Research Corporation, with a small facility in Hawthorne, California.

They sold a fair number of machines, enough to keep afloat, but the great speeds of the 701s and 1103s confirmed what I had been saying in my speeches from 1949 on, and in my internal grumblings about the jet engine simulator GE was building for Wright Field: most analog applications were going to be digitized. The MADDIDA was a compromise; it was digital, and it appealed to many engineers. But it was not general purpose; you couldn't just switch programs and run payroll. It was really an unusual (and powerful) way to solve differential equations - and there were precious few of those in banks, or department stores.

While CRC was making and selling its original machine, therefore, a design team was laying out a general purpose small mainframe, a little smaller than the IBM 650. The prototype didn't work very well. The money was running out.

Back in the boondocks, sleepy National Cash was finally realizing it needed to sell computers, and as soon as possible to design and build them as well. The company was great at turning out brass cash registers, but the soaring years of Patterson, who had built the outfit and trained Watson Senior, were decades behind. NCR had slowly made the transition to electrical and even electronic operation, but was about where Remington Rand had been when Eckert and Mauchly clambered aboard. A somewhat similar way for NCR to take the giant leap was to acquire an advanced computer outfit; they bought CRC.

The Dayton electronics people tried to salvage the Hawthorne prototype, leaving Steele And Co. to do weirder and more wonderful things. I no longer remember the level of redesign, but certainly the specifications, which had been leaked to a few favorite customers, were not changed. They went to better components, redid the packaging for simpler maintenance - that sort of thing. The new prototype didn't work either.

First I heard of it was when Lasher and Oldfield asked me to pretty up the computer center for important visitors. There wasn't much else for them to show off; the Official Engineers had only desks and drawing boards, the administration was in rented space in a downtown TV station building, and Bob Johnson's shop was miles away and somewhat off limits (at Al Zipf's request). The visitors turned out to be the top

men at NCR, headed by a courtly gentleman named Allyn, who obviously didn't know a transistor from a toggle switch, but found my 704 most impressive. We were careful not to stress that it was an IBM machine.

There was a major meeting. I listened with my eyes rolling in my head, as I realized GE was offering to redesign the poor brute of a machine one more time, and manufacture it in fair quantities for National Cash to sell and service [-233-] (it was to be called the NCR 314). Our department was indeed planning a manufacturing facility north of Phoenix, and it would be making ERMA computers and testing them in complete banking systems in a year or two. So that part was possible, although it seemed to me Dayton could probably do it as well as we could, and would have much deeper support facilities. But who would do the redesign? And, my part of the discussion, who would do the systems programming? The NCR crew didn't seem to know what I meant, and I wasn't all that sure the Tempe boys did either.

Dan McCracken and I realized this was one project that would have to fly or flounder in Phoenix; Palo Alto was fully engaged. We literally begged for a chance to help, and I made sure that the NCR people heard me begging. Dan took the order code of the 314 home one long weekend and brought back a 704 simulation - one of the most remarkable feats of forced-draft programming I ever witnessed. We tried to add timings and input/output stuff as well; even today that is not easy, and this was 1957. And we hung around the edges of the circus, offering to carry water for the elephants and feed the tigers, even if we couldn't do our trapeze act. Not a chance!

Dan gave up. He was anxious to try the deeper management waters in GE. He took the Cordiner/Smiddy philosophy more seriously, and the Gerry Neumann counterexample less seriously, than I did. He wangled a staff job in operations research back at 570 Lexington, bade us a sad farewell, and decamped. Charlie Asmus and I felt just as badly about Oldfield and Strickland and the poor dumb department as Dan, but Chaz was pretty deeply committed to a General Electric career, and I was watching Elizabeth revel in the Phoenix climate and Phoenix society - and enjoying the non-GE part of it myself.

Elizabeth and Grace and Deo and I had first lived "in irrigation" on the north side of Phoenix, and I would drive across open desert in the morning with the top down on the 190SL, to the welcome air conditioning of the computer center in Tempe. We had installed an air conditioner in Elizabeth's Chevrolet, so she and her aunt and the poodle had gentler transport. We wanted a much more elegant house, and in the desert; we were being entertained a great deal, and looked forward to reciprocating.

We had been taken up swiftly by the local power structure. It was partly that Barney had family problems, and could not accept many of the social opportunities that came his way; he did the Downtown Luncheon Club thing nicely, but that was about it. Public image counted for a lot in Arizona, and I was an old hand at working the media, having four years of Cincinnati 701 and 704 publicity behind me, and the Rocket Society. And Grady and Kay Gammage genuinely liked us, and spread the story of our romantic courtship and marriage and honeymoon around town. Elizabeth was much taken with a smoky-eyed socialite named Kax Herberger, who promptly made her chairman of a Symphony Guild committee and inserted her into the afternoon-tea circuit.

Then there were our friends the Haases. Lew was into everything, as an early settler, the director of the Chamber of Commerce, and one of the Hondo-Wearing Boys who thought they ran that part of the state. Actually it was run by the Valley Bank, the power company, and two or three [-234-] very rich landowners (one of whom sold GE its factory site in Black Canyon), but they kept a loose rein. Elizabeth and I spent many happy hours at the Haas place I had so admired on my very first visit.

Elizabeth Haas told us it was more than they needed now that their children were gone. Would we be interested in buying it? We were delighted, and it was easy to deal with friends, without agents and lawyers and all that. They helped us with the loan: "New people like yourselves are always welcome here," said the banker, "especially friends of the Gammages and the Haases."

Well, the air conditioning didn't work in the pretty guest house, which was to be Aunt Grace's. And the main house was riddled with termites. And Lew did caveat emptor on us, and I found no lawyer in town would sue their old buddy. Scratch, oh, five thousand dollars - and one major and several minor friendships. We were both anxious to have the house, and it was just right for us. But Elizabeth had sold real estate back in Ohio, and I had watched my GE buddy pay twice for his swimming pool...

We had learned the hard way that newcomers to Arizona always got fleeced at least once. It was a major industry, second only (and related) to tourism. If you survived, you were then entitled to duck behind a saguaro and take the next greenhorn yourself. I imagine it is much the same today. You can be cute and talk about the pioneer spirit, or you can be grateful you're not an Indian.

I confined my raiding to the computer business, and was considerably more successful than in real estate. I had heard of a strange establishment down below Tucson, on the Mexican border. It had always been called Fort Huachuca, but now was touted as the Army's electronic proving ground. The idea was that you could cruise around in a tank or an armored carrier, perhaps with light aircraft or helicopters overhead, and play games with radio communications and small radars and whatever. Back at Aberdeen they might test a tank for its climbing ability, but there was no room for wide-ranging electronics - and a lot of interference, and taxpayers with tender televisions.

Not long after the story of the 704 began to hit the Arizona papers, I got a call from a Dr. Frederick B. Thompson in Tucson. He said he and a small group of technical people were working on a contract at Huachuca, and had been given space at the University in order to have access to a computer and libraries. Could he and his Number Two come up and see me?

This was at a time when I was very anxious to sell some 704 time. And besides, I was aware of the intense rivalry between Arizona State and the University; emissaries from the Tucson camp were of great interest. Well, it turned out Freddie and I had many mutual friends, mostly at Rand. He had been the central figure there in the Superstraw air warfare simulation, which had begun shortly after I left Forrester, and which had given Stan Rothman many of his ideas. It was a lively conversation.

Fred and his sidekick, Mike Seven, were employed by a consulting outfit in Los Angeles which had the contract with the Army. The work was going badly, and I quickly understood why. To write simulations, or software of any sort, you have to have a clear and stable statement of the problem. When my women in Evendale sat down with a familiar engineer (I use the term with [-235-] some trepidation), the big job was to extract that clear statement and keep it unchanged or under close control while the coding and debugging and running of the program took place. The Huachucans really didn't know what they wanted, and the Thompson team was reluctant to force a solution to an unwanted problem on them.

"Well," I said, "could we do better, or could you do better if you worked for GE?" "Not technically," said Mike, "but with a cushion of other work under us, we could afford to beat on them for answers. Right now, we're under the gun." Fred chimed in, "Don't think for a minute this particular model is the only task down there. If we had the freedom to look, we could turn up a dozen major computing and modelling jobs."

I wasn't sanguine. From the brief descriptions, I could guess that the other jobs would also suffer from inept customering. But the group - there were two juniors and a secretary in Tucson - looked great. I had left my best analysts back in Ohio, and the new ones Benson had recruited in Lynn and brought along were still untested. Parenthetically, the team of Charles and Harriet Meadow turned out wonderfully in the next year - but so did the Thompsonites.

I hired them. They had houses in Tucson, so for a start I left them there, thus establishing an outpost in U. of A. territory. This involved an opportunity to meet the president of the university, who attempted to pass me down to the head of their tiny computer operation. I wiggled out of that, and became friendly with the academic vice president. He and his wife had a lovely house north of Tucson - the desert was higher than around Phoenix - and I especially remember a terrific white male toy poodle named Florio, the first toy I

had ever really admired. Thompson was allowed to stay on, but there were tensions; the president had been partial to the Los Angeles firm, and regarded the beam I had inserted in that eye as at least a mote in his own. In the end I let Fred move to commercial space nearby.

All this was before the von Braun romance, and things got much worse in the department - and not just for my section - as time ground on. The Bank of America effort went fairly well, and the Tempe engineers got to work on the NCR 314, but there was no long range plan, and with the exception of Johnson and two or three others in Palo Alto, no obvious competence. Although GE had spent only a few million bucks so far, and that mostly on the MICR rights, the trifurcation of Doc Baker's old empire made the new divisional vice presidents anxious to show profits or at least cut losses.

Our guy Strickland had a harder row to hoe than his military counterpart, and knew nothing about computer technology, or even its impoverished history in Syracuse and Schenectady. My attempts to tell him how great Generous Electric was as a computer user were easily undercut by Oldfield, who claimed they were at best self-aggrandizing, and probably not even true. It never seemed to occur to Barney that making some of his people look good, made him look good - a lesson I had willingly learned from Maxwell and Curtis in the Thirties. And I was obviously contemptuous of the whole Arizona operation, although not outside the walls of the department.

One day when I was scouting in Huntsville, getting ready to make my proposal to Hoelzer and von Braun, I got an urgent call from my secretary.

[-236-] "There is a big division visit set for tomorrow in Oldfield's office," Jean said, "and I just got the word a few minutes ago; they say it was an oversight. Charlie is in New York, so I thought I should call you." She had Charlie's secretary working on the air reservations, and actually relayed them to me before she hung up. I reluctantly climbed on the nasty flight to Memphis, sat up three hours in the middle of the night waiting for the connection to Phoenix, and arrived green from airsickness (it had been very rough into Douglas) at about the time Strickland's meeting was to start.

Jean met me at the airport, having told Elizabeth she needed to brief me on developments, and drove me to department headquarters. Oldfield looked daggers at me as I staggered in, probably because he had hoped for my absence. Strickland was holding forth on the relative merits of binary and decimal representation, about which he knew rather less than Jean Miller. I mopped my brow and wished I had another barf bag.

Soon I recovered enough to start objecting. Strickland turned sharply on me and said, "Herb, you just got here." "Harold," I snarled, "you're the one who just got here. I've been here for twenty years." Ah me, how to win friends and influence vice presidents! He never forgave me.

There was a hiring freeze, but it was too late to catch the Applications Section; I was at full strength. And of course the freeze had to be set aside as soon as the Huntsville contract was firm. I was not popular at Barney's meetings.

When the Huntsville operation was solidly underway, with Sassenfeld aboard as a subsection manager and the transfers of Phoenix people to the new operation safely begun, I talked seriously to Elizabeth. She had been very supportive as I struggled with Barney and his henchmen, although she must have remembered all the great stories I had told her in Wauseon and New York about Wonderful GE. "I love the desert," she said, "and so does Grace and the little boy [Deo]. But you do what you have to do. I hate to see you knuckle under to those stupid people."

I went to New York and talked to Jim LaPierre, who was by this time executive vice president. He was as friendly as ever, but told me bluntly that his job for the next year or two was to settle the turmoil inside and outside GE caused by the prosecution and imprisonment [!] of a gaggle of high company officers who had been caught conspiring with their opposite numbers in other companies to fix prices and split up

lucrative contracts. It was a seven days wonder in the U.S. business community, and a severe strain on the professional-management philosophy of Cordiner And Co.

"It's up to the group executive and the division executive to direct the company's entry into computers, Herb. I'm sure they are doing their best." "Their best is nowhere near good enough, Jim - not with IBM snapping at their heels," I replied. "Even if they had a Neumann or a Parker, it would be tough; IBM is more dominant in its business than your old friend P&W. I hate to give up. The company has enormous resources. With the right leadership it could give IBM a good run. Gossip in the trade has it that Tom Watson [Junior] regards GE as a major threat, much more serious than Rem Rand."

"Could you do better than Oldfield?" he asked. "Anybody could do better than Barney," I said. "That technique of pitting his managers against one [-237-] another is a killer." "There was a lot of that in Syracuse, Herb." "But Harold wouldn't let me near the controls; he doesn't even encourage me to get more Huntsville-type contracts, Jim."

He couldn't have been nicer. But the potential damage to General Electric of the anti-trust schemozzle was literally in the hundreds of millions; it consumed him. In later years I was reminded again and again of the Norris Aphorism. GE had too many things on its plate: jet engines, and atomic power, and gigantic legal problems - not to mention the consumer businesses, and the industrial businesses, and the military and space businesses, and the financial and service businesses - to do justice to its puny little computer entry.

LaPierre sent me down to talk to Harold Smiddy, who was in many respects the most powerful of the General Electric staff officers - perhaps it is not too unkind to compare him to the chief party theoretician versus more ordinary Politburo types, in 1957 Moscow. He was brilliant; in his heyday perhaps the best known business philosopher in the country, excepting only Peter Drucker (whom he frequently employed). I had watched him in action on Association Island two years before, under the famous elm tree. It gives you a feel for the man to know what he said there: that if two or three of the hundred or so GE departments were not in trouble at any given time, company policy was too conservative.

That may well be the idea in the giant IBM of today, but it certainly was light years away from The Old Man's philosophy in the Forties and before: Not A Sparrow Falls, or in another context (viz. the prune episode), Win `Em All. You could be having trouble in the GE X-Ray Department and not hurt the Dishwasher Department at all; the Watsonian Empire was regarded as indivisible.

Smiddy knew me by reputation - had in fact toured the old 701 shop in Building 300. He was unimpressed with my story about Phoenix. "Too soon to tell anything," he pointed out. "You haven't even finished the first machine for the bank. And it often takes several managers to get a new show on the road; Oldfield may not be there forever. Do your job well and you may outlive him." "He will be replaced with someone chosen by Strickland," I said, "and Harold doesn't know beans about IBM or the computer business - not even as much as Doc Baker - and doesn't look to be learning very fast." Smiddy was clearly losing patience; he didn't often deal with lowly section managers, even notorious ones.

"I'd like to point you in another direction, Harold," I said. "In a few years everybody will see, as you have already seen, that information flows are what tie together a giant diversified company like GE. Separate departments and their primary functions are sort of linked by standard accounting practices even today, or you couldn't compare results or put out the annual report. Soon the various business and technical computers will talk to each other, and you can have what we call a real-time picture of the company's operations."

"I suggest you may want to start up a staff function on information processing - not just computers, but also the communications and other auxiliaries. Right now it would pay off in more sophisticated procurements, and by helping advanced departments like the AGT ones help [-238-] those just starting to use computers." Harold bristled visibly. "Grosch," he said, "I'm having enough trouble keeping the damned accountants from stitching the company back together again, without you pushing everybody's computers

into cooperating."

Well, there went the ball game. Twenty years later GE, now out in fashionable Connecticut rather than in that Lexington Avenue tower I had hoped to fill with computers and programmers, initiated exactly such a function. I had been a little previous - or maybe the company had to wait for Harold Smiddy and his philosophies to be forgotten.

I had had a great run. I was convinced that the company which had been so good to me would not succeed in the field I loved - even after the hitch in Phoenix I supposed I could switch back to AGT and work for Cochran again, or Gerry, but I didn't want to. It was time to go - and unlike McCracken, to go all the way - out of GE. I was sorry.

After the dedication of my building in Evendale, I had lost Liston Tatum. I forget now whether he left IBM then, or later; at least he had to leave Ohio. He had been just what I needed, and a friend besides - and the hero of The Oklahoma Land Rush.

IBM sent me a good replacement named Bob Maxwell, a little more of a salesman than Liston, but still a capable link back to the Poughkeepsie and Endicott shops, and to Applied Science. He came to me quietly when word first began to get around that I was going to throw in with the new GE computer initiative. "Herb," he said, "I have been asked to tell you that we would like to have you back in IBM. There are things going on that you would be delighted with, some of them things you helped start. You could give us all kinds of guidance, and we know a lot more about how to use your kind of skills than we did when you left." And he claimed IBM would have asked me before, except for reluctance "at every level" to steal me away from a customer.

I had been flattered. If what he said was literally true, it was a considerable compliment; someone had had to back 'way down on my unacceptability, or someone else had to have been mightily impressed with my Evendale accomplishments. On the other hand, if they were saying they wanted me not to go to Phoenix because I would be too formidable a worker in the new GE vineyard, that was also a compliment - of a dubious sort, but still a compliment.

"Would you pass the word back to 590, Bob," I said after a little thought, "that I'm flattered by the offer, and would take it in a minute except that I've gone too far with the big shots who are starting the new GE activity. I loved being in IBM, and I was still hanging on to the door frame in Washington with both hands while Cuthbert and his crew were shoving me out. I wanted to stay, and I'd like to get back. Maybe down the road it'll be possible."

After I got done with Smiddy I had gone back up to LaPierre's suite to say goodbye and thank you. I was startled to meet Lou Rader, who was general manager of another of Strickland's departments, and who was on the same rather sad mission. He could not stand Strickland, just as I could not stand Oldfield, and in spite of his higher rank and longer service than mine, had also decided to leave General Electric. After a little sparring we discovered each [-239-] other's secret, and commiserated with poor old GE for losing two such great guys. Some years later Lou became the top man in Univac, then went back to GE - I think to be in Virginia, which he loved dearly - and finally rejoined the professoriate, in Charlottesville.

I flew back to the desert and told Elizabeth I had no more hope. She calmed me down in her usual fashion, and after I recovered - the excitement had amplified her powers - I wrote out a little scenario and called Galactic Headquarters. I got Horace Post, who was still Tom Junior's private secretary, and told him I would like to see his boss. I rehearsed the scene with Bob Maxwell eighteen months before, suppressing my doubts about IBM's motives at the time. "Mr. Watson is out of town this week, Dr. Grosch," he said in his quiet way, "but he could see you next Tuesday afternoon." "I will be at the Gotham, Horace - and thank you."

A year or two later, when I was licking my wounds after being savaged by Vin Learson, I realized I had

made a mistake. I should have run down Bob Maxwell, or any one of a dozen good friends inside IBM, and found out how the 1957 Evendale invitation had originated. By going to Tom and recalling the earlier offer, I had laid an obligation on him: IBM had made some sort of commitment.

That wasn't at all what I had in mind. I thought of him as a friend who knew my history in the Watson Lab and Washington era, who had seen me under full sail in General Electric, and who because he was top dog in IBM would be best able to place me or turn me away. He was serious when I saw him, but asked me about my new marriage and about Phoenix. He seemed to have heard about the Huntsville operation, and was interested in my estimates of American space enterprises. The conversation lagged.

He looked me in the eye. "Herb, have you changed?" he said. "They tell me you could be very useful to the company, but I'm not sure you really will be happy with us."

"I'd like to come back to IBM if you still want me," I said. "I'd prefer to try something new - not to be too close to Applied Science or the Service Bureau people, where there were problems before. For instance, I have an unusual set of overseas contacts, and IBM is just beginning to look for technical sales in Europe. Perhaps I could be of use in Paris." One problem I had was that I knew Elizabeth would never, never, never live in Poughkeepsie or Endicott.

"We still prefer to use nationals in World Trade, Herb," he said. "And while a 709 is going into the Vendôme office next month, that will be under a young man named Maisonrouge, whom I think you know. When Horace told me what you wanted to talk about, I asked Charlie De Carlo where he thought you might fit while you got used to the company again, and he said he would like to have you as his executive assistant for a few months. He has the programming group, with many of the men and women you knew at the SSEC and the downstairs 701, and most of the university contacts that Dr. Hurd used to service. Go over and see him; he's at 425 Park. Then let me know what you think."

I was pleased and not pleased. I knew Charlie well, and could work easily with him. But I was obviously being slotted into place, not offered a choice of assignments. And down inside, where I hoped Tom Junior couldn't hear him, [-240-] a little green demon was whispering that Charlie was junior to Hurd, and Hurd was junior to me. Not in IBM, alas, but in the wide world outside, and especially among my 704 buddies.

De Carlo had come out of Pittsburg. He had a good doctorate in something like differential geometry - remember, that was years before computer science departments - and had come directly to work for Cuthbert in 1951, only two years after Applied Science had started. He was neither a narrow scientist like Eckert nor a Hundred Percent Club enthusiast; in fact, what he really should have been was an opera singer. Many years later, after our paths no longer crossed in Computerland, he escaped from IBM with Tom Watson's assistance, and became president of Sarah Lawrence. His wife Dorothy played good cello and didn't think much of the IBM constrictions; the college job was just exactly right for both of them, and I heard many times how popular they were, even in the difficult days of the early Seventies.

We had crossed blades many times. He was a loyal IBMer, but not painfully so. He was fun socially, and never developed the quick look over the shoulder that so many Headquarters executives displayed. He was as good a judge of wines as I, and had a considerable capacity for sake martinis. He liked my Maisonette Restaurant in Cincinnati. He was blond, medium height, a little heavy; three years younger than I. He came on to strangers half way between cordial and sharp.

There turned out to be two floors of IBM offices at 425 Park Avenue. Charlie himself was embedded in a sea of programmers, who were working under a chap I had never met, Jack Ahlin. They had troubles. His corner office was cluttered with their annotated printouts, but Charlie was relaxed. We got down to cases.

He knew I understood the 590 kind of operation. There were still no organization charts. Tom Watson called the shots for everybody, just as his father had - but it was understood that those days were coming to an end. Unlike GE, there were lots of special-assignment and assistant-to jobs in every cranny of every

building - and lots of buildings. I was to do what Charlie was too busy to do: make speeches, argue with customers (gently), soothe the programmers. "Executive assistant" meant I did it all in his name, not my own. Some of the tasks were risky. For instance, IBM had signed the famous consent decree the year before [1956] agreeing to sell machines as well as to rent them, and notably to refrain from scaring customers away from the competition's computers by early disclosure of IBM plans. Like the 701A dope The Band Of Brothers beat out of Learson/Hurd/Amdahl, hmmm? Somehow or other favored customers still got early word; if an IBMer was caught spreading it he was in deep trouble. I remember a mission from the British atomic energy authority...

I was really in no hurry. There were hundreds of places that I could have tried. But the lure of IBM was strong, and clearly I was not to be allowed to bargain, at least about a job. There was no problem about salary, and when I told Charlie I had an expensive and very special desert house to dispose of, he said I could be signed on in Phoenix and transferred "with full benefits." Not including the art movers, I laughed. We struck hands. I went back and told Horace. Years later it occurred to me the scenario was not too different from [-241-] the time when Tom gave me twenty four hours to decide whether to go down to Washington!

I had done my duty to the troops back at the ranch, but it was a wrench to leave them nevertheless. I would have given my right arm - well, a finger or two, anyhow - to have taken Charlie Asmus and Jean Miller with me; we were a great team. But Chaz wanted to stay in GE, and Jean wanted to stay in Arizona. I gave notice, having agreed to report to IBM January 1 [1958]. It would be understating it to say that Barney and his henchmen were delighted. You could hear them sharpening their knives. I had alerted Hoelzer and Sassenfeld in Huntsville, and Grady Gammage at Arizona State, to be ready to repel boarders, and to help my youngsters do the same. Asmus and I debated whether a recommendation from me would help or harm him; in the end I suggested him as my successor to Oldfield and Strickland "because of the crucial nature of the new operation in Huntsville, which Charlie helped set up." Barney chose Benson.



Elizabeth loved the idea of New York. We never even considered the suburbs. I found a good apartment in Sutton House, on the corner of 51st Street and First Avenue: two big bedrooms, the larger with its own bath - very important for our connubial exercises, which were still frequent and vigorous. Doormen around the clock, and a mail room (which came in handy years later when we moved overseas). Marion Kellogg, now well on her way to her GE vice presidency, lived around the corner. Greta Garbo and Mary Martin lived on our block, across from the famous River House. I rooted hard for Elizabeth to see Garbo, who was her dream actress; every time she did I got hours of dividends.

Déodat loved it too. He took to leash walking as if he had been raised in Manhattan. We identified neighbors by their dogs: Suzie's Papa (Suzie was a Skye), Mrs. Dackel (she walked a long-haired dachshund).

But before I start in on New York I must tell a nice little story about Arizona: nice, because it came out well. It epitomizes everything that was wrong, and a few of the things that were right, about that strange state.

From our first days in irrigation, we had used a good dry cleaner named Sam Blue. Elizabeth and Grace, used to small towns, soon became friendly with the young driver, who was a nephew of the owner. About the time we moved to our desert house the youngster quit delivering our stuff, but Elizabeth assumed it was because we were on a different route. She had wanted to hear whether his teenage wife indeed had produced twins, but the new driver was surly.

Six months later young Ronnie showed up again with our cleaning. The girls were astounded to find out he had been in the juzgado, and not just in the county one, but in the notorious Florence penitentiary. He didn't want to talk about it, but over a few visits they got the story. The amazing element for me was that he had been paroled, not because he was near the end of his sentence, and not particularly for good

behavior, and most certainly not because the twins had indeed arrived - but because the Pen was full, and they needed space for murderers and worse! Lesson One: Florence was a hellhole.

He had been involved with some tough friends, one of whom was the son of a rich underworld type in Phoenix. He and the rich kid were caught with a [-242-] fair amount of marijuana; the former got off with a warning, Ronnie got two years. Lesson Two: a rich father helps, especially if he is known upstairs.

Elizabeth and Grace were certain Ronnie was a Good Kid, especially after he brought his pretty wife and the twins over to see us one evening. One night not long after that visit, Elizabeth got a frantic call from Mr. Blue. Ronnie had been picked up that morning, and was already on his way back to Florence as a parole violator; the hearing had been in camera and Blue had not even known, let alone been able to get to a lawyer. We were the only ones of his fancier customers who cared about Ronnie and his little family. Could we help? We said we'd try. Lesson Three: don't count on due process around Phoenix.

His lawyer came to see Elizabeth the next afternoon. I was on my way to New York - actually, to sign up for the apartment and (miraculously) to finish selling my dear 190SL to the then occupants as a present for their son at the University of Utah in Salt Lake. She poured out the story over the phone: Ronnie had had a casual meeting with his former friend a week ago, and the day before the parole officer had snaffled him, said friend had been found out in the desert, well perforated. Lesson Four: be careful if you do any off-road driving in Arizona; there are corpses everywhere.

Fortunately Ronnie had an iron-clad alibi. He had been working his cleaning delivery route all day, and had tickets and customers to prove it; the execution had been bracketed quite narrowly. But the cops were angry; they thought they had a patsy, and could close the case - and the kid was getting away. So they had complained to the parole people, and Ronnie had been picked up and sent back to Florence for seeing the murderee the week before! Lesson Five: don't disappoint the cops by being innocent; they'll hate you for it.

The lawyer said, "There is nothing Mr. Blue can do. There is really no appeal procedure; the Parole Board owns the kid body and soul, and could have put him back for spitting on the sidewalk. The only thing I think can help is if you have some connections in the Capitol." "Herb will fix it," said my glamorous wife. Lesson Six: delivery boys should be nice to beautiful customers (it's easy).

I talked to Grady and Kay Gammage. They told me in deepest confidence that one of the key figures in the governor/assistant/parole and pardons secretary/director of parole board chain had had a similar minor arrest as a young man, and might be sympathetic. I talked to some reporters who had milked me profitably in the past, and found out how to approach said key figure. I talked about von Braun, and the American satellite everybody was watching. Soon I found myself in the governor's office, with an uncomfortable parole board chief across from me. We talked about how the new General Electric plant on Black Canyon Highway was progressing. I mentioned my young friend Ronnie and his nice little family. Three days later said young friend appeared on our doorstep with said family, and we took a picture. Lesson Seven: focus carefully at moments of high emotion, or your photo will not be sharp.

For the remaining weeks Elizabeth and I avoided lonely roads, and never ever stopped except in big gas stations and busy parking lots. The 190SL was [-243-] gone, but we assumed the gendarmes had "made" Elizabeth's car. We escaped to unruly New York with big sighs of relief. We had won, but guessed that there were many unexploded land mines on the battlefield. Lesson Eight: even paranoids may really have enemies.

For three years we got Christmas cards. The little family was still together.

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The Menace of Phoenix *I told IBMers to forget the GE entry*

Elizabeth 19 IBM relocation policies *the barracudas swam around our desert house*

Jack Ahlin [22](#)

John Backus, Harlan Herrick, Ruth Levy and Elaine Boehm *one extravert*

The SDC syndrome *"Hire me a hundred sharp programmers."*

Don Pendery *he had first-hand knowledge of what not to do*

Don Furth *the reddest hair and the most freckles in California*

SHARE *its 709 presumption left it open to IBM's suave take-over*

Bob Bemer *a major IBM force in the Pentagon COBOL committee*

Charlie Phillips *if Grace Hopper was the mother, he was the father*

Bill Heising *doing the only piece of software for STRETCH*

STRETCH [IBM 7030] *amazingly, 604-retuber Red Dunwell was in charge*

"Pallid Flats" *De Carlo and his whole crew were moving to White Plains*

The Library Anecdote *I saw how PC software would be sold in the Nineties*

IBM Williamsburg *organization charts finally arrived in Watson Country*

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A Cal Tech conference *first of its sort: not "can we?", but "should we?"*

Lee DuBridghe *he drew By Havens and Louis Ridenour, both ex-Radiation Lab*

The Swansong Story *the AP sent it to 150 papers on a quiet Saturday*

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A birthday present *Tom Junior buys me an antique duck decoy*

[-245-] There were changes in Incredible Business Machines. It was much larger. It was bursting with engineers and scientists. It was integrating its formerly rather remote World Trade operations with the domestic efforts - and in manufacturing and development, not just sales. Those of us near the hearthstone

of the company understood that professional consultants were in the woodwork, like the termites in my desert house (and like termites, they left little piles of debris in unexpected places).

One thing had not changed. There was a Watson on the throne, and all decisions came from the throne room. I had had the best of two worlds in Evendale; there was delegation of authority, and clearly defined responsibility - but also there was real leadership: LaPierre and Parker and Neumann. In Phoenix I had seen the failures of professional management without leadership. Galactic Headquarters and its outriggers showed how leadership without professional management operated. I much preferred it to Arizona, but Ohio was still better.

Watson Senior had built up his personal staff over many years, and the load had not increased any faster than that staff's capacity - or his own. Watson Junior had that huge load from the start. Yes, his father's staff was in place, and completely loyal to the new emperor. But the tasks kept building and building - probably even The Old Man would have begun to have trouble by, oh, 1955 or 1956. For one thing, there were the lawyers, swarming over the consent decree like smoke-maddened hornets.

Then there was competition. It amazed me to discover that everyone I met in or near 590 was deeply worried by the GE entry. I spent a large part of my time in the first months of 1958 telling everybody who would hold still to forget the Menace Of Phoenix. It was hard for IBMers accustomed to having every resource of their company at Watsonian disposition, to imagine a universe where far greater resources were so partitioned by decentralization, [-246-] and so abused by senior managers who had no feel for the product, that a fledgling effort could die in the nest.

I tried to play the Smiddy statistical view for them: that GE expected a considerable number of failures among a hundred and twenty profit centers; that the shareholders only cared about the bottom bottom line. The few who believed me went away to pray to Watson-Who-Art-In-Heaven that such horrors never shadow Tom Junior's empire.

The move to Manhattan had gone smoothly. Elizabeth and Aunt Grace and Déodat had driven east, stopping at favorite scenic spots in Utah and Colorado to store up memories; all three of them had loved the western landscape and the western scale and openness. Of the four of us, only Grace did not revel in New York, and she enjoyed it vicariously through Elizabeth's eyes. She was almost eighty, and to be uprooted twice in two years after many decades in a small Ohio town, and driven back and forth across the continent, had to be a little, um, startling.

The jokes about "I've Been Moved" went back before the war. It was deliberate Watson policy not to promote a man (or, after the Forties, a woman) to be in charge of people he had been working with. That meant most promotions, and all those outside major enclaves, involved relocation. The machinery was well-exercised.

In my case the principal problem was the desert house. The Phoenix barracudas circled the rather small IBM office, anticipating the feast. The offers reported were astoundingly low, and sparse; I had warned the IBM administrative man that if word got out that the company was guaranteeing my equity the real estate mob would eat him alive. After six months the final stage of IBM procedures took over; careful appraisals yielded a value for the property (which included four acres of land), and IBM offered to pay me that, and close out the relocation. They were then free to sell for whatever they chose; I would drop out of the picture.

I accepted with alacrity. They soon sold at a ridiculously low figure, presumably to a disguised barracuda; how the shoal decided which hungry fish was to have the meal remained a mystery. The company not only made the mortgage payments while all this was going on, but paid me interest on my equity for the time it had been tied up. I emphasize that this was standard practice for a senior employee, not something special for a Prodigal Son. They lost at least \$15,000.

There was also a generous allowance at move time for carpets and drapes and such. Elizabeth added a sizable chunk of my capital and upgraded our furniture, including slip covers (I had warned her about New York soot) and curtains and drapes. The carpet we bought from the nice Utah couple who had been in the apartment. The total effect was lovely. She had salvaged the crystal chandelier pieces from her Wauseon mansion (the sale price of which she carefully refrained from merging with my funds). One of my happier mathematical tasks was to work up an optimum arrangement of the six or eight kinds of prisms, to go over our dining room table.

While all these domestic maneuvers were going on, I was getting used to being De Carlo's alter ego. Wasn't hard; almost everything he did was something I already had done, or could do, or knew about. The only problem was [-247-] not to overlay his preferred responses with arrant Groschisms - in spite of my assurances to Tom Junior, I hadn't changed all that much, and my freedoms in Generous Electric had left me even more vigorous than when IBM had extruded me six years before.

That vigor was partly absorbed by the necessities of finding out what had been going on inside IBM while I had been away - a great deal, needless to say! The seething mass of programmers in 425 was soon a concern; although it was only one of five or six areas that Charlie managed, it was consuming much of his attention, and he welcomed my intervention. Jack Ahlin did not.

The Band Of Brothers had been transformed into a formal structure called SHARE - the oldest and most famous of the computer user organizations worldwide. I had been one of the dozen or so founders, of course, and the installation symbol GE in the original 1956 list of members stood for Evendale. As it evolved away from a beat-on-IBM cabal toward a technical-exchange group (an evolution very warmly encouraged by Cuthbert Hurd, and now by my new boss De Carlo), I had put Don Shell in as the key General Electric man. He backed away from officership as the organization grew, but offered his exceedingly effective 701 interpreters and 704 compilers to be SHAREd. The 704 utilities were working several months before either those at IBM or at the other early 704 installations; this was primarily because Don and his sidekicks Jim Porter and Dorothea Clarke were so good, but also because I had protected them against the slings and arrows of daily 701 service operations.

During the time I had been in Arizona, IBM had solicited inputs from all SHARE members concerning the next big scientific machine and its system programs. For instance, John Lowe of Douglas, still a dominant figure in the Los Angeles area, had actually passed up the 704s, settling for core memory on his 701 or 701s (remember how underpriced the 701 had been?). He had definite ideas about what it would take to get him - and because of his position, most of the other Douglas installations - to order what was to be called the 709. And everybody, including Shell in Evendale and my crew in Tempe, had ideas about programming tools to accompany the machine.

Today we would use the catchword "environment"; in 1957 the computer tribe had only just invented the term "operating system". The SHARE officers got the members together and produced tentative specs for hardware and for the system software. IBM did not pay too much attention to the former; there were very tough guys like Jerry Haddad in the development groups, masked by the benign smiles of Applied Science. But it took the software specs seriously - too seriously.

Ahlin, who I vaguely remember had come to IBM with a petroleum background, was told to build up a group to write SOS, the SHARE Operating System, and have it ready to test on the 709 prototype before announcement. He had started with a half dozen of the best: experienced programmers from the old SSEC and 701

groups. I think John Backus was still in the gang, although he must have already had his dreams about FORTRAN by then. There was Harlan Herrick and Ruth Levy and Elaine Boehm, and two or three others.

Jack made a terrible mistake. It had already been made out in the world, [-248-] notably at SDC, the Systems Development Corporation, when that was spun off from RAND. But it was new among IBM programming projects. He sent word over to 590: "Hire me a hundred sharp programmers." How familiar

it sounds today; dumb outfits like Citicorp and Travellers have made the tactic common, and have even added a zero to Ahlin's 100!

IBM was a great draw, even at a time when programmers were as scarce as hen's teeth. The raw recruits began arriving; the trickle became a stream; 425 bulged with new bods. The original experts, who could otherwise have been writing SOS, turned to organizing and tutoring the newcomers - and, being mostly introverts (Elaine was a popular exception), did a rather poor job. The 709 was announced, without software. SHARE came hammering on the door. Lowe And Co. were unhappy with the machine specifications. And everybody was worried about SOS.

By the time I hired in, the crisis was in full bloom. Charlie had begun to realize that more was not better: that the original small group and a few assistants (chosen by them, as Shell had chosen Porter and Clarke) would have finished the job by now. But it was too late. The task had been organized to death, split up into fifty chunks and a thousand interfaces; there were supervisors, of course, and they were competing vigorously - not least because Ahlin's slot was clearly going to be open very shortly. It was a horrid, horrid mess.

I was just too late to help with the key decision, which was made by De Carlo with advice from Don Pendery on the West Coast. Ahlin was replaced by Don Furth, known throughout the Hurd family as having the reddest hair and the most freckles in California. Don "repaired" the damage (actually, he just about started the whole business over - as proven by the fact that he cut down the SOS objectives along with the surplus coders). I tried to be useful, but there wasn't much I could do except pat Furth on the back, and of course tell Charlie how right he had been. SOS came out late, and a pale ghost of the original robust specification, but it came out.

A probably unintended consequence of the fiasco, and of a certain amount of unhappiness with the new hardware, was the considerable diminution of SHARE aggressiveness. The Band Of Brothers (and Dottie Blum) had clearly known more about big computers and engineering utilization, collectively at least, than IBM itself. So SHARE insisted on telling the company what to build and how to program - and the result was a bust. There was a current of "Let's Be Good" in SHARE already, supported by peaceful intellectuals like Shell, and a fair number of sycophants who hoped to work for Cuthbert some day. It turned into a tide, and washed over the Lowes and the Strongs and the Armers. The battle never rejoined; IBM support for SHARE (printing and distribution, and early information, and even - shhh! - a cocktail party or two at the semiannual bashes) grew and grew. The world's first user group had been captured.

There were two other major software operations in 425, and they were very different from painful SOS. One was an almost solo effort by Bob Bemer, whom I knew quite well from his Lockheed adventure. He had joined IBM a short time before I came, and was designing a commercial language which he fondly hoped would rival FORTRAN. The papers I have are labeled [-249-] X-TRAN, but there were lots of possible names under consideration. Bob was the logical choice to pit against Grace Hopper and Howard Bromberg and Joe Wegstein in the Pentagon-sponsored committee which was trying, shades of ADA, to develop an agreed standard commercial language. The diplomatic father of this attempt was one Charlie Phillips of the Controller's Office, and what came out in the end was COBOL, the Common Business-Oriented Language which is the major compiled mainframe language over the whole world today.

It was one of the few successful committee projects in the long history of the programming business, and one of the few usable "standards". Many of the pieces were due to Bemer, and many others to Everybody's Favorite Computer Person, Grace Hopper.

An even more fascinating project was near Bemer's cubicle. It was the first piece of software for STRETCH, three years later to be called the 7030. The lead programmer, too engrossed in what he was doing to be a manager, was a Bill Heising. I hardly knew him, but soon discovered that he was the older brother of the Heising that had been working on the jet engine simulator in Evendale's Building 300 when I descended from on high in a cloud of concrete dust - not optimum introductions to either the younger or the older

brother.

He and two or three associates were doing an assembly language for the hush-hush machine, and so far in advance of construction that the order code could still be altered as their adventure indicated improvements. This was how the Kenyon Estate team had operated when the Defense Calculator was in gestation, and I strongly approved. Bill did not want me to know much about his work, and indeed it was one of the top engineering secrets in IBM, made more sensitive by the consent agreement not to flaunt paper machines. I was totally amazed to discover that the man building the machine was Red Dunwell, who had reluctantly re-tubed the first 604 at Oak Ridge in 1949. He had grown great in nine years!

Three years later, when the final performances and prices of the STRETCH components were made public, I had a crucial involvement with the system. But in early 1958, I had only an overview. As a result of my first briefings, I wrote De Carlo and Dunwell urging that a great deal more software be written, starting right now; that Bill Heising's assembler needed to be imbedded in an operating system - albeit a simpler one than SOS - and that FORTRAN or better would be needed even for the prototype. "The machine design is so different, and so much more powerful, than the 701/704/709 architecture [I probably still said 'structure'] that almost nothing can be transferred". Deep silence. I sent a copy to McPherson, who had not seemed particularly elated at my reappearance, even without the box of prunes. More silence.

I decided this was a good time to try out De Carlo. "Trouble with STRETCH, Charlie, is that while it's the focus of design effort and technical excitement in the company, the projected sales are microscopic. You'll remember it was like that when the 701 was on the drawing board - 300,000 points for the whole run; less than a month's sorter production. Yet it revolutionized the company".

"STRETCH can't do that, Herb", he replied. "we're doing it to help a few special customers like Los Alamos, and to counter the publicity about LARC [-250-] [the first Rem Rand supercomputer]".

"Just like 1950, Charlie", I said, "same special customers, and LARC instead of UNIVAC I.

"It's our first shot with fast transistors", I went on, "and the first Freon-cooled scratchpad memory. This look-ahead thing is bound to catch on, even if Dunwell and his boys don't have any statistics to back up the idea. But gee! none of it will startle anybody if we can't run impressive demonstrations, and you can't have demos without software".

"Herb, I've got a hundred men and women eating their heads off out there. What do you want me to do? Reassign them? Bill doesn't want `em". "Neither would I, Charlie", I said, laughing. "But I can get you four or five more Heisings if you want, and if you lock Backus and Greenstadt up in a quiet room somewhere they could grind you out a better FORTRAN in a year". "John would quit first", said De Carlo. "Depends where you put the room, Boss", I said. Didn't work.

About this time I had disturbing news for Elizabeth. The whole De Carlo shebang was to be moved to larger quarters in White Plains (I made myself unpopular with those in favor of the move by re-christening it Pallid Flats). Even with IBM's easy policy about relocation, it was extremely unlikely she and I would get much financial support for a move. Most of the senior people affected already lived in Westchester; Charlie and Dorothy De Carlo lived in Bronxville, and were delighted. Those few who lived in Jersey would probably ask for re-assignment, but that was ruled out in my case by my coming in through Tom Junior. Besides, we liked not-at-all-pallid Manhattan.

The solution was obvious: reverse commute. Even in those days the stream of commuter automobiles into Manhattan every morning was horrendous, and most commuters came by train or bus. But the counter-flow was light. Elizabeth's blue Chevvie was in the Sutton House garage, relatively unscarred by its first springtime excursions. I would drive out to Pallid Flats each morning, park in assigned space in the IBM garage, and reverse in the evening, free of train schedules and such. And we could still walk to the theater.

Three stories about those days - two cute, one grim. Charlie had been invited to be on a program at USC in

Los Angeles, and couldn't fit it in. He sent me. No problem: if someone would tell me what to talk about as I got up, and for how long, I could do several speeches a day. Well, it turned out this one was at a conference sponsored by the School of Library Science (Charlie would be chagrined to know the inviting dean was indeed very inviting). I gave the audience a mixture of Pete Luhn, small computers, and the Imperial Watsons. There was considerable applause.

When we broke up two older librarian-type ladies claimed me. "Doctor, we understand you have a lot to do with IBM support of special projects. We have been working on one for our library, with help from the downtown IBM manager - he has loaned us a keypunch and a sorter, and lets us come in at night and use a tabulator. But he is getting impatient, so we thought perhaps you could help us". "Yes, my boss Dr. De Carlo does indeed monitor some of the things we are doing with universities. But we normally support only projects that are so unusual that normal funding is not yet available, or projects that may turn into future business after a first demonstration".

[-251-] "Yes, your manager explained that. We are putting together a punched card catalog of the books in the Los Angeles Children's Library, and expect copies to be in great demand if we can finish it". "Ladies, I can understand putting the LC or the British Museum books on cards, but why in the world would other librarians want your children's thing", I said, puzzled. "You don't understand the economics of a popular library, Doctor. It costs so much more to access and catalog a cheap book than to buy it in the first place that children's libraries all over the country will order copies of our catalog and buy the books to match".

Mamma mia!! The secret of cheap, effective single-application (or personal) computing, spread out before me in 1958! I saw the point instantly, and have told the story a hundred times to illustrate it. Get a computer program that does about what you want, and modify your requirements to fit the program!

The second story is a somber one, illustrating once more that there was a dark side to the imperial splendors of IBM. The top managers of the domestic company were called together in Williamsburg, Virginia, and the long-awaited reorganization was announced by Tom and the heads of the new outfits. The details don't matter any more; IBM now reorganizes every few years, and that first effort, trumpeted to the rest of the company in a thick special issue of BUSINESS MACHINES, is only of interest to historians. It was notable because the organization chart, with all its surround of formal management, had finally come to T.J.'s empire. Life was made easier for newcomers, although not every power source was unveiled. I looked in vain for George Richter, presumably still The Gray Eminence of factory production. I also noted that, unlike inside General Electric, there was no explicit invitation to communicate other than over the direct channels of authority; you always had done it in the old IBM, but at considerable personal risk.

Everybody in White Plains except a small contingent of secretaries, left behind to answer the phones, gathered in a local theater (IBM was too new in the town to yet have its own auditorium). Tom Junior sent a message; he was running parallel meetings in Manhattan. Ours was chaired by Maclean Smith, who was locked in battle with Vin Learson for the Number Two spot in the company - the new charts were being scanned carefully to see how that battle was going.

Mac described the Williamsburg sessions and gave a short summary of how the decisions had been arrived at (no mention of the consultants). He then gave a short overview of the results, concentrating on the parts of the new divisions which had been or would be in White Plains. He announced, to audible gasps from the audience, that the monolithic marketing structure so familiar to everybody would be split three ways. And he called on the man who had been in charge of the huge outfit, the Praetorian Guard of the Watson Empire, to give the details.

Remember the third requirement for lifelong IBM job security? Well, here it was in its cruelest form. Poor Bob, who had just lost the richest principality in the realm, had to introduce the three men who would succeed him, describe his own new assignment (it wasn't Anchorage, but it wasn't anything very great either), and thank IBM and Tom and Mac for the wonderful opportunity!

[-252-] Doesn't sound all that beastly in cold print, and after four decades. But it turned me inside out at the time. There were damp eyes in the audience, and not only among the secretaries; Bob was popular. Yes, he kissed the hand - but it hurt to watch.

There is an enormous enthusiasm today for what has been re-christened "expert systems". I agree; wonderful stuff! But the idea is not new: to imbed the knowledge, the know-how, the practices of a valuable individual or team in a computer program. The famous Los Alamos nuclear codes, dating back to CPC days and updated and expanded a dozen times into the Cray generations, contained the expertise of top physicists and bomb designers. Every chess-playing program, whether in software or hardwired, embodies the chess tactics and strategies of its master. And while I had an office in Pallid Flats I watched perhaps the earliest attempt to intentionally model a single human being.

I've referred a dozen times to George Richter. He was hidden away from the customers, in the very heart of IBM. He was a little guy, one of the original employees that Watson Senior had gathered in the Twenties. He had gobs of IBM stock which, split again and again and again, made him a millionaire several times over. There was at that time no formal retirement age in the company, but George was certainly in his sixties. He was balding, gray, but still vigorous - back in my previous incarnation I had called him "the only man in IBM authorized to use the name of a customer and 'son of a bitch' in the same sentence".

In some arcane fashion he allocated, and in earlier times had in fact controlled, factory production. He reacted to calls and notes from T.J. himself, of course, and from the most senior and powerful sales executives: Red LaMotte, for example. He was at the precise and hottest focus of ultimate deliveries; to cement a sale or salvage a disaster he could reach into Endicott or Poughkeepsie assembly lines and test areas and produce six keypunches, or a 407 tabulator, or two 709 tape drives - and move everything else around so as to conceal or minimize the damage.

By sheer coincidence he had the office next to mine in White Plains, although he didn't work for De Carlo (in fact, it's hard to imagine whom he did work for). He had printouts of factory schedules stacked neatly on his desk, but no other visible apparatus; I don't even remember a secretary. He did the intricate permutations and rearrangements in his head, apparently. I never knew for sure, but I doubt if he issued written orders; he would call a department manager at one of the factories, and that manager did the paperwork.

Those of us in the know all wondered what would happen when George took his bundles of IBM stock and left for Florida. We couldn't imagine how he could get through even the first day without a factory to turn upside down. And we couldn't imagine how IBM would operate without him. He and I were quite in tune - two cynics. His office was plastered with Hundred Percent Club awards memorializing his exceptional performance in 19xx, when factory deliveries came within 0.6 percent of quota. We laughed heartily about it; he set the blasted quotas, he said, and revised `em every day!

One day an innocent young Ph.D. psychologist named Ivan Rezuca [-253-] appeared on the scene. He had been charged with modeling The Gray Eminence, so that when George finally left for sunnier climes a computer program could take over. Really! In 1958!

George was surprisingly gentle with him; only ripped him up and down a few times a week. And he was genuinely cooperative; didn't try to conceal how he operated, or mislead the youngster. But it was hopeless. George really didn't know how he did what he did (they had warned Ivan about that in advance), and I strongly suspect his procedures changed from day to day, and by no means smoothly. He was still at work when I was ejected a few months later. Maybe they attached his head to a science fiction life support system, and it is running the company right this minute from a heavily guarded room in Armonk?

The handsome apartment on 51st Street was being readied for an elaborate Christmas. Elizabeth bought a gorgeous tree (we were shocked at the price, compared to Arizona), and I put up a mobile made of extra

ornaments. Elizabeth bought Grace a lavish mink stole to match her blue-gray hair, and I bought Elizabeth a thousand dollar bill - the only one either of us had ever seen. I got dozens of presents, notably a wonderful dog-walking coat that I still used in 1991. It was the most sumptuous Christmas any of us, including Deo, had ever had. New York is at its very best in the holiday season; I knew it from previous years, and Elizabeth and Grace concurred.

All four of us had participated in the von Braun visit to Poughkeepsie a month or two earlier. Grace and Deodat had enjoyed West Point, and Elizabeth had enjoyed Wernher. I was in very good odor with Charlie Benton, the head of Military Products. It was time for me to get myself a line job again; De Carlo had capitalized on the 7090 excitement and moved up, leaving me to his successor, whom I did not like. For the machine buffs, I should tell about that 7090.

There were many of my old Defense Calculator friends working for Red Dunwell on STRETCH, along with some strong newcomers, notably Fred Brooks. For instance, Werner Buchholz and Mort Astrahan were deeply into the systems design, which Fred dominated. They knew, as Frank Hamilton told me after the SSEC success, that real prestige in IBM came from fathering a production machine. An SSEC, a NORC, Pete Luhn's chemical-structure sorter, counted for less than a chain printer, and much less than a 650. They cast about.

Soon there began to be meetings about BABY STRETCH. It was to be a new-architecture machine to succeed the 709 as the principal scientific mainframe. Charlie sent me to the sessions as his representative, just as he had previously sent me to the new IBM Research reviews. I was negative, partly because all the valuable 704/709 software would have to be done over, mostly because it seemed to my amateur eye that the plan retained all the clumsy parts of the huge parent machine - the lengthy order code, for instance - and dropped the powerful stuff like look-ahead.

One Sunday evening I got a call from Poughkeepsie; one of the bright young guys on the outskirts of De Carlo's operation had had a weekend brainstorm. Charlie and Dorothy were out, and he had to unload on somebody or burst. His name, by the way, was Graham Something - either [-254-] Jones or Smith. Another Graham, either Smith or Jones, worked at about the same level in UNIVAC, and I can never remember which was which. Anyhow, Our Graham had come up with the idea of mapping the exact 709 structure onto high speed STRETCH transistors, retaining most of the peripheral equipment unaltered. I was the second person in the world - no, the third; he was married - to hear of the 7090.

Both Charlie and I were instant converts. He took the idea upstairs Monday morning, and it spread like wildfire. In a week it had killed BABY STRETCH; my old and new friends never really forgave me. In a month the circuits were in test. In six months, the first production machine was shipped. It was a fantasy come to life. What happened to Our Graham? I never knew.

I talked to Benton about starting a software group for him. One of his largest product lines made the SAGE computers, which he built in Kingston for the Air Force and the Lincoln Labs of MIT. There was supposed to be a SAGE II in the works, and I pointed out that the Systems Development shop in Santa Monica would get another contract to do training and programming - a contract that IBM could probably have if it geared up to bid (hundreds and hundreds of programmers). I emphasized that, as in my great shops in Evendale and Tempe, such a group would have to be at the same level as engineering. The head of Benton's engineering, who planned to take over from McPherson some day, thought that a very poor idea. Strike One!

Benton borrowed my services from De Carlo's successor and sent me out to survey SDC and IBM software capabilities in the air defense area. I reported back that the only large bunch of programmers I had ever seen conspicuously worse than SDC was their IBM Kingston counterpart. The message was not well received. Strike Two!

I went over to talk to the executive newly placed in charge of the Service Bureau Corporation, suggesting

that a cooperation between his crowd and Benton's SAGE II hardware people would solve the organizational problem. I promptly got a venomous memo from Vin Learson, to whom the SBC chief and Charlie Benton both reported, telling me to keep my @#\$\$%^& fingers out of his businesses. Strike Three!

Benton had not forgotten my link to Huntsville, however. NASA was being formed in Washington, to pull together the fragmented but popular U.S. space program. He had a marketing manager, a weak sister, under whom were program managers for the Army, Navy, and Air Force - not at all weak sisters! Probably because he remembered how I had easily beat out his people for my Huntsville contract, Charlie offered me the program managership for NASA and other space activities.

I would probably need to move to Washington, he said, but first we should see where the power center for NASA developed. "Charlie, I have to tell you I'd quit before I'd move to Huntsville", I warned him. "Not likely", he said, "West Coast, perhaps - or if it gets spread around fast enough, maybe you will want to stay right here". I agreed.

There was an early IBM contribution to the national space effort in Washington, on Pennsylvania Avenue. The company had put in a 709 and a team of ex-Watson-Lab types (with advice from Wally Eckert), and was doing [-255-] trajectory and orbit calculations on a mostly-gratis basis. Twenty people or so, including Bruce Oldfield, who had been Number Two on the Inyokern 701, and who had joined IBM to get the Washington job. I was sure Bruce would not resent working for me. Benton gave me that.

Then there were small teams of sales engineers who were chasing specific contracts, offering hardware capabilities at the IBM plants in Kingston and Owego. And there were two or three men in Owego, who furnished dope to the sales types. They came to me also. No problem; in fact Bob Ellsworth, the top sales engineer, and I liked each other immediately.

There was to be a major press release. I remember a fairly long discussion with some PR types - yes, they had a few hiding in the bushes at Galactic Headquarters, just as there had been secret beancounters back in 1947. The question was whether to point to my Huntsville exploit, and mention GE (but not the Computer Department, we agreed), or just to focus on the NASA Center [new name] and my Rocket Society presidency. I suggested that the announcement be separate from the re-naming and re-dedication of the 709 shop: "Hit `em twice, a month apart", I said.

I asked about a raise. "You've only been back a year, Grosch", said Benton. "They snatched De Carlo away before he could reward my sterling qualities, Charlie", I smiled. He grudgingly upped me to \$25,000; I was aware that Gus, my direct boss, had been a star commercial salesman and therefore must be getting three times as much - maybe even more than Benton. Most of the Military Products salesmen were on salary, not commission. Also I could smell a lot of politics in the wind. I shrugged it off, and took Elizabeth out to celebrate.

Spring was in the air, and crocuses and conferences were blooming. Benton had received an invitation for IBM to participate in a big meeting in Pasadena, before my appointment. He had passed up an opportunity to have someone give a paper - I would have been delighted, of course - but now named me the official IBM representative. The delegation included Wallace Eckert and By Havens, and a couple of Owego types who did not work for me.

The conference was novel: "The Realities Of Space Exploration". It was to be at Cal Tech, sponsored by the Institute itself, and with Lee DuBridge presiding in person. He was in the middle of his term as president [1959], a job he left a decade later to be Eisenhower's science advisor; he was the former head of the wartime Radiation Lab at MIT - that accounted for By Havens, of course; he was on the RAND board; he was writing a book about the space effort. He had called the conference to discuss for the first time what advantages and disadvantages there were for American industry, for American and world science, and for humanity as a whole, out beyond the atmosphere.

It was a beautiful late Spring day, almost free of smog. I saw many old friends, and not just from Rocket Society and Columbia days. There was a fair contingent from Huntsville, but not von Braun. The recently confirmed administrator of brand-new NASA, Keith Glennan, was the center of a group of eager marketing types. Harold Urey, the Nobelist, and several other generalists of the same level, were conspicuous. I said a brief hello to Louis Ridenour, who had just left the chairmanship of International Telemeter (plug-compatible core memories, with Paramount Pictures funding) to become head of a new Lockheed Electronics Corporation. Louis had been a [-256-] leader at the Radiation Labs, and like Havens was really there at the call of DuBridge; he had edited the enormous postwar set of Rad Lab publications, and had gone on to be Dean of the Graduate School at Urbana before he started Telemeter.

We had all gotten together socially Thursday night, and the meeting was scheduled for the following day only. All papers were invited, and the morning session went smoothly. Lunch was catered, and pleasant; I wanted to sit with Eckert, but he was involved with his old friend Urey.

The last paper of the day was the one by Ridenour, and it was much more raucous than the earlier ones. To my mild surprise, he criticized the whole idea of space exploration, even unmanned ventures, on the grounds that we had enormous problems here on Earth that could better occupy our technology. I certainly agreed with his thesis, but was startled to hear it from a vice president of Lockheed; moreover, I hadn't remembered Louis as being very socially conscious. For my part, I had spoken at the Rome IAF meeting in 1956, before Sputnik, as being very much in favor of unmanned, computer-controlled scientific space experiments: "We only make [them] more difficult if we insist on taking human bodies along", I had said.

The audience was restive. I got the floor and said, "Dr. Ridenour, we badly need to extend the reach of science out beyond the atmosphere. I agree that we must not divert too many resources away from human problems, but to cancel what we are planning would be the swan song of a dying culture". Urey sprang to his feet and made some fairly impassioned remarks about human creativity, noting that the tomb of Tamerlane (which he had just visited) was a monument also to that creativity. I wasn't certain which side he was on - if indeed there were sides. There certainly were cross-currents!

I got up again and said, "Harold, creativity is all very well, but when that tomb of yours can be destroyed by missiles, as Williams of RAND said the other day, 'in a thousand breaths', we have to direct that creativity rather carefully". There was a series of such remarks, all vigorous. Ridenour did not respond. DuBridge said these were exactly the sort of ideas that he had hoped the meeting would generate; he thanked us for coming, and we broke up.

I flew back on the Red-Eye, which was still a Super-Connie; the 707 jets had just been introduced, but first class with pull-out leg support, and a nine-hour flight, made for much better snoozing. I got to the apartment early enough to walk Deo.

I had expected a quiet Saturday. Early in the afternoon I got a call from Bob Truax, a Navy captain who had also been a president of the ARS. He was on weekend duty at the Pentagon. "What the hell did you do, Herb?" he laughed. "I got this telegram from IBM implying you did something against orders, and disowning you for your sins". "God only knows, Bob. Who signed it?" "T. Vincent Learson. Mean anything to you?" "Baa-aad news. That's the top guy in IBM below Tom Watson". Long silence. "Thanks very much for calling, old boy. I'll send you a postcard from Anchorage."

A couple of other calls came in. I was in the papers, and in more than one city. I rushed out to the corner and got a Times. On the front page, center bottom, in exactly the same place where that august journal had announced [-257-] the ENIAC in 1946, was a major story. The headline read, "IBM Scientist Calls Missile Program 'Swan Song of a Dying Culture'". Oh, oh, oh!

It was a problem to piece things together. It was a Saturday. Most of the attendees at the Cal Tech conference were not home yet. IBM itself was pretty much shut down. By Monday noon I had most of the

story. It had, unfortunately for me, been a quiet Saturday for news. The Los Angeles Times had had a staffer or a stringer at the Cal Tech conference - which Ridenour apparently never knew, and I found out only as the meeting broke up. The paper put the story out on the AP wire, and it was carried in over 150 cities.

One of the newspapers was in Owego, where IBM built most of its military stuff in those days. They got the plant manager out of bed, and asked him to comment. His name was Johnson, I think - I didn't know him. He said exactly the right thing: "I'll have to see what Dr. Grosch actually did. Meanwhile, I can tell you that IBM and the Owego operation fully support the national defense programs".

Alas, in Greenwich, Connecticut, bedroom suburb for the top IBM brass, things did not go so well. The local paper got Charlie Benton out of bed also, and he blew it. First he claimed he didn't know I was out in Pasadena. Then he denounced me six ways from Sunday - I mean, Saturday. He got rid of the reporter, who immediately set to work on a follow-up with the headline, "IBM Repudiates Space Manager", or some such.

Benton called Vin Learson. They met at Benton's office off Madison Avenue and drafted the telegram, which Benton then had sent out to all the space-related agencies he could think of, including not only government outfits like the Navy, but a bunch of contractors. All this time I was sitting only a mile away, completely unaware of the excitement. Nobody thought to call me.

The game was joined. My direct boss Gus Rathe chickened out, telling me in a one-minute meeting that Benton and Learson had taken me over. Benton was very worried there might be a comeback from outside; that NASA's Glennan might come down on him, for example, or Western Electric, which I was just getting into bed with for a bid on Project Mercury when all this blew up. Never happened; this sort of criticism was old stuff in Washington, even if it turned IBM managers green in Greenwich.

But the real battle was Learson versus Grosch. Vin had done a bad thing for the company, and a very bad thing for me. He had apologized for what might indeed have been a rather damaging remark, and disowned me for making it - meaning that he had ruined any further connection for me with the space program - without getting the facts. He had failed to check with me, or with Havens or Eckert, or with DuBridge, about what had actually happened. DuBridge sent me a tape of the session, and a letter explicitly disavowing the story. Havens and Eckert both tried to tell Benton I wasn't guilty. It was hopeless. One of us, Learson or Grosch, had committed a serious crime. One of us was going to suffer. Vin Learson had a very clear view which.

While I was being bastinadoed daily by Learson and his henchmen, something much more tragic happened. Ridenour had also been featured in the original story, and it had been made very clear that he had said naughty things [-258-] (and from the point of Lockheed, he certainly had). He was also under great pressure. One morning he was found dead on the floor of a Washington hotel suite: a stroke or heart attack. He had a florid complexion and a football-coach physique. But he had a sharp and still creative mind, and of course a family. My trouble paled by comparison.

IBM had a famous Open Door Policy. Disciplinary matters could be appealed upstairs, all the way to a Watson if necessary. I knew all about it. I could see the open door in the distance, figuratively speaking. I could see my erstwhile friend Tom Junior sitting inside. But Vin lay between me and the door, like Cerberus, with all three heads alert and all three sets of fangs dripping venom. I sent off the DuBridge letter. It never got inside. Months later, when I finally got a message through to Tom from outside the company, he wrote me that I should have tried harder!

My IBM friends, all but a very few, suddenly found me too wraithlike to recognize in the corridors. Young Ellsworth, who had known me for only a few weeks, was warmer and more supportive than DeCarlo, and my cowardly boss Gus disappeared completely. The best offer I got was from Learson: to become manager of STRETCH publications (Heiser's assembly language manual), at my current \$25,000 salary; to move to

Poughkeepsie, and "keep your goddamned mouth shut".

One problem was that Vin was physically threatening. He was six four or five, lean and hatchet-faced. He would tower over me and grind away. And it was known all over Galactic Headquarters that he enjoyed the carnage: liked to count the skulls pyramided outside his office suite. One day, after a particularly painful exchange, I said to him, "Vin, this whole company is crawling with guys who want to imitate everything you say and do. Isn't there room for just one who wouldn't be like you on a bet?" "Be over here at ten tomorrow", he growled.

After six weeks I gave up. I wasn't getting any closer to the Open Door. Clearly as soon as I ceased to be a Big Story I would be quietly slaughtered and disposed of. I tried again to get shipped overseas; not a chance. Even Anchorage would have kept me in IBM, but Learson owned Anchorage too. I resigned. It's noteworthy that I did not get a golden handshake.

In spite of my notable transparency in Headquarters halls, my treatment and my departure did not go unnoticed, especially among the technical types. It had gotten about that I had not really said bad things about the missile program, and this in spite of the fact that I didn't swear fealty - I really kind of thought the missile program was the swansong of a dying culture, even if I hadn't said so in Pasadena!

There were rumblings. One day Tom Junior circulated a very unorthodox memorandum. I never saw a copy myself, but it is supposed to have said, "Fellas, it's not true that there is only room in IBM for trained pigeons. We need wild ducks too". It was immediately christened The Wild Duck Memo, and it is resurrected every few years - officially - and passed around at management levels. Those memorial rites, and the use of "Ready" instead of "Idle" on machine status lights, are the last marks of my sojourn in the world's greatest company.

One last story: on 13 September 1973, more than fourteen years after The Wild Duck Memo was first circulated, I was taking my new boss Pat McGovern, publisher of COMPUTERWORLD, to a luncheon with Tom Watson and Frank Cary and Gil Jones, in a lovely private dining room in Armonk. Somebody, probably Horace Post, had done the usual thorough job on the visitors, and turned up the fact that it was my 55th birthday.

We are waiting for Tom to appear. Suddenly the door bursts open and in he comes, carrying a Seagram [-259-] carton (!!through the sacred halls of IBM!!). He sets it down and pulls out an antique duck decoy he had bought for me from a Vermont museum. "For the original wild duck", he says!

NOTE: This marks the end of the special pagination that began on p.1 . Blank pages will continue to be inserted to insure chapters start on odd pages.

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24 DO NOT GO GENTLE ...

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In Chapter 24 you will encounter
(in order of appearance):

Vin Learson [17](#)

The IBM Space Program [23](#)

The missile program "Bad For Us"

Watson Junior [11](#)

A position paper *advocated "the arts of peace" for Tom's IBM*

Weapons systems *bomb delivery via B52 and B70*

SAGE *defense is OK, and besides, IBM was indispensable*
Missile gap *I thought it existed, in 1959*
Manny Piore *I hoped for his support*
Resignation *hated to tender it, but Vin jumped at it*
Two months' pay *a month better than LaMotte had done*
MTAC 09

[-261-] I ended the first edition of my autobiography by telling about the 1959 Wild Duck memorandum, and a memorial to it given me on my birthday years later - and with a picture showing me holding that memorial decades later still. But in fact, I struggled for some weeks inside IBM after the memo came out, and fitfully for some months after Vin Learson ran me off the premises. Indeed, in 1961 I managed to pry open the hard IBM carapace for a few weeks, and I'll tell that story in Chapter 28.

But at this point I want to write in more detail about my last struggle as the ostensible manager of IBM's space program. In some sense the story is of a watershed; I was aware at the time that I could never climb back into my favorite company again if I kept poking at Pasadena instead of hunkering down in Poughkeepsie for two or three years and waiting for Cerberus Learson to take all of his heads and eyes elsewhere.

But I wanted to capitalize on the trouble, not just escape it - indeed, it was pretty obvious that escape was impossible. I had not really said that the missile program was "the swansong of a dying culture", but I was convinced it was Bad For Us, and that made denials that I had said any such thing much more difficult.

So I worked hard on a short position paper. If it was taken seriously, it would help IBM and the nation, even if I still got ground to powder. And it just might get me through the Open Door, which didn't seem otherwise reachable, and mitigate pulverization.

What I sent over to Tom Junior was this:

C O M P A N Y C O N F I D E N T I A L

April 12, 1959

To: Mr. T. J. Watson, Jr.
Subject: IBM Corporate Policy in the Missile/Space Area

This memorandum is a carefully considered and serious recommendation for an IBM posture in a sensitive and important matter. It may well be my only contribution as Manager of Space Programs, wild-ducking being a pretty hazardous business at best, and I hope you will read it unimpatiently.

Our company has from its inception been concerned primarily with the arts of peace. There are a million jokes about "THINK"; I have never heard anyone deride "World Peace Through World Trade". On many occasions we have gone out of our way to strengthen our corporate image as a supporter of international friendships; we were early and enthusiastic partisans for the UN.

Now we have a Military Products Division, and are actively beginning to solicit contracts to design and manufacture specialized equipment for the Department of Defense, the AEC, and NASA. Vin Learson has told me, in discussion of the Cal Tech incident, that IBM policy is "to go along with the government" and to build anything it asks us to build.

I've thought about that statement a lot, and believe it needs careful consideration. In the first place, Learson was stating a practice, not a policy - see Mac Smith's recent speech to DP [-262-] managers, for instance. But more important, and a major consideration for MP Marketing, is the fact we are now seeking out contracts in the weapons business. It is one thing to accede to a special request to help defend the country [SAGE, of course], where we are told we are the only possible source, and our patriotism is invoked; it is another thing

entirely to go out and solicit responsibility for the delivery of nuclear weapons on "area" targets (a euphemism for Hiroshima, Leningrad - or New York).

I recommend most strongly, then, that in my own area of competence IBM, through its MP Division, bid competitively only for contracts which are primarily concerned with space exploration, and quietly but definitely stop further solicitation of weapons and weapons system contracts. We are deeply involved in the B52 and B70 bomb delivery systems, and cannot pull back in good faith. But let us plan to convert the Owego capabilities to less deadly projects at the earliest opportunity. You probably share my doubts about the soundness of the B70 concept, and its chances of survival on the Washington scene; let us fill the gap that may be left with something less likely to make us "merchants of death".

My enthusiasm for space projects is not particularly dampened by the fact that much of the new science and technology resulting therefrom can be and may be turned to offensive ends. Our technical civilization is so highly interconnected that any act, however peacefully intended, may be turned against others. If we help land on the moon, or if we track and control a communications satellite, the good we do or hope to do outweighs the bad. Missiles are something else again!

This conviction does not stem from a pacifist persuasion, by the way. Force still stalks abroad, and reasoned preparation to meet it is in my mind quite justified. But the missile race has become technically, economically, and morally indefensible. Russia has opened a gap in our defenses which no American effort - even with good planning and without wasteful duplication - can close. We must win with other weapons; with missiles we can only lose.

For this reason I recommend that we not waste the wonderful resources of the IBM laboratories and factories, and especially people. Let us actively seek to employ them in solving the problems of space, and not on projects of mass extermination.

H. R. J. Grosch
Manager, Space Programs
Military Products Division

cc: Mr. T. V. Learson
Dr. E. R. Piore
Mr. C. Benton, Jr.

It didn't fly. My guess is that all copies were quietly picked up and sequestered, including the original. Whether Tom ever saw the attempt I've never known, but he didn't refer to it in any subsequent correspondence over the years, nor at the 1973 luncheon with Pat McGovern. Probably only Horace Post remembered.

[-263-] I waited a few weeks. I tried again and again to see Tom: notes in interoffice mail, calls to his office, often taken by Post. The notes were never answered; the promised appointment "as soon as Mr. Watson can see you" never arrived. A month went by. It was now two months since the AP had blown the whistle on me and on Ridenour. I gave up.

May 22, 1959
Memorandum to Mr. T.V. Learson
Subject: Resignation

During the past two months, you have been kind enough to review with me several ways in which I might continue with IBM. None of these appear to fill our mutual requirements. I should like to continue a friendly association with you and with many others in the company. But I shall be better able to help advance the computer field from some other vantage point. Accordingly, I regretfully tender my resignation.

H. R. J. Grosch

A hand-carried answer came back within hours:

May 22, 1959

Memorandum to Dr. H. R. J. Grosch

I am in receipt of your letter of resignation today, and I want to assure you that I am very regretful that you have arrived at this conclusion. I had hoped very much that the assignment we worked out for you in the Data Systems Division as Manager of the STRETCH programming area and all its ramifications was satisfactory [Poughkeepsie??].

We will accept your resignation effective as of the end of May, and a separation check for two months' pay will be mailed to you representing all and final payments from the IBM Company.

I want to wish you the very best of luck in whatever endeavor you undertake. If I can personally be of any help to you, please let me know.

T. V. Learson

Well, I spent the next week packing my office gear and library, finding an outfit called Johnson that wanted my long runs of periodicals, notably a complete set of early ACM publications and a complete set of MTAC. How many times over the last twenty years have I wanted them back: originally for easy reference, and now because they would bring ten times what I sold them for in 1959. On Friday May the 29th I moved out; Benton and Learson had sent the telegrams disowning me on March 28th. I should have fought another month at least.

[-264-]

25 IVORY INSTEAD OF SILVER

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In Chapter 25 you will encounter

(in order of appearance):

DATAMATION *source of all trade news and much hilarity*
World Trade Europe *centralized IBM power in Paris*
Grand Palais *largest Parisian exhibit site in 1959*
Ike Auerbach *mysteriously, had the inside track with the outside*
Sandy Lanzarotta *new DATAMATION editor in Los Angeles*
ICC *in EUR Rome, an International Computer Centre, empty*
UNESCO *opened a scientific nexus in Paris, with money*
Hôtel Lotti *to be my home from home in Paris for three decades*
Mercedes 190SL [19](#)
ICIP *the zeroth IFIP conference now had a name*
BCS *The British Computer Society, started in 1957*
Silver Cities Airways *their important passengers were automobiles*
Elfenbein [ivory] *German for "elephant bone"*
Giro d'Italia *bicycle race second only to the Tour de France*
Courmayeur [19](#)
Torino *beyond its Po indeed lies Italy*
Howard Aiken [01](#)
Andy Booth [04](#)
AUTO-MATH59 *poor exhibits, but at least some from Japan*
IFIP *International Federation of Information Processing Societies, to begin in 1960*
Bob Bemer [16](#)
Cambridge [19](#)
Chris Strachey *great NRDC computer architect*
Maidstone *I crashed the Ivory Lady and stayed at the Star Hotel*

[-265-] From early 1958 on, there had been subterranean rumblings in ACM, in the other NJCC partners IRE and AIEE at the Eastern and Western Joints, and in the just-christened trade journal DATAmation, about a real international meeting. As soon as I was comfortable in Charlie De Carlo's skin, and beginning to enjoy the way I could draw on many parts of IBM using his authority (or to be more precise, the Watsonian authority that he was permitted to exert), I probed for facts among the rumors.

The World Trade staff at Galactic Headquarters said they knew nothing, but de Waldner's people on the Place Vendôme were alert. WT Europe exhibits people were being nibbled on by French academics and by special customers, notably at Electricité de France, who didn't ask for cash or commitment but spoke enticingly about a big show in June of 1959, and if pressed claimed it "might" be at the Grand Palais. "J'entendu que le même," the IBM contact at the Palais said, shrugging over the telephone. No contract had been offered.

As rumors circulated about a committee headed by Ike Auerbach, I began to worry. "That whole gang in Philadelphia is anti-IBM, Charlie," I warned. "If they get something going, our people will be excluded as they were a dozen or so years ago at the Moore School."

"Water over the dam," said my boss, who had SHARE and STRETCH and several dozen 709 customers to keep in line. Also he had no doubt been warned by Tom Junior's secretary that I was overseas-happy; not a sparrow fell unnoticed on the higher floors of 590.

As a knowledgeable editor named Sandy Lanzarotta took over at the Thompson shop and upgraded the hind end from DATAmation to DATAMATION (and converted the magazine from Connecticut to Los Angeles perspectives), the plot thickened. Yes, there was a committee; yes, Ike dominated it; yes, it was working "on behalf of the U.S. information processing community" with its European counterparts to mount a major conference in Paris or Rome in the summer of 1959. Rome, a location backed by the mysterious ICC, International Computation Centre, which Elizabeth and I had encountered while on honeymoon in 1956, was being outflanked by both Paris and Philadelphia.

The key was of course funding. The overseas men, whose names were never mentioned in the first WJCC announcements and in the spring and summer DATAMATION articles, had a pipeline in place into UNESCO's Paris headquarters. With that money, or promise of money, eager beavers on the U.S. side began to gnaw away.

A Ramo-Wooldridge consultant named Grabbe was named as exhibits chair, assisted by a R-W worker, a BuShips bureaucrat, a Bendix man, and to my chagrin Ralph Mork of IBM World Trade, who obviously had known more all along than I had. The American program effort was run by Alston Householder, purest soul in numerical analysis, and Arnold Cohen of Minneapolis, a hardware guy. And a strange journalist got the publicity nod, putting DATAMATION's nose out of joint.

Today I would be upset at being shouldered away from the trough by a horde of insiders. In the fall of 1958 I turned aside, secure in my IBM opportunities and expense account. If something good got set up, I probably could go - too late to give a paper, but I would have had trouble satisfying the U.S. and European purists even if I conformed to the rules and dates. The exhibits attracted, but I was very dubious about what overseas stuff could be shown, and two huge Joints a year did the American scene perfectly.

[-266-] Then the Cal Tech sky fell in, and early May found me stranded in Sutton House. I talked to Elizabeth. She thought me foolish to expect to find anything in Europe after my crucifixion, but agreed that there was a big black crepe bow on the apartment door as far as local jobs were concerned. We were not too strapped financially, and of course overseas prices were a long way below Manhattan - ah, 1959! I said I would fly coach.

Arrangements went briskly. It was too late to get space at the cheap conference hotels, but it was only

May, and the flood of Louvre-lovers was just beginning. I had stayed at the Grand Hotel near the Opera with Elizabeth in 1956, and did not want to go there again; that honeymoon itinerary had been stage-managed by CIT, an Italian travel firm, and most of their selections had been terrific (La Réserve on the Côte d'Azur, for instance). But they had failed in Paris.

The fancier IBMers stayed at the Ritz, but that seemed a little much for the unemployed! I went to de Waldner's favorite, the Lotti, on rue Castiglione just down the street - but I'm getting ahead of the story.

I wanted to cock a snoot at hoi Philadelphia polloi, and to have fun besides. And it was only the third of my more-than-a-hundred intercontinental charivaris; the first two had been wonderful because of Dorothy and Elizabeth, but now I would be solo (perhaps uninhibited is a better word!).

I ordered a rental 190SL Mercedes convertible, the precise image of my Silver Queen of Cincinnati and Phoenix, to be delivered from Frankfurt to the Geneva airport, and planned to go over the passes to Courmayeur as in 1954, then up to Paris for ICIP [yes, International Conference on Information Processing: it now had a name, although later most attendees called it "The 1959 UNESCO Conference"], then over to Cambridge for my first BCS, British Computer Society, conference, then back to Germany to turn in the lovely lady.

"Where will you leave the car while you are in England, sweetie?" asked my wife. And I had a lulu of an answer.

"There is a thing called Silver Cities Airways, dear," I smiled. "They fly funny propeller jobbies on which the nose opens up, and three or four cars get driven aboard, and I sit in a squinched-up cabin behind. They fly from a French channel airport to Lydd [LYX], on the south coast. Doesn't cost much, since it is only a twenty-minute flight - and I'll have the car in Cambridge!"

Actually worked out to be less than a fancy garage in central Paris or at Le Bourget would cost for a week. Amazing, those Brits! The hovercraft killed it in a few years, and also killed the overnight rail sleeper between Paris and London - but I managed to ride that too, before it disappeared.

No doubt Elizabeth was remembering the erotic potential of my original 190SL, but she was confident of her own attractions - and probably looked forward to stories of any successes I might have!

I kitted myself out in SCCA [Sports Car Club of America] gear instead of taking climbing boots, got a new Michelin and a letter of credit - this was long before the credit card boom, and many of the American attendees at ICIP had serious problems with cash; when they ran out of travellers' checks they found AmEx in Paris wouldn't take their Poughkeepsie bank checks!!

Off I went to Geneva, delayed in Boston by a flat tire [!] on the Pan American DC7C - turned out they jacked up the plane using a point under the wing, and I have a slide to prove it. The envoy from [-267-] Frankfurt was still waiting, however, and delivered a spotless cream-colored 1959 190SL with black top and leather. The Silver Queen had been an early 1955.

The voluminous documentation called it ivory: elfenbein, a lovely word. It was wonderful to drive such a beauty again.

I headed up the lake and the Rhône for the Grand St. Bernard, but turned off up the Val Ferret to inspect Mont Dolent, which I had climbed in 1954 from the Italian side. The weather had been lovely in Geneva, but turned mountain-y as I went high. And as I returned to the main valley and went south and up the narrow pass road, I began to encounter snow banks up to three meters deep.

The path had been laboriously cut through by equipment far less powerful than what I had seen at work in the Sierras and in Colorado; the high passes in Europe are simply allowed to close in November, and do not reopen until June in extreme cases (I was reminded of the Crater Lake rim road in 1948).

But I was confident, and had checked at the airport; the pass had been opened for the Giro d'Italia, the greatest bicycle race in Europe after the Tour de France, which would go through the next day! It was getting late, so I passed up the Hospice and its big dogs, and headed down into Italy.

Aosta did not then have a good hotel, so I headed up the Dora Baltea toward Courmayeur, but decided against going all the way; it was of course light until very late, but I was prop-lagged. So I turned back to the casino hotel in Saint-Vincent and was welcomed. They had some overflow business from the race, said the concierge, who also called ahead for me for the next night.

The Royal di Courmayeur, which Dorothy and I had liked so much in 1954, had opened but was full of press and radio and TV people. The riders and their escorts were to be in cheaper quarters the next night (the village was the terminus for that leg), so every level of housing was working; I got in at the Hotel Courmayeur. "But have him check in early," my concierge was advised on the rickety telephone.

Disregarding the warning, I got up late and took Miss Ivory up a strange little road to the famous Tête de Champex, from which some of the most famous photographs of Monte Bianco have been taken. No one else was there, and there was snow under the shrubbery; it was early for the Alps. I took Kodachromes for Elizabeth and Grace, of the car as well as the mountain (and of me, using the self-timer and a clamp on the rear-view-mirror mount, as I had done the year before in the Canadian Rockies).

It was my first bike race, and I was delighted at everything I saw. The food was poor at the hotel, but I was anticipating great things in that venue later in the trip. The portions were enormous, having been enlarged for the *corridori*, lean little men who ate like wolves, and their coaches, who were often obese. The hotel was full of them.

After the start next morning, as the entourage sped away, I put on heavy sneakers and drove past Dolonne to the T-junction at the very face of the mountain, where the marvelous tunnel emerges today. I wanted to climb - well, scramble up - a big hill called Mont Chetif which is in the SW armpit of the T. On top is a shrine, and each year on the proper feast days the guides and porters of the village lug heavy batteries up, and that night light the bulbs in the halo of the Madonna there. The story is true - or at least I photographed the bulbs! And I captured Mont Blanc, especially the Fauteil des Allemandes, which is perfect from Chetif, and Courmayeur, and snow bridges to the south tunneled by the Dora torrent.

I drove out over the Petit St. Bernard, which had no snow problem, and then around via Breuil-Cervinia [-268-] and deserted Sestrières to Torino. I could look out of the high hotel window on a side street and watch locals admiring the Ivory Lady, parked below with the top still down, but it was from a cheap room in the Principe di Piemonte, the best hotel in town. Semi-coach!

I had lunch next day, pointing out which trout I wanted in the terrace tank, at a lovely restaurant in a restored medieval village on the bank of the Po - indeed, beyond it lies Italy! It was the weekend, so the new Pinin-Farina factory where custom bodies were put on Alfas and Lancias was closed, but I drove out and looked in the showroom window anyhow, and thought haughtily my Lady was more impressive.

Well, time to think about business. I turned north, over the Simplon and its watchful Eagle, and up toward Paris, stopping at Michelin-inspired hotels and restaurants, and remembering Dorothy and 1954.

It was the first of many many visits to the Lotti. The hotel was handsome in a conservative way, and so was the concierge Josef; Elizabeth would have approved. The restaurant was not much; it improved in later years. But breakfast, *petit déjeuner* in the beautiful room, was just right. Taking the ivory princess, who rested in the middle of rue Castiglione at night, so as to show her to the less fortunate, I drove off to UNESCO headquarters, which was just a year old.

Suddenly I was back in the computing world. Everywhere I looked there were familiar faces: a hundred Californians, a hundred New Yorkers, and English and European friends besides. In the end there were

1800 bods, from 500 Frenchpersons and 400 Americans and 200 West Germans and 170 Brits down to a lone Mexican, Sergio Beltran. But many straggled in long after the opening ceremonies, and there was no grand reception or banquet, as there would be at the follow-ons in the Sixties and Seventies and Eighties and Nineties.

Conferences were by now old stuff to the U.S. crew. The Joints had been going since 1951; the tenth one had just finished in Los Angeles, with an attendance of over 4000, and a big exhibit, and lots of Europeans. But Paris was something else again, and had drawn a raft of wives and kids. who were milling around UNESCO with the techies, trying to draw them away to the museums and the shops.

This was made easy by the program, which was repellent. It had read well back in the U.S., and Great Names were giving papers or running sessions. But the novelty was in the foreign talks: what was going on in East Germany, or the USSR? Japan, where the real action was only beginning, was now being noticed. Actually most such information was traded in the UNESCO bars, of which the Californians were startled to find several (Manhattanites knew there would be, from the UN Headquarters on First Avenue).

The honorary chairman was Howard Aiken, who was only mildly irascible but kept to the Upper Reaches; the French gave him a medal. The honored vice chairs were Goto, Lebedev, Peri for France (whom I never heard of before or since: the earth must have swallowed him), Picone, Santesmases, Wilkes, van Wijngaarten, and Zuse (an early appearance). And for the United States, John Mauchly.

Session chairs included Andy Booth of Birkbeck, Grace Hopper, Stiefel from Zürich (mis-labeled as German), Sam Alexander, and the usual painful list of academics. Antonin Svoboda, who had gotten back to the U.S. a year or two before, was still listed as from Czechoslovakia, and there were other anomalies. The Europeans gossiped about them, but the Yanks wanted to talk about time-sharing. To each other, mostly!

The opening session was at the Sorbonne, and there was a lot of French. The technical sessions back at [-269-] Unesco House were mostly in English, sometimes understandable in spite of the accents and the microphones. There was simultaneous translation in the usual UN mode (four languages) but the technical terms gave much trouble. In formal international work the booth ladies usually follow manuscripts - listening for divergences, of course. Most of us computer types hadn't a clue; only Ike Auerbach was really experienced, in 1959. And I only learned in 1967.

The July/August issue of DATAMATION carried a very good account of the conference, considering the magazine was only in its third year. And there were pictures. The reporter, Etienne Guerin, refrained from giving the titles of the papers, and so shall I.

The exhibits, called AUTO-MATH 59, were terrible, but even so I got first inklings of the Japanese entry. You could do a thorough tour in an hour, versus feeling dizzy after a dozen hours in the JCC halls.

In his article Guerin concentrated on the birth of IFIP, the new International Federation of Information Processing, which was to blossom in 1960 after ratification by seven national societies. That posed a problem, as the weird Americans had at least three and only the British had another healthy non-google-eyed one. Obviously work was needed back at the ranch; I belonged to the ACM, the IRE and the BCS, but I was tarred with the IBM brush, so I was not asked to help; word that I had been fired was only just getting around.

That word was being spread by a few non-IBM-type IBMers, notably Bob Bemer. He had brought a tall handsome (but definitely not blushing) bride to the meeting, scrambling aboard even later than I; the local World Trade people found the couple a hotel and cashed their Manhattan bank checks, but Bob's name never did make it into the attendance lists. I told them about Generous Electric sending Elizabeth and me on honeymoon to Rome, but the newlyweds were not impressed.

The Ivory Queen got to them in spades, however. They were planning to go on to the BCS meeting in Cambridge as I was, and were intrigued by my Silver Cities plans - so much so that Bob rushed out and

bought seats on the same flight, even though he had no car to put aboard. After the "do" was over IBM managed to get them out to the airfield (probably a chauffeured car; I have forgotten). They watched by my side as an attendant drove the Lady very carefully up a ramp into the plane, along with two large sedans, and buttoned up. We flew. No drink service!

At Lydd, which was a barren little WWII strip forty miles south of London, there were no taxis (naturally!). The Mercedes trunk was small, and my luggage filled it, but the right seat was available; I offered to take Bob's lady in my Lady, "all the way to Cambridge, pal", leaving Bob with their luggage to make a separate and painful journey. Alas! the new marriage bond was too strong. As I remember it, Bob ordered a taxi from Lydd village and had it drive them all the way to Cambridge - more than a hundred miles!

Here I have to go back to a nice Jet Engine adventure. On Wednesday night the 17th I was enjoying the Champs-Élysées when a bunch of senior Evendale people rushed up and embraced me. The International Air Show was on at Le Bourget, and GE had a big exhibit and a hospitality tent (I had been to several such events in the U.S. and knew what they were talking about). Of course I must come out. Tomorrow?

Clarice and Gerry Neumann, who had now risen to a department general managership, welcomed me warmly. The champagne and bouchées were terrific, and I enjoyed the fly-bys, especially the ones by [-270-] foreign planes. It was a spectacular reminder of another world, and Jobless Grosch was unabashedly wistful.

Cambridge was as Dorothy and I had seen it five years before, and I was delighted to meet my English friends, many of whom had not been able to afford Paris. I was introduced to Chris Strachey, who had given one of the few good ICIP papers, but whom I had missed in the scrum. Sandy Douglas had come over from Leeds, and we renewed our contact. He told me that my new society BCS, then only two years old, was going further afield, planning for future meetings in Cardiff and Edinburgh.

There had been a slight commercial flavor to ICIP because of the exhibits, even though the politicking by Europeans about IFIP-to-come was academic and governmental. That flavor had evaporated beside the Cam; the central BCS figures and many of the speakers were very highbrow indeed. I turned back toward the vigorous American scene with relief, although the ACM would never never match the banquet in King's College!

The weather had been marvelous ever since I crossed the Saint Bernard, but as the Mercedes and I steered toward Lydd a light rain began. The roads were greasy from the prolonged dry spell, and in Maidstone I slid into the back of a big Austin sedan and crumpled a headlight and front fender on my tender lady. It happened in front of a big garridge, and the whole crew of mechanics rushed to my - well, her - rescue and pushed the Ivory Lady into shelter.

I put up at the rather good local hotel overnight, telephoned to change my Silver Cities reservation, calling myself every kind of a stupid for my crime, and waited out the arrival of parts from London (next day by rail!).

I caught the evening flight, thirty hours behind schedule, and drove all night through Belgium to make my appointed return date in Frankfurt the next day. The agency was devastated at what I had done to their beauty, and there were forms and forms to fill out. I had had insurance, but reimbursement for what I had spent on repairs in England looked almost impossible.

I presume I flew back to New York directly from Frankfurt; my memory and my slide collection are blank. All I can remember is how my wounded Lady looked as I said a regretful farewell!

[-271-]

SUMMER BY THIS SON OF YORK

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In Chapter 26 you will encounter

(in order of appearance):

Stan Frankel [03](#)

Bob Johnson [20](#)

Paul Brock *a good friend, a good consultant, and a Good Eater*

C-E-I-R *computer services: anything, anything, anything!!*

Robbie [H.W. Robinson] *a very hungry Son Of York*

The Savoy Grill *"he that is tired of London ..."*

Les Fox [19](#)

Chris Strachey [25](#)

Sandy Douglas *from Leeds and the early BCS to a private tennis court*

The Matterhorn *towering over Zermatt and in my imagination*

The Zermatterhof *best of the non-Seiler hotels*

Air France *might just put me on the inaugural 707 flight to Idlewild*

The Geiger Aeronca *could slide off the Riffelberg with one Grosch or two corpses*

A stock option *I said yes, but I distrusted Robbie*

Sunset Tower West *"in the heart of the dollie belt" on Sunset Boulevard*

The Alfa Romeo Spyder *scarlet, and with the Veloce engine*

STRETCH partners *I proposed to RAND and eight airplane outfits*

The Cock 'N Bull *great beef bones and gorgeous women*

Telecomputing Corporation *transformed from honest Burbank beginnings*

An anonymous blonde *a distraction, while Hardeyes was going through Robbie's wallet*

The 7030 [STRETCH] announcement *precursor to a major IBM failure*

A San Francisco injunction *served in the Jack Tar lobby*

Legal wrangles *in the end I made \$10,000, less lawyer fees*

Jack Strong *we remained good friends, even after he took Robbie's shilling*

LARC *its failure made STRETCH promotion unnecessary*

I really love an apposite quotation, and this chapter title, as you will see, is an absolute marvel. True, Shakespeare said "sun of York", but my slight improvement fits the circumstances.

The winter of my discontent was 1959. The Wild Duck of Chapters 23 and 24 was having a hard time settling on his next pond. Word of the imbroglio at Cal Tech, amplified at least on the West Coast by regrets over Ridenour's untimely death, spread rapidly; my attempts to tell what had really happened, aided by friends and by DuBridge, did very poorly. I was used to benefiting by what today is called media coverage; now I found out in 1959 how hard it was to alter the results of that coverage after interest had dwindled. I told my story in Paris and Cambridge, but that was a specialized audience.

I got back from the ICIP/BCS trip a little depressed, and crunching the pretty Mercedes was only a part of it. I had not hit on possible employment either overseas or back in the U.S. at either meeting, and I had spent a small fortune restoring my IBM-damaged ego. While Elizabeth and Grace were careful not to criticize, they had to be dubious about my careening around places like Courmayeur while I had no income at home. I set to work.

After I had answered a few fancy employment ads and followed up suggestions from friends about places that needed Chief Information Officers [ah there, Harold Smiddy!], I realized I was sort of in Coventry. Most big user organizations were tied enthusiastically or reluctantly to The Grim Gray Giant, as I had

christened IBM a year or two before, and felt they depended on favors from Vin Learson and his boys. If a company really needed me they might take a chance, but I hadn't hit one of those.

I tried hardware outfits, not as a creative type but as a proven expert manager of (or extractor-of-results-from) creative types. I remember interviews for the general managership of a Stromberg Carlson subsidiary in San Diego which made an interesting Charactron-based high speed printer, and where my adventures at Cal Tech had never been heard of. But such outfits seemed to be thin on the ground.

In the early years of the decade several previously valued senior members of the computer fraternity had been skewered by McCarthyism and the suspicions of the times. Nothing like the Hollywood witchhunts, of course; for one thing, there were no uglies upstairs in the trade using Washington antiliberalism against old enemies.

Los Alamos was completely in the grip of security freaks (who of course had failed to apprehend or even suspect real spies like Klaus Fuchs, and were revenging themselves on Oppie And Co.). So Stan Frankel was treated badly. But when Dick Clippinger was under shadow, his new bosses at Raytheon did quite well by him - no MGM beastliness.

Observing this from Ohio in 1955, I noted some unhappy exiles had survived by becoming consultants; Frankel had completely disappeared, but was busily designing powerful small machines down in a basement somewhere. So we didn't see him at the Joints? Big deal!

I printed up a rate card and declared myself a consultant. For the obvious reason that I knew where a lot of problems were buried, I tried GE early on, and even struck a little pay dirt at IBM later. At GE, bypassing Phoenix as not yet having buried its problems, let alone wanting them disinterred, I talked to Bob Johnson in Palo Alto. He put me to work listing research areas where I thought the big laboratories in Schenectady, and his SRI connections in Palo Alto, and (in the hopefully near future) his own bailiwick, might produce developable payoffs.

I drew on my knowledge of Poughkeepsie and Kingston IBM projects; Yorktown Heights was barely underway, and the 115th Street enlargement of the Watson Lab was working too far out in physics and chemistry and metallurgy to look promising. Bob tucked away my recommendations, paid me promptly with Phoenix money, and waved me off.

As consultants must the world over, I called on friends who were also trying to sell advice or offer personal services. One of these was a Good Eater named Paul Brock. He had been a major technical manager at Electrodata before the Burroughs rapprochement, along with a great gal named Sybil Rock. Paul had been brought into the company by Clifford Berry, who was an early chief engineer of the predecessor company and had before that been an associate of Atanasoff (although the latter's name was not familiar to me in 1959).

Paul had met Cliff through Purdue, and years later returned to that university when the exigencies of consulting palled. But in 1959 he had just started on his own, working out of his Pasadena house. I told him my side of the Cal Tech incident at the EJCC in Boston just before Christmas, ending with the Wild Duck memo, and his big belly shook as he laughed at me and with me: a good friend.

Soon he had introduced me to his newest client, C-E-I-R. This was the new corporate name of what had been the non-profit Council for Economic and Industrial Research, now the brainchild of one Herbert W. Robinson - the Yorkshireman of this chapter's title. Robbie was an inside-the-Beltway type, and the Council had been suckling on one of the thousand federal teats. He wanted not to wean it, Heaven forbid! but to add richer commercial fodder, and Paul was introducing him to potential customers, relying on Electrodata experiences.

The Son Of York was a remarkable fellow. In spite of his businessman/entrepreneur posture and appearance, he had good doctorates from LSE, the London School of Economics, and from Oxford (Balliol).

He had worked for Lord Cherwell, who was Churchill's scientific advisor, mostly by using the new mathematics of operations (Brits said "operational") research to allocate scarce resources. He had served on at least one mission in Washington and, correctly judging the relative postwar strengths of Britain and the U.S., had immigrated in 1943.

He worked in international outfits where citizenship was not a requirement, got his U.S. papers in 1948, and did a hitch in Defense. He tripped over a project to computerize reports of nuclear warfare damage from a network of sensors and such - or a proposed network, maybe. It was super-Top-Secret [for no good reason, seen from 1998; antisabotage precautions would be needed only much later in the game, and even then only at the Secret level], and out of the main stream. I don't think Benton's boys in IBM's Military Products Division had ever heard of it.

The Council had been founded for and was working on a big input-output analysis job for the Air Force. Robbie dug into his savings and bought control, rented an IBM 650 - which was needed for the OR stuff anyhow - and got the secret job. He hired Bill Orchard-Hays away from RAND, and picked off Jack Moshman, who had done the model for the notorious television [UNIVAC] election prediction. Fantastic!

Robbie had two great advantages. First, he didn't know beans about computing or computers, so he could promise anything his clients wanted with a straight face. Second, there was no way the Post-Bang Boys could realistically test the resulting software. The SAGE people knew all about that but were off in another Pentagon universe (call it No-Bang). The customer was perforce delighted.

By the time Paul introduced me to Robbie all this had settled down. I was of course not to intrude on Paul's territory, although in his generous way he had told me I could offer overseas contacts he didn't have; remarkable! What he emphasized at the first meeting, in C-E-I-R's dull Arlington quarters in the early fall, was my unusual experience at running big charge-back shared operations on major IBM machinery.

Robbie first sent me off to look at a cooperative 709 he was sharing with Union Carbide at their Manhattan headquarters, a short mention of which had appeared in the burgeoning DATAMATION. I reported it was being clumsily run by both partners but that no major fixes were needed. The relationship prospered, although I adjusted to Yorkshireman tightfistedness with reluctance, fending off criticism of my restaurant charges with accounts of glamorous exploits for IBM and GE, and dangling my Brits and Europeans.

It soon came out that Robbie hungered for a presence on the English scene, where his image as a boffin and as a grinding academic could be submerged in C-E-I-R glamor. I volunteered to find him a point man, and set out gaily for London and the Savoy. Later I'll do the English user and manufacturer scenes as I reported them for Control Data in 1962; this was a much narrower task.

My first candidate was Leslie Fox, who had gone up to Oxford from Goodwin's group at NPL to start computer courses and to run an early Ferranti machine supplied by the UGC, University Grants Committee. I worked on him over the best the Savoy Grill had to offer: took him up on a high hill and showed him the kingdoms of British computer service. Not a chance, he said, reminding me of the sports fields of Oxford and the delights of research (he was an Oxford Blue and a creative numerical analyst, in that order).

My third choice was the powerful system designer Chris Strachey I had met at the BCS, who was involved with Ferranti plans for the ATLAS, competitor with LARC and STRETCH in the supercomputer steeplechase, and had given one of the few significant papers at ICIP. When I talked to him on the phone he made me tell him what I was after, and turned me down flat without even letting me buy a drink. He wanted to build new machines, not run old ones. "I had my fill of that after the war," he grumped. And I had heard how good he was at logical design, from Goodwin and Wilkie and especially Stan Gill; it was hard to argue.

I was shipping in my second choice next day, and had my fingers crossed; my fourth choice was Gill, and I

was pretty sure he loved the Cambridge ambience as Fox loved Oxford's. But it turned out Sandy Douglas, who came down from Leeds, was enthusiastic from the start. He wanted to make his fortune as strongly as Robbie, but was less willing to give up the intellectual world; he was a founding member of the new British Computer Society (which Robbie didn't give a fig for). I did, and had joined in 1958.

As a consultant, I wasn't empowered to make him an offer, nor even to describe C-E-I-R British plans. "They'll revolve around you and your experience and your contacts, Sandy," I said. "Robbie is an opportunist; he'll use what you do best, not force you into an IBM blue suit or make you shave your moustache. I'll ship him over."

I didn't want Douglas to see the messy headquarters or scent the marginal finances. On the other hand, he knew Orchard-Hays and Moshman, and was impressed. Also I had already guessed that my client wanted to "do" England [on business], perhaps with his American wife!

Robbie came over, hired Sandy with some sort of stock option, set him up close to the Kingsway IBM offices, and in the end did fairly well with the London enterprise. Years later the two of them got in bed with BP, British Petroleum, and turned the English branch into a separate stock company. This evolved into what was later known as Scicon, and Sandy got enough out of the deals to buy a house up-Thames with a tennis court.

I left the two hungries to work it out, and took off. I had an elaborate plan under way, which involved my first visit to Zermatt and the Matterhorn, followed by a major airline adventure. To further the former, I had brought my then-unusual Head skis, my Molitor boots, and the parka and so on from Squaw, and they were standing in my Embankment-side room in the Savoy.

My first-class airline ticket continued on to Geneva/Paris/New York; I intended to pay the European parts myself. I had a single room reserved at the Zermatterhof, arranged by Swissair back at Rockefeller Center. And most of all, I had a request in, via the fancy Air France office in Manhattan, for space on the inaugural 707 flight from Orly to Idlewild, which Aviation Week and my old PR buddies in Evendale said was laid on for the last day of January [1960].

There were to be honored VIP guests, of course, but the whole plane was being specially set up for first class - it was designated AF0707 - so there was a good deal of space left over even after the big shots and the press were accommodated. I had picked up the date months before, but without my old Evendale connections was not much more than an ordinary New York customer. I had written several letters on my engraved Sutton House stationery and mentioned I was an AA Admiral (1954) and a TW Ambassador (1955) and a honeymoon berth-rider on the SAS Transpolar (1956), but had had only a very cool form letter in response.

The Swissair plane on Friday was a dumb little Convair just like the ones I had flown a hundred times out of Cincinnati. I shared a seat with a handsome chap who turned out also to be going to Zermatt. He was a Swissair executive who was invited to the weekend wedding of one of the Seilers, the family which owned most of the fancier Zermatt hotels, and was pleased to be able to borrow the Thomas Cook rail schedules book which I had purchased in London. I had already chosen the trains to get me to Brig and onto the narrow-gauge to Zermatt, and was literally quivering with excitement (he was of course a very old hand, not a railroad buff, and somewhat amused at my boyishness).

Then things began to go wrong. The pilot came on the blower and announced that Geneva was fogged in, and that we would divert, not to Zurich, but to the small airport at Basel. Even my seatmate was upset. We pored over my Cook and decided it might just be possible to catch an express from someplace [probably Chur; I no longer remember] that would connect to the last train out of Brig. But there did not seem to be a way of connecting via the Basel station, especially as the trip in to town was made difficult by the three-countries airport location.

By this time we were on the ground and baggage was coming off, including my skis. We had picked up a rich Englishman who also wanted to look at my Cook, and also wanted to move fast - he had a date in Geneva. We used his money, my timetables, and my Swissair friend's airport savvy to get a private car (the taxis were all taken), and off we went. We just barely made the train at some place or other, with all our duffel. We had a jolly dinner on board, the two of us got off in Brig, and the "milord", as my Swiss laughingly called him, went on to Geneva.

I had a wonderful time up topside, took lots of Kodachromes - still have one of Mr. Swissair sunning himself on the Riffelberg at lunch the next week - and learned a little about the village. The Zermatterhof was terrific. Then excitement: Air France in Geneva came on the telephone and said I had been "allotted space" on the inaugural Sunday, and that they had booked me on one of their Caravelle flights to Paris to connect. Trouble was, I would have to go into Geneva the night before to get it, spoiling a whole day of my expensive ski excursion. And since I was on a weekly rate at the Zermatt hotel, I was looking at an extra overnight in expensive Geneva besides.

I huddled with the wonderful Zermatterhof manager. There was a glacier pilot named Geiger, he said, who frequently landed on the Riffelberg slopes up above the village, and who would fly me direct to the Geneva airport. And circle the Matterhorn besides!! It wasn't cheap, but wow!

Sunday morning very early, wearing city clothes but in after-ski boots, I took the first Gornergrat train up, got off at the Riffelberg stop (no skiers yet - too early) and found a tiny Aeronca waiting nearby, on skis which had small wheels poking through for non-snow landings. The takeoff was terrifying, since it involved a fairly steep downward slope and an irreversible drop-off, but the pilot said he did it many times each month. OOOGH! we made it.

Nobody seemed to be impressed in Geneva; flying in from the Matterhorn was a regular thing. I remember asking the pilot, a nice youngster named Martinelli, whether he could handle another passenger, thinking of how Elizabeth would thrill at the idea. No, he said, one live passenger was his limit - but two corpses were OK (Geiger did a lot of mountain rescue work, much of it really really dangerous).

At Orly there was an Air France chap at the foot of the Caravelle steps for me, and my skis and baggage were transferred directly to the big jet across the way. What a thrill!

I had only an aisle seat, but my 707 seatmate turned out to be the Air France chief of cabin service, so we got even more attention than the other VIPs. I told him about my morning flight out of Zermatt, which made him blink, and got his card, which I used up and down Air France for several years. The food and service were fantastic - extra staff, of course - and the Laurent Perrier Grand Siècle champagne flowed and flowed.

And Elizabeth met the plane, looking magnificent in her mink stole, and excited by my Zermatt stories and my Alpine ski tan. Quel aventure!!

Meanwhile back at the Arlington ranch Robbie continued to wheel and deal. As I had taken Fox and Douglas up on a high hill and showed them not-very-distant fortunes, so he worked on me to come over from consultancy (and a high per diem, which he hated to pay) to a senior salaried job with a fancy title and a sizable stock option.

I should have refused; I didn't want to Give Up Everything For Gold, and Herbert W. looked like trouble. But it was a high hill he took me up, and I remembered painfully how I had regretted Cuthbert Hurd not doing the same. Robbie saw computer services as a way to make millions; I saw them as a way into the future, and toward power and excitement and very good living - those Watsonian perks The Old Man had generated. And more trips to Zermatt. I said yes.

But I distrusted Robbie. You could tell in your first few words with him he would sell anybody's birthright for a mess of pottage, and scrooge around while the pottage was on the boil. So I inserted a clause in the

agreement giving me a pro rata chunk of the promised stock package if the relationship was terminated before the option matured.

Well! What we both wanted to do was to combine my very special knowledge of the IBM STRETCH program, my familiarity with the large-computer operations environment, my contacts in the Southern California tin airplane business, and my demonstrated persuasiveness, with the C-E-I-R willingness to promise anything, anything, anything.

"Don't spend a penny you don't have to," was Robbie's first command. So instead of setting up an office on Wilshire and hiring a couple of beautiful secretaries, I rented a motel room in Sunset Tower West, within walking distance of ten good restaurants, and put in a private phone line.

I breakfasted most mornings at Schwab's, which was only two blocks east (I was in the heart of the dollie belt, between Chateau Marmont and Scandia). Elizabeth, confident of her attractions [and rightly so] gave me carte blanche. "When you have sex with some of those Hollywood beauties," she said, I want to hear the details. If they do anything you particularly like ... What a woman!

One of the few loose ends in a rather tight expense-account package at C-E-I-R headquarters was a generous mileage rate for use of your own car (probably because Robbie drove a big Cadillac). I instantly made a down payment on a magnificent scarlet Alfa Romeo Spyder. The radio and other electrics were dreadful, but oh! that engine - and I bought an imitation-Hermès head scarf to keep in the glove compartment for "Hollywood beauties" to put on while I had the top down!

Just right for me, that little car was. John Lowe drove a horrid old old Buick to accommodate his wooden leg; Jack Strong had a Caddie a lot sexier than Robbie's; Cecil Hastings had a bicycle! The outfit I bought the Alfa from, Hoffman Motors, had its main office in Manhattan; I dealt with them, which made the monthly payment thing simpler and provided New York plates against the Sutton House address (and let me avoid sales taxes in both states). A salesman on Wilshire got the commission, so I got good service; the whole concept of working "in the cracks" became familiar in later years, when I was a full expat!

I settled in to writing a series of fairly fat proposals, ninety percent boilerplate but ostensibly tailored to RAND, three Douglasses, two Lockheeds, North American, Hughes and so on. Each one offered a cooperative arrangement to install and operate a major STRETCH system in the LA area, with C-E-I-R taking a third of a shift to resell to smaller clients and four partners buying a sixth of a shift each.

I specified simple arrangements to expand a partner's utilization and of course reduce the per-hour cost, and offered on the other hand to resell on commission any unused time from the guaranteed share. I specified how the number of partners could be increased or decreased. I proposed to expand to a second smaller system after two shifts on the first machine were solid. I gave a list of components for each system, with capabilities and probable costs - data not available from IBM, which was constrained by the 1956 consent decree, even though announcement was imminent.

It reads well even today; it was free of legalisms, spoke frankly of trust between the partners instead. It reflected deep experience on my own part and on the part of every proposed partner in operation of big computers. Wasn't anything like the document Union Carbide and C-E-I-R had signed for New York. And, much to Robbie's dismay, it listed the possible partners to whom the proposals were directed.

I had his consent to put out a "preliminary proposal" to generate partner comments, and had STRETCHed that permission to the limit. I knew that if the seniors back in Arlington, and the lawyer and the finance guy, and Robbie himself, once started improving the script, I'd be stuck in Sunset Towers until IBM not only announced, but some competitor like SDC or even IBM itself made a similar offer. I used that argument to get a reluctant OK, but of course Robbie expected something itsie-bitsie, not this forthright document.

I hand-delivered three copies to the computer big shot at each location: I knew each one, was liked by some (Lowe, Strong, Armer) and respected by almost all. I expected a copy would find its way immediately

to the local IBM office via Cuthbert Hurd's Applied Science people, and blandly mailed a request to the LA office on D-day (my birthday, 13 September 1960) for "a senior sales rep and one of Hurd's gang" to call on me as soon as possible and "get discussion going on a probable C-E-I-R order for an early STRETCH".
HmMMM!

My phone rang off the hook for a day or two; most of the recipients knew what I was working on, but even Lowe had not known details, or what I proposed to charge. Then silence, as the document worked its way upstairs in the various organizations.

It got topside fastest in IBM, needless to say, and a stiff-backed local management type (in a sport jacket, however, which was a nice touch) came out to read me the riot act. He was icily not amused when I suggested that the Service Bureau Corporation might well want to compete "as they tried to do in Huntsville" - cruel, cruel! "Perfectly all right with C-E-I-R, George," I said, "but remember this meeting establishes our right to a machine ahead of SBC, or I'll stir up a Consent Decree stink you wouldn't believe!"

While we wait for the denouement, two stories: one starting with Paul Brock, one about Robbie. Paul introduced me to his favorite lunch place, which was walking distance west of me (but too far for Paul!), the famous Cock `N Bull. Lots of movie types, and the best barbecued beef bones on the West Coast (or so Paul said). I opened a charge account, and wondered if I should wear an ascot. Driving up in the Alfa helped a lot too.

The Right Drink was Pim's #1 Cup, with a cucumber stick. Filling up the big pewter mug with Cock `N Bull ginger beer was what had given the place its cachet. And even Jack Strong was impressed by the women.

Early in my stay Robbie flew out. His plane was rerouted to San Berdoo, but I was alerted, so I drove out to save him the ugliness of a cheap airport bus. He did not, repeat not, like the Alfa - even with the top up. But I told him it was cheaper to operate than his Cadillac, and much easier to park.

Turned out he was not inspecting Sunset Tower West. He had had a long, strange telephone conversation with the CEO of a Los Angeles firm that wanted to either buy out or at least to take a major position in C-E-I-R. I have to beg pardon for having forgotten names and details; in all my papers I have found no trace of this peculiar visit. I remember that the company involved was the one that had taken over, and later dumped, the hardware part of the Beeman/Bell Telecomputing Corporation when it was broken up, largely because they valued the name.

I tagged along with Robbie, mostly to provide cheap transportation - LA taxi rates were unbelievable. We ended up in a lavish Beverly Hills mansion with three hard-eyed entrepreneurs who seemed to know the C-E-I-R balance sheet as well as Robbie, and two luscious wenches who served drinks and generally decorated the place. Robbie was repelled by the whole thing; much as I was later to dislike him, his original sturdy Yorkshire morality and LSE/Oxford intelligence surfaced frequently, and this was one of the times.

The weekend was coming up. "I have a place in Palm Springs," said Hard-Eyes Number One. "Let's move out there and do this more informally around the pool." Robbie muttered some pathetic story about having commitments in Virginia, and we scrambled out. I was bursting.

"Herb, what were those two women there for?" asked Robbie plaintively as we Alfa-ed off to his cheap motel. "The blonde was for you, you lucky boy!" I laughed. "You could have ravaged her all weekend, while Old Hard-Eyes was rowelling his brunette and going through your wallet." He thought I was kidding!

If they had had the foresight, or the generosity, to provide a redhead for me, I would have persuaded my dear boss to at least go out into the desert and put on borrowed bathing trunks, and maybe even get laid. But no Yorkshireman would sell his company to Hard-Eyeses for nookie. A Saskatchewan, maybe; it would have to be prime, prime nookie! I'll never know.

Two things came together suddenly: IBM made formal announcement of STRETCH; the story was carried in the May/June [1960] DATAMATION. And I began to get turndowns from my submissions. Most of the latter were not connected to the IBM story; for instance, Paul Armer's boss at RAND wrote me a scathing letter saying that if my idea of a cooperative was sound, RAND or SDC would be far better placed to sponsor it than this dubious outfit I seemed to be associated with (I took this to mean "no"!).

But one or two were connected. I got a plaintive call from my friend John Lowe at Douglas Santa Monica pointing out that the official IBM performance figures were a good deal less impressive than my estimates, mostly due to the non-announcement of the freon-cooled rapid memory, and the prices were somewhat higher. I had discovered this already via Applied Science friends who had sneaked me a same-day copy of The Grand Announcement, and I had called C-E-I-R with the news.

Over the next two weeks I checked out the full list, many of which probably would never have written me their refusal. I had expressions of interest from a subterranean at Hughes named something like Mayhew, who a couple of years later turned out to be a very important skulldugger for Reclusive Howard, and from Jack Strong and Frank Wagner at North American Inglewood, and a "keep us informed" from Northrop. Not enough, I told Robbie.

As Director of Corporate Planning or some such - I really thought of myself as C-E-I-R Flexible Ambassador To Aerospace - I knew Robbie was well into a public stock offering, and had even been shown drafts of the prospectus, now in a delicate stage. The UK office and the Union Carbide shared installation were carefully described, a new venture underway involving Orchard-Hays but not me was mentioned, and the intention to "explore" a STRETCH was very briefly referred to, with appropriate cautionary words about its probable high cost.

What I could not know `way out on Sunset Boulevard was that Arlington was in a wild tizzy over the offering. It was many years later that hi-tech outfits and venture capitalists and underwriting firms "did" several such affairs a month; it was all new in 1960, and not only Robbie but all his stock-option seniors were expecting to turn some of their holdings into Real Money if all went well.

And here was this bearded loose cannon, Call-A-Spade-A-Bloody-Shovel Grosch, telling his prospect list C-E-I-R would have to rework its STRETCH proposal. No, no, nooo!!

Picture me standing under the open stairway in the lobby of the Jack Tar in San Francisco [but I was staying at the Clift!], holding forth to a small skeptical audience about the AFIPS conference we were all attending, and why IBM was being so close-mouthed about STRETCH. Two formal types, obviously not computernicks, came up to me and asked if I was "Doctor Herbert Grosch". I should have said, "Who wants to know?" I suppose, but instead I said a brisk yes.

And they served me with papers. First, a formal dismissal notice from Robbie, to take effect at the close of business in California that very day - about an hour ago, in fact; second, a demand that I turn over all C-E-I-R papers and property to a named lawyer on Wilshire in Los Angeles "forthwith", at which time a severance check would be delivered; third, a temporary injunction granted by a San Francisco [!!] judge prohibiting me from discussing any and all C-E-I-R affairs with third parties, and calling on me to appear in his court with counsel, also "forthwith", if the injunction was not to be rendered permanent. Jeezus!

I was too cynical about Lawyer Scam to rush out and hire somebody right away. Instead I did the unorthodox: went over the next morning to see the judge who had issued the injunction, told him that all the papers (and all the people Robbie wanted me not to talk to) were elsewhere, and that I was removing myself from his jurisdiction, ahem, "forthwith" - mentioning Sydney and Tokyo but not Papeete. He agreed pleasantly [this was San Francisco, not LA or DC or NYC] that the matter appeared moot. We shook hands, and I drove immediately to the airport.

If I were doing this part of the book in chronological order, as editors and reviewers and friends have

urged, I would now embark for Tahiti. Really!! Instead, I'll finish with The Son Of York and his minions.

I had a speech engagement elsewhere, and the travel involved gave me time to figure what to do. I already had tickets for the adventures to be described in the next chapter, and there was several days idle time in Los Angeles that I had planned to use to call on potential STRETCH users (not including Mr. Hoity-Toity at RAND!).

I used them instead to close out the Sunset Tower apartment and telephone, store a carton of C-E-I-R papers and records, go ahead with the previously arranged garaging of my pretty red Alfa, and set up an appointment with Robbie's Wilshire lawyer.

I asked him if he knew of the option agreement, and he said it was not mentioned in the papers that had been sent him (in other words, he was just an extension of a Nest Of Vipers in D.C. or Arlington). He tried to be coy about the severance check, but in the end admitted it was "salary due you" up to the moment of dismissal: Yorkshiremen did not do Golden Handshakes.

Telling him that I had carefully stored away "all C-E-I-R documents" on my own time and at my own expense, I bid him goodbye. The check? he said. "Send it back," I smiled. "There will be a lot more haggling when I get back from Australia. Be sure to tell Robbie I mentioned the option agreement." And I drove away to the airport [rental car].

Six weeks later, when I flew into Idlewild from Europe [yes, Europe!], Elizabeth was horny, amused, and bemused, in that order. She reported numerous anguished phone calls from secretaries (a big mistake, with Elizabeth), lawyers, C-E-I-R executives - but not The Son Of York. "Let it sizzle, chickadee," I laughed. "Meanwhile, let me show you the Thai silks I brought you, and the jewelry."

In play were the following elements: papers in Los Angeles [trivial, but the lawyers didn't know that], my knowledge of the California possibilities for C-E-I-R, ditto for Australia, severance pay, the option agreement, a round-the-world first class air ticket charged to Arlington, and expenses in California and Sydney recently billed. In the wings were another troupe of actors, waiting for me to start a Cleveland facilities-management company related to my Huntsville success. And, very very reluctantly, I had hired a lawyer. Complicated!

My lawyer called their lawyer and said I was "back from Australia and Japan". I presume they grappled. There is to be a meeting in New York, my guy told me. No hurry, I said.

As I expected, Robbie himself did not come; in fact, I didn't see him again for over twenty years, after he had made his pile. A lawyer and the C-E-I-R finance man showed up. Grumpily! I reminded them that serving papers on me without warning - and in the Jack Tar, for God's sake - did not precisely fit the image they wanted to display in the underwriting, or in Los Angeles.

The C-E-I-R lawyer talked about the injunction. Never made permanent, I replied. I also seem to remember telling him in scatological frankness what he could do with his injunctions, and that I would send a copy of the next one to the SEC the day it was served. Shush, my lawyer said.

The beancounter produced a list of disallowed expense (not just the glorious Air France ticket, either). My lawyer countered with a demand for salary due and three months severance pay in lieu of "customary notice" and mental anguish. Pretty!

He then produced the employment agreement, much to the finance man's disgust, and claimed 523 shares of C-E-I-R stock, based on my [short] length of service versus the five-year option payoff. The phrasing in the contract was clear, the message, unacceptable to Robbie, who had most of the stock.

We threatened to bring suit (with copy to the SEC, I laughed). The lawyers said the finance man and I were disturbing influences and chased us out for their conference. In the event, C-E-I-R agreed to hand over the

stock, provided I understood it could not be sold or transferred for one year [or maybe longer; I find no trace in my papers]. They agreed to swallow all the disputed expenses except the Big Ticket, and to pay salary plus one month's severance pay.

I had tried to get my lawyer to bargain for his fee, but he said it was unethical. I told him I wanted his skills, not his ethics. Failed on that one!

There was a nice upshot. I mentioned above that I was being urged to start a facilities-management outfit. When incorporation was complete, and I had been elected president, I sold Robbie's precious 523 shares, making nearly ten thousand bucks on the deal. When the C-E-I-R troops descended on me en masse, I pointed out that there was no prohibition on my working for a competitor, or starting one, and that conflict of interest required me to not hold C-E-I-R stock while doing so.

And I paid my lawyer. He was not happy with me, and said Robbie would undoubtedly sue. I'll need you again if he does, I replied.

After the STRETCH announcement settled in, the Wall Street Journal reported that Robbie had rented two of the monsters, and had hired my good friend Jack Strong to run one on Wilshire Boulevard. I called him instantly and warned him about Robbie, but it was too late. When I went out to Los Angeles to retrieve the little Alfa, Jack had signed with a building manager, and the C-E-I-R logo had gone on up topside.

In the end IBM installed only four or five machines, now called 7030s, in the U.S. They put one into the AEE in England. And, anxious not to make or service any more, they released C-E-I-R from its contract. Jack put in a 7094 on Wilshire, but I never saw it; I was living in Monaco.

To the best of my knowledge, none of Robbie's senior employees made a buck out of their options for years; the stock dropped like a stone not long after I sold mine, leaving Orchard-Hays and Moshman and still-my-friend Strong, and the founding nontechies, unenriched.

The literature has carried some of the story of the STRETCH disaster, including a little of Red Dunwell's story. DATAMATION was the only trade journal to cover the story as it happened, and anecdotally, but later publications filled in. Probably the weirdest yarns were on p.18 of the September/October DMN issue, which said C-E-I-R would pay \$300,000 a month for one 7030 (the second was not mentioned), that Robbie had bought out General Analysis Corporation to get programmers to staff it, and that RAND had been considering copying my cooperative idea but had backed off!!

An associated story signed by Bill Orchard-Hays said programming was an "Important Key To STRETCH Future", which I took to mean he had spare bodies in his new Houston shop.

I really never heard much more of the huge debacle than was published. The official IBM position was "Grosch? Never heard of him", and the techies who were not bound by Galactic Headquarters strictures either didn't know much (the details were narrowly held) or regarded me as one of the causes - remember Baby STRETCH, and the ambitions of Fred Brooks and Werner Buchholz and all, killed by the 7090 concept? The late Cuthbert Hurd probably could have told the whole story. And some of Tom Junior's unhappiness surfaced in his autobiography decades later.

One cause was the failure of the freon-cooled ultrafast scratch-pad memory. Another was that look-ahead, which has been incorporated in current fancy chipperly, doesn't do as much for most applications as the 7030 architects had hoped. And announcement was six months delayed.

Big problem, I'd guess, was that LARC, the RemRand rival supercomputer, could be seen by Watson Junior and his Golden Boys to be a complete failure, so the urgency to finish and publicize and sell the unhappy 7030 was much reduced. Obviously IBM lost money on each one, as they had on the 701s, and with LARC dead in the water there was beancounter dissent. Watson Senior said "go" on the 700 series, but even he might have passed on STRETCH.

27 VERY, VERY NEW WORLDS TO CONQUER

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In Chapter 27 you will encounter

(in order of appearance):

ANCCAC *the first Australian National Conference on Computers and Automatic Control*

John Bennett *from Illinois to SILLIAC*

Eiichi Goto *inventor of the parametron*

RTW synergy *cheap add-ons with a Round The World air ticket*

The real transpolar *AF and JAL went far north of Greenland*

TAI [laterUTA] *Paris to Los Angeles the hard way*

Ava Gardner *I picked up what she sloughed off*

Sunderland flying boat *talk about tin airplanes - and double-decked!*

The Society Islands *Bora Bora, Tahiti and Moorea: lovely*

PIP *I founded the IBM-free Polynesian Information Processing Society*

The Lucs *the French consul in San Francisco and his English wife*

Fiji beaches *white sand instead of Tahiti's black*

TEAL Electras *the Lockheed wing spar was done in floating point*

South Island *New Zealand is an earthly paradise, especially if you are a sheep*

Mount Aspiring *looked like the Matterhorn, from a small plane close up*

Sydney *a vital city in a burgeoning economy*

DATAMATION *carried my long trip report, and much more*

TRT *I met LEO's remarkable Thompson for the second time*

Clem Harper *our friendly ANCCAC chairman*

The BOAC Comet *slim engines in the wing roots, and beautiful*

Bangkok *even in wat country, T.J. reached out*

Hong Kong *the world's scariest approach path, with a splash at the end*

Kurosawa-san *we exchanged name cards and farewell bows*

JEIDA Center *Japan Electronic Industry Development Association showed four minis*

"Nikkatsu hoteru" [hotel] *by taxi from, and with a vital line of kanji, to!*

The Tokyo subway *I used base-one digital techniques*

Kaoru Ando *later chairman of IFIP, and a friend*

Isao Takasaki *his career detour helped the whole Japanese computer industry*

IBM Japan *treated well by government and users alike, and reciprocated*

88° north *while eating dinner at Maxim's*

French strikes *busses from Brussels, and lamps in the hotel corridors*

The Lotti [25](#)

Sandy Douglas [26](#)

Roberto Olivetti *third generation in the office machines industry*

Boz de Ferranti *instant friendship with an owner, an MP, and a future BCS president*

Stan Gill *co-author of the very first programming book*

The Ferranti ATLAS *Manchester's riposte to the LARC and the STRETCH*

Carving the joint *necessary skill for a works manager, but not in GE*

Elizabeth 19

While playing games for C-E-I-R on Sunset Boulevard, and eating delicious beef bones down the street, and ogling the wannabees at Schwab's, I had been preparing for a magnificent new adventure.

There were multiple threads, not all computer-connected. Two that were, dominated. The Bennett Boys

were about to hold their very first ANCCAC, Australian Conference on Computers and Automatic Control, in Sydney. I had known John Bennett since his long stay in Champaign, and we are still friends today. He invited me to chair one of the user sessions, offering only a complimentary registration but referring obliquely to my "new" C-E-I-R connection [computer trade gossip crossed even the Pacific and the equator, probably via DATAMATION].

I knew enough about the Australian enthusiasms, and about Robbie's desire to fly high among overseas English-speakers, to propose to him that he consider setting up in Sydney as he had in London. Exaggerating my acquaintanceships, I promised him to turn up another Sandy Douglas. He didn't want to pay for such expensive prospecting, but told me to keep Bennett's offer on the front burner. In true Groschian fashion, I took that to mean "go, boy, go!".

The second thread was that I had been following the very small trickles of news coming out of Japan. I had exchanged letters with Eiichi Goto, who was still at Tokyo University doing componentry, and I knew a little about how the famous Dr. Ikeda was transforming Fujitsu from a communications outfit. I knew IBM was dominant among the very very few solidly American firms operating in Japan. And I had written down a name or two from the Electrotechnical Lab, which was a cross - in those days, a miniature cross - between the Bell Labs and Sam Alexander's NBS.

Wasn't much, but most Americans in computing had no interest or knowledge at all about the coming Japanese explosion. My IBM information was seminal - and besides, I remembered those unexpectedly original Japanese aircraft gunsights back in 1942!

Also I had seen the equipment from four Japanese companies at AUTO-MATH 59 at the Paris ICIP meeting: Fuji, Hitachi, Nippon Electric [today's NEC], and Oki.

Scouting new business for American enterprises, as I later did in Europe when I did my ITT investigation [which I haven't gotten to yet: patience!], I thought it feasible to pay the extra air fare myself to return via Japan. If nothing else, I could write it off on the income tax (not that my bracket was all that high!) And it was not a lot of money, assuming Robbie did the Sydney ticket.

Now the non-computer excitement began to mount. Looking at the seductive route maps in the back of the Official Airline Guide, I began to list stopovers [no extra charge for first class passengers; this was decades before crazy fare wars and special tour tickets]: Darwin, Djakarta, Saigon for the Angkor ruins, Bangkok, Hong Kong; wonderful! And remembering the vast expanse of Captain Bligh's Pacific, why not Fiji and Tahiti?

By this time I was spending almost as much time in the downtown Los Angeles Air France office as at Sunset Tower West. They had the International Edition of the OAG, and the British ABC as well, and attractive female assistance. And they knew me from the New York AF inaugural, which I winningly described from the Riffelberg onward just in case one of the ladies was between boyfriends.

Air France was pioneering the Tokyo/Paris transpolar route, with 707 jets no less, and BA was flying Comets, with a very different engine arrangement, on the Sydney/London long haul. And about this time, I began to exchange letters with Roberto Olivetti, to whom I had been "introduced" by Vacca and Ercoli.

Soon I had a half-inch-thick Air France first class ticket [I still cherish the bundle of passenger coupons] for a flight to Sydney, up to Tokyo, over to Paris, down to Milan, and back via New York to LA. Twenty-six legs, in the end: much longer than a mere RTW [Round The World].

There was a nice intromission. My original itinerary took me to Fiji, then doubled back to Tahiti by flying boat [!!!], and cost quite a bit extra. The tall Australian girl who was selling me the Air France masterpiece called me at my "office" on Sunset. There is a new airline coming in to Los Angeles from Paris via the Far East, she said, and Air France will handle it for a year or two. They are making their initial return about the time you want to go, and they are routed via Papeete.

This was TAI, Transports Aeriens Intercontinentaux [now UTA]. If I juggled my transpacific flights a bit, I could not only start a few days later, and spend a day longer on Tahiti, but save two hundred of my own dollars. Wow!

I talked to the chap who had just been appointed TAI sales manager for the U.S. He said they would accommodate me in Tourist, since the first class was filled up for the inaugural flight with assorted VIPs. I said OK, but if I held on to my first class coupon would he promote me to First Cabin if some VIP no-showed? Not likely on a free trip to Tahiti, he laughed, but sure!

And that was what happened. The extra time before starting was just what I needed to straighten out some of the mess that Robbie and his nasties had created. And while I was doing it my Air France lady called to say that, ahem, Ava Gardner had dropped out, and I had been assigned her space!

There was no counter yet for TAI at LAX, but I found a great champagne farewell party underway at an air freight hangar. The DC7C - yes, propellers - was in from Paris and Papeete, with a load of somewhat frazzled French VIPs and some very thirsty crew members (both groups were staying over, while U.S. VIPs and a fresh crew that Air France had deadheaded in via the Atlantic two days before, took over).

It was complicated, in the inimitable French way. The French guests were to see Hollywood, San Francisco, Vegas and so forth, and return to Paris on the next flight (same plane, a week later). The U.S. guests, most of whom could not afford to be away as long as the French VIPs, were to have a three-night stopover in Papeete and go back to Los Angeles on the flight that was to pick up the French guests. The whole ball of wax included crew rests in New Caledonia and Tahiti, a crew change at LAX, and at least a day to load more champagne on the DC7C at Orly!

Problem for the Ava Gardners was that the affair used up a whole week. And everybody except the air crews were confused by the International Date Line, and crossing the equator. Well, not me - after all, I had been an astronomer!

As I circulated, champagne flute in hand (real glass; this was French VIP treatment), I began to realize I was not all that much out of my depth. I wasn't Ava, no - but I knew several of the guests and had connections to others. Through Evendale I knew the publisher of Aviation Week and the president of Western Airlines; through the ARS and IBM I knew two NASA people, and by a London social accident I knew the English wife of the French consul in San Francisco. Soon I was swept up by the group, and in fact not only got Ava's hut and complimentary Mini Renault but was asked to keep them when the American troop went back to LAX. What wonderful good fortune!

The big bird landed to refuel at Honolulu, crossed the Equator and made most of us in first class into shellbacks, and landed on a long but little-used airstrip on Bora Bora. The airport "building" was an open-sided thatched shelter, but a good party was laid on anyhow. Meanwhile a huge Sunderland double-decked flying boat was landing in the lagoon, and we were taken out to her by two launches - the entire Bora Bora fleet.

We took off to remarkable tintinnabulations, flew low across a dozen atolls and islands, and ended at dusk in Papeete harbor, welcomed by a terrific dancing troupe.

The airport at Faa was under construction, and when it opened a year or so later it killed off the flying boats with TAI, but they continued to operate as Polynesian Airways or some such, for another decade.

The best-known member of our VIP group (now that Ava had dropped out) was a grizzled Pacific figure who owned the most famous older hotel on Waikiki Beach, the Royal Hawaiian. He operated his own long-range PBV amphibian, and flew all over the enormous South Pacific. There were only a few ladies; the best-looking was the wife of the Chief Pilot of Air Madagascar [an AF feeder], but I much preferred the English lady from San Francisco, who was a manufacturing chemist [!!] even though married into the

French diplomatic corps. And sexy in spite of it!

And it was not only the male VIPs who missed Ada. The hut maids at Hotel Tahiti made it clear I was a poor poor substitute.

We had arrived on May 8th. After a hectic but wonderful three days of partying and sightseeing, the VIPs - by this time I was saying "the rest of the VIPs" - were flown back, and I was left in The Little Hut, with a gratis rental car and free room and board. Very lavish!

I founded the Polynesian Information Processing Society in the bar, and published a story about it in DATAMATION some months later. Membership entitled you to say "I'm a PIP" and to attend the annual meeting "on any island of the South Pacific not having an IBM office". Cecil Hastings was to be an honorary member.

Parenthetically, when I got back to Papeete almost twenty years later, IBM had an office there, servicing the French atomic test sites. The PIP meets no more - but I'm remembering one can now fly into Easter Island. Surely, surely, IBM will never ...

Well, TI 89 showed up westbound on Bora Bora and took me away to Nandi. The distances were huge. I not only crossed the International Date Line for the first time, but saw my very first in-flight movie! That was 2100 statute miles: seven hours, in propellers.

I took a ground taxi to Korolevu Beach [30 miles], snorkeled amid gorgeous deserted coral reefs, flew air taxi back to Nandi - never did get to Suva - and boarded TEAL for New Zealand. That was Tasman Empire Air Lines, now Air New Zealand. Electra turboprops; I was wondering whether the wing spars had been changed from the older design. There had been crashes, which I feared had been due to floating point calculations on the two Lockheed 701s. Not true, it turned out; it was faulty applied math, not computing software, that buckled the wings.

From Auckland I flew on to Christchurch and Dunedin, my lifetime farthest south [46 degrees], where a rental car awaited. Getting it had involved the New Zealand consulate in New York; Hertz and Avis were not yet trying! It was a green Holden sedan, and not much compared to my delicious Alfa Spyder back on Sunset, but I drove away with enthusiasm anyhow, to a hotel in Queenstown.

Having done a very thorough job of guidebook reading back in New York, I had booked a light-plane flight out of the tiny airport, first along the famous Track and the waterfalls, then to a landing on the beach at Milford Sound (where the operators of the lodge were just closing up for their winter - May 20th!), and finally after tea off to circle Mount Aspiring in the New Zealand Southern Alps (reminding me and two other passengers of the Matterhorn).

Stupendous scenery; I have been back to South Island three times, and it remains a scantily populated Earthly Paradise - ten times more sheep than people! Good university at Christchurch, too.

Well, I drove next day to the handsome new Hermitage Lodge at Mount Cook - a very different surround from Zermatt, but full of end-of-season climbers nevertheless. And it was the weekend. I had not brought any climbing gear except light boots, but managed to get up to the famous Ball Hut anyhow and take a few pictures, which I still treasure.

On the Tuesday I turned the muddied little car in at Christchurch Airport and flew away happily to Sydney and computerdom on another TEAL Electra, thirteen hundred miles of blue Pacific.

Youngsters from John Bennett's crew met me at the busy airport, saw me to my luxury hotel, and arranged to get me out to the conference next day. Most of the British guests were in cheaper quarters, and there were only five or six Americans; I stole off to King's Cross and enjoyed mild Australian raunch: nothing to what it is like today.

A computer conference was Big News in Sydney, and I got a good spread in the press, mostly because I said naughty things about IBM and knew a great deal about the British adventures. In fact, I used the newspaper story at the IRS next year to get them to not disapprove my deductions! But I shall do better to quote my key paragraphs from the July/August 1960 DATAMATION:

herb in australia

The Sydney sessions were a huge (I choose the word carefully) success. Originally Bennett, Harper [ANCCAC chairman] and the other organizers expected one or two hundred people, and perhaps thirty or forty papers; they ended up with six hundred registrations, 140 papers in quadruplex (usually one business applications, two technical applications and one design session in parallel), and a major program of visits to sample installations. The meeting was opened at the University of Sydney and sessions were also held at the University of New South Wales across the city. It gave me an eerie feeling to hear J.P. Baxter, chairman of the Australian Atomic Energy Commission, bewail the low output of "mathematicians and of engineers with adequate mathematical training" and predict that the spread of computers in Australian industry would cause a shortage of mathematics teachers in schools and universities. Another hemisphere, same problems! That was the official opening speech, too; Baxter is also vice chancellor of the University of New South Wales.

Preprinted summaries of all talks were distributed at registration; these were bound in four units, one for each parallel session - a nice touch. There was a well-attended cocktail party instead of a banquet; the idea may well have been brought back by the many visitors to our JCCs from those climes, but the well-oiled recruiting pitch was conspicuous by its absence. The familiar rivalries of Los Angeles and San Francisco, still lingering like grit between the molars from two weeks before, transformed smoothly into Sydney and Melbourne after only a few sheries.

I heard perforce less than a quarter of the papers. Those reciting actual accomplishments were in tune with current [U.S.] installations: quite a few 650s already, RAMACs and 7070s later this year, a 7090 for the Weapons Research Establishment just ordered (that's IBM; about the same level of sophistication in English equipment, of course). The projections, though, were closer to our current excitements: an Army DP concept like Fielddata, overly fancy automatic coding system plans, remote data input/output and transmission channels. Even the extreme upper end of the size spectrum is being considered, rather to my surprise - mostly ATLAS, but LARC and STRETCH are under surveillance.

And the universities, with apologies to my good friends there, are falling behind just like ours.

The largest newspaper put out a special section on the meeting, with five pages of ads from the major English manufacturers. I made the front page, via a photograph cribbed from an old DATAMATION masthead, and so did Thompson of LEO Computers Ltd. Swann of Ferranti's also came down. Burroughs, Remington Rand, and Bendix (there's a G-15 in Sydney) were represented by their local affiliates, and there were substantial pushes from English Electric and EMI. There is no purely Australian effort - nothing, at any rate, corresponding to the Holden automobile, which while a GM product is designed for and manufactured in Australia. My educated guess, based on only a week in the country, would be that IBM and Ferranti are tussling for the lead

The number of major applications will probably be out of proportion to the Australian population (say ten million people). But the tasks are smaller; thus the largest stock broker in Sydney or Melbourne needs a 7070, not a 7080. Balanced against this is the tremendous optimism and excitement of the Australian boom and the scarcity of clerical workers.

I reverted to tourism and anonymity after four days, made my own way out to the airport, and boarded my first BOAC Comet. Unlike the 707 and DC8, it carried its Rolls Royce engines in the wing roots, giving a lovely sleek look and a few miles per hour faster speed. Trouble was, changing engines took a day or more as opposed to hours for GE or P&W machinery; also, it presupposed future engines would be small, and I knew from AGT Evendale that the economies of fan engines carried with them necessarily bigger diameters.

And although I was a first class passenger, nobody on the crew wanted to talk engines with an ex-Evendaler!

Even at cometary speeds, it took forever to cross the empty heart of Australia. BA709 refueled at Darwin and Djakarta, and put me down almost eleven hours later in Singapore. Needless to say, I had reserved at the Raffles, Traveller's Palms and all, and found it a great relief from airports and air passengers. I had no computer contact on that first visit, but concentrated on eating and sightseeing. On later trips I got to see Kuala Lumpur and such, but in 1960 the ex-colony was pretty quiet, and there was no time to explore the tailoring shops.

Next day I took a less interesting 707 to Bangkok, where I had allowed time for temple trotting. This was partly intentional, but mostly due to the fact that I had been unable, even with the expert help of my handsome Australian AF agent in Los Angeles, to figure out a way into Angkor. My Air Madagascar chief pilot had told me in Papeete it was just as well: "The end of the earth," he called Siem Rep airport. "Even if you get in you may be stuck there for days."

Bangkok traffic was wild, and driving was on the left, and the stop signs were lettered in Thai [but octagonal!]. Still, I wanted to try my hand; after 1954 on Buckingham Palace Road it didn't scare me - much! Problem was, like New Zealand, Hertz and Avis had not arrived, nor Godfrey Davis either. The Erawan sent me to a garage that was amazed I wanted to not have a chauffeur, and asked four hundred bucks deposit in consequence.

As I emptied my wallet of Air Travel cards and assorted plastic, the young lady who had been assigned me because of her good English espied my 1958 IBM ID card. "Oh," she said, "I have an IBM electric typewriter!" and waived the deposit. I thought it better not to tell her I had been fired avec impressement 53 weeks earlier: bless you, T.J., wherever you are, I thought.

The driving was mostly difficult because of finding my way, but I had a map with icons of the major temples [wats] superimposed, and one could often see their spires in the distance. I finally got to the Wat Arun, a fabulous structure garnished with broken crockery as I recall, climbed up and around on it while remembering the top of St. Paul's in just-postwar London, and took some great Kodachromes. And back at the hotel I was braced by a rambunctious American who had heard me lecture in Chicago. Cooo!

I had three amazing days, and drove out to the airport past ditches full of water buffalos to board a familiar PanAm 707 - the famous globe-circling Flight 2 - for Hong Kong. It was of course my introduction to the terrifying approach path into Kai Tak, leavened by the fact that my seat mate in first class turned out to be the pilot's wife! Thanks to her husband, we made it.

I had booked into the famous Peninsula Hotel in Kowloon, and was intoxicated with its splendor. Didn't forget to buy goodies for my eager wife back in Manhattan, either: Thai silk, very much more cunningly offered than at the Erawan.

In later years the city became a major computing center, but in 1960 it was pretty much commercial DP (and punched cards, at that). I had almost three days to look around, and found my British connections more useful than even those with IBM. My reports in DATAMATION were scanty on Bangkok and Hong Kong.

I gorged myself on strange foods - not all Chinese, either - and explored Victoria as well as the mainland

side. I knew about *taipans* but only on later trips got to meet any. The Peninsula was better for richies than techies, however, so it was with mild relief that I boarded a Britannia propjet for Tokyo.

This was my first Canadian Pacific flight since Elizabeth and I had weathered Amsterdam/Churchill on our 1956 honeymoon, and my first Britannia. It was a long although very comfortable six hours; a Comet or 707 would have taken four. First cabin service had begun to offer sake and hot facecloths, which helped.

My seatmate was a stocky Japanese businessman of perhaps fifty. He saw me reading a copy of DATAMATION which I was marking up to show in Tokyo, and gently opened a conversation. His name - we exchanged "name cards" early on, as I already knew I should do - was Kurosawa, and he was the boss of the Japanese company that marketed and serviced Creed teletype equipment. "Electronics soon!" he said.

He was discreetly surprised that I would venture into Tokyo (and on a first visit) without introductions. I explained I was known to people like Goto, and that I could call at IBM "although I now work for a customer". And I told him I had some knowledge of the doings at the ETL, Electrotechnical Laboratory, although no acquaintances as yet. Growing bolder, I told him a little of my history, which he absorbed stoically.

He began to describe the structure of JEIDA, the Japan Electronic Industries Development Association, of which his company was an active member. I had read nothing about it in DMN or the WSJ (and had not yet become a regular reader of the HERALD TRIBUNE, which didn't cover Japan very well in 1960 - or computers, for sure!), so I listened intently. He said as soon as he reached his office he would call and tell them of my arrival, and that I should have the concierge (he said "hall porter", reflecting the Englishness of his Creed connection) call and arrange a visit for me "with a Mr. Takasaki, who speaks good English".

We parted with much expression of esteem (I practised bowing, rather clumsily), saying we would get together in a few days. Decades later, I am curious he did not offer me a ride into town - being met by family instead of just his driver, perhaps? I paid an enormous fare for a taxi to the Nikkatsu, not being sure enough of the interchanges to use cheaper methods. My mouthing of "*Nikkatsu hoteru*" worked, to my relief; my New York guidebook was not sophisticated enough to print the *kanji* to show drivers. Within the hour I had bought a wonderful white-covered one that did!

As I had been warned, finding one's way was the overwhelming problem. A primitive and very very expensive method was to have the, ah, hall porter call ahead, write the extremely complicated directions (which everyone who had foreign visitors expected to have to give) on a small paper which had "Take me back to the Nikkatsu" printed at the bottom in Japanese and three western languages. After some consultations between the hotel doorman, and the occasional selection of another *equipe*, the taxi would take you away, and another would [usually] bring you back. Attempts to do this for more than one excursion at a time were almost impossible, the directions on how to get from Address One to Address Two not being available.

My own skills, not yet honed as they would be in years to come, were still enough to do better than that. I had a subway map with much English, another looking quite different and with much *kanji*, and a way with hall porters. Marking Tokyo University and the equivalent on the two maps, I set out to meet Goto.

Not able to match either map with the highly stylized subway signs, I relied on digital methods. Both my maps said the hotel stop was much closer to one end of the line: six stops that way, eight the other to the university and then on to the second terminus. So, trying to orient myself in an underground maze, I took the likelier direction, passed seven stops ["Ah!"] and got off. Needless to say, I was memorizing the return.

This was a time when American Viet Nam policy was angrifying Japanese in general and college students in particular, so it was with some trepidation that I asked for campus directions. The second young man I asked, however, not only had very good English, enquired of several others in the scurrying throng about physics labs, but broke off his own concerns to escort me personally to the very door of Goto's office. Ah,

Japan! Much bowing and *domo arigatoing*, of course, helped by Goto himself popping out and adding his own thanks to mine.

Nothing in my notes or the scant trade literature tells me whether it was known that Goto was going to join IBM, but I was constrained to talk only about technical matters in any case. He wanted to hear about solid state research in the West [about which he was much better informed than I], but found my stories and pictures about IBM and competitive user adventures fairly interesting. He was far better read than I in the IRE/AIEE/IEE literature, had never heard of or seen MTAC, and I felt he paid little heed to gossip magazines like DATAMATION.

He looked carefully at my souvenirs from the San Francisco Joint, only a month old (it seemed like years, back before Tahiti!) but asked about other talks than the ones I had sat through. He told me more about ETL but not much about the JEIDA shop. And he called his best contact in the marketing side of IBM Japan and arranged a meeting for me next day. It was a good visit, made easy by my obvious respect for his research and my intense but friendly curiosity about the little-known Tokyo computer scene.

I went that evening to the world-famous Nichigeki Music Hall just down the street from my hotel, and enjoyed it immensely. It was a Japanese version of Vegas, not the Reeperbahn, and I would have enjoyed even more nudity and much more raunch, but it was lovely. Featured a blond, um, goddess from Australia, I faintly remember.

I was invited to lunch at the American Club by IBM, and there met for the very first time Kaoru Ando, who is still a valued friend - and two decades later was to be the chairman of IFIP (which in 1960 was just being put together). He was at that time head of national marketing, under a Madison Avenue World Trade type whom I have forgotten. The manager's boss, a big bruiser named Irwin from 590 whom I had met, was also visiting. The luncheon was enlivened by a table-hop by an ecstatic American from Sony carrying - waving, in fact - the very first table model TV any of us had seen: a twelve-inch cube, harbinger of the "miniature" years to come.

IBM Japan was not invited into all JEIDA activities, and Ando (who did not yet realize Learson had hung it on me the year before, although Irwin knew) was elated that I would get a tour of the JEIDA installation later in the day. He told me the situation was that while "several" companies were sharing exhibit space, they had competing sales efforts, and problems with partly-shared maintenance which made it difficult to hide hardware idiosyncracies. I giggled.

I tried hard to pump for market data, knowing that Irwin would shut the flow down as soon as the gang got back to the office. I put what little I got into my DMN column, of course, along with what the locals told me.

"JEIDA" turned out to be the J.E.I.D.A. Computer Center, a square building in Minato-ku. It dated back to mid-1958, and was subscribed to [in 1960] by 58 manufacturers. Besides the Center, the outfit concerned itself with patents and licenses, worried about quality control, planned to do export promotion when there was more to export, and interacted with researchers (university and ETL, I assume). The brochure I have says "...the development of the [electronic] industry is an essential factor for tomorrow's prosperity of Japan." How true!

Isao Takasaki was a Fujitsu contribution to the Center. It was a non-standard deviation from the normal big-company career path, and in later years led to his heading a wholly-owned subsidiary called "Algorithm" which was a very early software house; a good job, and making use of his English skills, but a side track. He then migrated, amazingly, to a line job at Nippon Electric, where we lost contact.

He welcomed me cordially, already knew about my curious career and my Evendale building, and had read some of my articles - not the very earliest, about astronomy or table-making, but management stuff and the DATAMATION columns, and from them knew Grosch's Law. Very flattering.

He had already reserved dinner spaces at The Inn Of The Badger for the two of us and a couple of other JEIDAns with English. He first gave me a detailed tour of the four computer areas in the building, loaded me down with literature (which he finally recaptured and sent by messenger to the hotel next day!), and described in detail the organizational aspects of both the Center and the association. The latter was ostensibly headed by the president of Toshiba; the Fujitsu board member was a man named Wada whom I never met, but the actual direction was by one Tamotsu Saito. Takasaki headed two of the five departments under Saito, notably running the computers and most of the building.

It was bigger than I expected - four stories, nearly 20,000 square feet, and with its own power arrangements and air conditioning. The four major machines were a NEAC-2203, a HITAC-301, a FACOM-212 and a TOSBAC-III (but within the Center known as JEIDAC-101, -102, -201 and -202 respectively). The first two were small-to-medium by U.S. standards, the others small; three were transistors and diodes, the FACOM all Goto parametrons. Multiply speeds ranged from 5.4ms [NEC] to 16ms [Toshiba]. The first two had fast little drums, Fujitsu had core (but not much). Three had slow page printers but Toshiba had a big line printer; my handwritten note says "OKI"; that would seem unlikely except that Oki had shown a printer in Paris. As you read this, remember that a hundred 7090s were rampaging back in the States, not to mention DP shops - all with great peripherals.

Takasaki was expecting "a 650-size machine" in a few days (he didn't say from whom) and showed me the empty space reserved for it; the IBM crew had claimed they were actually installing 650s in Tokyo and Osaka - no customer names, however. Looked to me that on the scientific-user side Japan was two years behind the U.S. and a year behind the Brits; on the commercial payroll-and-inventory side, three years.

I still treasure the Takasaki brochure; it has crossed the North Pole once and the Atlantic three times. The illustrations are too dim to reproduce, but the memories - my memories - are vivid.

Few Americans (and no Europeans, I think) dreamed in 1960 how the Japanese would soar in the next thirty years. But certainly I've been much less surprised than most.

Dinner was fantastic. We started at the sushi/tempura bar and I was introduced to live ["dancing"] shrimp; then we took our shoes off and went onto *tatami* for major dishes; then we put our shoes back on - I'd worn moccasins - and had desserts sitting in straight-backed chairs on a hardwood floor. Weirdo plums, as I recall! Whole gastronomic abysses beckoned.

Ando and Takasaki had each listed technical applications now being done on local computers, but there were few surprises: an optical one more advanced than my by-now-old-hat ray tracing, and a first adventure in airline flight planning. I was more interested to hear a little about history; I knew about Goto, but there had been vacuum tube and even relay calculators in Tokyo back in the early Fifties. Only in the last few years has any of that been published, and it was rare stuff in 1960. I met the parametron Takahashi at Goto's shop, but didn't meet the ETL Takahashi until years later.

Before I fly away to Santa Claus land, clutching my computer brochures and my gifts for Elizabeth, I must make a few comments about the remarkable IBM presence. In the Fifties and Sixties virtually all the computer power in use anywhere in Japan was rented [or sold], brought in and maintained by the Watsonians, via the World Trade Corporation. Along with Coca Cola and a very few other companies IBM Japan was permitted to exist and flourish as a wholly-foreign entity, vital to the regime.

It was not until Fujitsu and its major rivals - yes, the ones with the other three JEIDACs - came to major stature in the computer business, overseas as well as in the archipelago, with Amdahl and Siemens for instance, that the Japanese government began to shut off its favors. Looking back from the Nineties, I think everyone concerned behaved well, the Japanese and the American manufacturers, and the Japanese computer customers.

I always leave Japan reluctantly, and never more so than on this first visit. I struggled out to Haneda (more

economically) and climbed on another fantastic flight - what a trip! Japan Air Lines and Air France were pioneering joint flights right over the North Pole - well, always within a few miles - to cut the time to Europe. On June 9th this was AF271, with a mostly Japanese cabin crew and great service. It refueled in Anchorage and was scheduled to terminate in Orly, with another quick refueling in Northern Europe if there were headwinds. The ordinary 747s do it easily nonstop, and the long range jobbies can go much farther - but it was exciting in 1960. "Divert to Thule", indeed!

First cabin was served a fabulous Maxim's-Of-Paris meal, with the same Laurent-Perrier *Grand Siècle* champagne I had enjoyed on the Air France 707 inaugural, and out of my right-hand window seat I could look south to Peary Land, the northernmost tip of Greenland. The captain came on the blower and told us we were at our farthest north, "beyond 88 degrees"! And his Japanese counterpart said [I assumed] the same.

The flight began to deteriorate in Hamburg. As the passengers, mixed first and tourist class, waited in the transit lounge, the Japanese business men found out from a Japanese stewardess that there would be a long delay. The windshield had cracked [!!] on landing, and there were no Air France spares stocked at what was only a casual refueling stop.

But worse was to come. Turned out there was a major strike in Paris, so nothing could be flown up from Orly, and it was doubtful if AF personnel in other European cities would hurt labor solidarity by shipping a windshield from spares in, say, Nice!

Some vigorous soul, quite possibly either the French or the Japanese pilot, scouted around the airport and got one of the non-European lines to "loan" our crippled flight the necessary part. After six hours we were airborne, only to land at Brussels (the strike was worsening in Paris). Angry Air France managers loaded us onto Sabena airport busses - not luxurious tourist ones, you understand - and away we went.

I crept into the Lotti ten hours late; no longer remember whether the Paris taxis were on strike. There was no electricity, and there were lanterns (in fact, I seem to remember oil lamps!) in the corridors. Even Josef, the normally unperturbable head concierge, was upset. *Quel blague!!*

I had missed my appointment at Electricité de France, and the telephones there did not seem to be working anyhow. I went to bed, eagerly. It seemed an age, aeons, since Tokyo.

Europe was ten hours earlier than Japan; we had crossed the Date Line. But the long long flight meant that I woke up on the weekend - no chance of recouping the EdF visit, since I was booked out to London Monday morning. On an Air France Caravelle! But the strike was over. I called and apologized, and was brushed off in true Parisian fashion.

I checked with Sandy Douglas, who was himself having troubles with C-E-I-R and with Robbie, and who wanted to hear all about my legalistic decapitation. Wasn't much interested in my stories about Japan, which was disappointing; I was bursting with them.

The Savoy Grill was fully booked, but I had a great dinner at Kettner's. Alone!

Wednesday morning early I took Alitalia down to see Roberto Olivetti. He was that day in Milan, at the magnificent offices behind La Scala, and took me off to a wonderful informal lunch at a nearby *trattoria*. He brought along his chief computer designer, whom I had heard great things about in England: Mario Tchou, who looked very Chinese but was wearing a gorgeous if somewhat rumpled Italian silk suit (Roberto was in veddy British tweeds, with brown suede bespoke Curzon Street shoes). After weeks in a Papeete hut, a Korolevu *bure*, and the Peninsula, I didn't know how to dress, let alone how to pry computer plans out of these two sophisticates.

I came to know Roberto much better in the next few years, although I began missing connections after the fiasco with Generous Electric - too generous, in the Olivetti case! But that comes later; in 1960 what I

wanted was to know whether what Vacca and Ercoli had gossiped about in 1956 at the Ferranti 1* ["One Star"] installation had moved ahead. Both men were open about the Olivetti ambition, which in 1960 was to develop the Borgolombardo laboratory and build DP machines somewhere around the 650 power.

I was full of STRETCH and the other 7000-series beasts, as they expected, but caught their attention with my comments about Goto and his parametrons, and the JEIDA building. Of course Olivetti was worldwide, but not doing more than exhibit their artistic side, in Tokyo. Like Roberto wearing Saville Row gear, a lot of Japanese with-it types had Olivetti typewriters for western correspondence rather than the expected IBM!

But I soon saw Tchou did not want to talk turkey: speeds, components, peripherals (which Olivetti was well able to supply, if Ivrea engineering was willing). It was tantalizing, but although it had not cost me much to fly to Milan and back, I didn't get much out of the meeting. But, great contact.

Back in London, Stan Gill helped me lay on my first visit to Ferranti's. I had not been in Manchester before; I expected to talk with sales people (and indeed met Peter Hall for the first time), as the contact with my user community friends. As it happened, however, I was swept away by my first interaction with Basil de Ferranti, who sat me down next to him in the lavish oak-panelled manager's dining room and pumped me up one side and down the other about IBM, and the C-E-I-R advent (he knew Sandy from Leeds), and my adventures in Tokyo - and about the room maids at the Hotel Tahiti!

Went on and on. I missed my flight back to London, and saw almost nothing of the rest of the plant. But there was clearly chemistry between this man, a dozen times more intelligent than Tom Junior, and the visiting American.

He was unhappy in his second marriage, interested in my glamor photos of Elizabeth. He was a major figure indeed, compared to Jobless Herb Grosch: an MP, a helping hand in the new British Computer Society (and later a president), a Cambridge graduate of distinction. But "Call me Boz," he said.

The patriarch of the family, now dead, was Sir Isaac de Ferranti, who was a very great electrical engineer and a president of the Institution of Electrical Engineers. The two sons Sebastian and Basil divided the management of the still privately held company, reminding me of Tom and Dick Watson.

And the founder reminded me, coming fresh from Milan, of Carlo Olivetti, who had begun the Ivrea enterprise - except that Roberto was third generation, not second.

Also, like IBM but unlike Olivetti, Ferranti had a Big Thing with the military. This was Sebastian's side of the house, and it was much more important to the company than Charlie Benton's Military Products Division had been to IBM. Boz was the father figure to the computer side, however, knew and admired Stan Gill, and was supplying money and encouragement to the ATLAS crew.

I had had operating manuals and such for Ferranti machines from my C-E-I-R visit, but as the Defense Calculator/701 documentation had constantly changed eight years before, so the material about the Arguses and Pegasi and other machines coming to fruition in Manchester was reworked and reworked. And ATLAS, like STRETCH had been, was a one-off or few-off adventure, so the paperwork was scant, dated, and dumb looking. I got a 14-inch-long paper-covered thing hot from the mimeograph on this visit which would be a historical artifact today, but it was of course superseded in months.

The works manager's chauffeur took me downtown to the grand Midland Hotel, where I found out next morning my bill had been paid "by Ferranti's, sir". I had trouble with my fabulous Air France ticket, although it had worked fine northbound, and ended up on the train, sharing a seat in the elegant dining car with a gentleman from Armstrong Vickers who had been at the Ferranti luncheon the day before.

He was still chuckling at my remark while watching the works manager carve the leg of lamb [yes!!!] while the waitresses carried the plates around, that Generous Electric would have to add carving abilities to its careful list of required managerial skills. The men already have to play fair golf, I pointed out.

When I got back to the Savoy, where I had of course retained my room in expectation of a shorter excursion, I got the hall porter to check that my dwindling ticket was still in order, said goodbye reluctantly to London, and flew back to the U.S. I was on an Alitalia DC8 which had problems with an injector plug before takeoff, and while the maintenance laddies were fiddling I was invited up to the cockpit, where I talked about GE engines and the Sunderland flying boat.

Elizabeth had come out to Idlewild to welcome me. I was a little worried that I might have been away too long; it had been over six weeks, and almost 35,000 statute miles. But she was delighted with me; backed me into a quiet corner and showed me she had worn "your favorite costume" under her silky raincoat - and she had!!

It was the most wonderful adventure of a lifetime. I took one longer trip in May and June of 1974, and that was also to exotic places. But for so early on in the jet age, and to see so many new aspects of computing up and down and around the world, and especially to have first reached into Japanese computing - well, 1960 was the greatest.

28 SOCIETY COMES OUT OF THE CLOSET

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DATAMATION [27](#)

The Watson Empire [01](#)

Watson Junior [11](#)

Dean McKay *nurtured the IBM image, but not on the Tube*

"Social Problems and the Social Revolution" *I interwove them briskly*

Automation and disemployment *told Tom to be cautious*

"The Two Cultures" *Tom Junior and Sir Charles Snow would deplore the gap*

A simulation of New York City transport *from pedestrians to ocean liners*

Computer services for peace *a much-needed tool for disarmament*

A simulation of the American economy *must be available to every contestant*

Corporate concerns *should the Big Boys lead or just follow?*

An IBM decision about TV *from 1961, it took twenty years*

The levers of power *Tom didn't want to pull them; I did; his father always had*

Watson Senior 01

In a worldwide 1996 society where literally millions of computer lovers (and not a few computer haters) await each month's flood of books and magazines and newspapers, all clamoring to inform and misinform and disinform about every tiniest cranny of computerdom, it is hard to cast back to a simpler time when only professionals cared; to a time, indeed, when one of the major tasks of those happy few was to suck a little edible marrow from the bare bones of engineering journals, decipher ACM hoity-toity, and evaluate the occasional and usually wildly misleading references in the business and general press.

Mostly it's a change, an enormous change, in scale. Today we read about gigantic multi-billion-dollar adventures to reconstruct the U.S. air traffic control system, or transfer the IRS to an unmanageable network of untrained users at the keyboards of tens of thousands of desktops designed and built by the lowest bidder; yesterday it was Roddy Osborne boasting in the Harvard Business Review of how he was going to run the GE Appliance Park payroll on the third UNIVAC I, at a total cost - hardware and software and consultants - less than it takes to write, and market on CD-ROM, a 1990s virtual-reality game for bored adolescents!

A watershed between the two eras was the appearance in the late Fifties of the first trade journal, DATAMATION. Here it was possible to look at computers from the outside; to bring the skills of professional journalists and the knowledge of professional computer users together; to poke fun at the wild doings of the trade, in a way no stiff professor or Surly Seymour Cray or overeager IBM salesman could ever do.

I had time after my Los Angeles adventures with C-E-I-R and my startling visit to Tokyo to carry on a frequent column for the pages of the magazine. I called it "Plus Or Minus" at first, foreshadowing the much longer series of articles I wrote a decade later for Pat McGovern's trade newspaper COMPUTERWORLD: "Black Hat, White Hat". And one of the newly acceptable subjects was the interaction of computers and society.

Could I turn some of my concern into cash? DATAMATION paid me a few dollars for each column - generous by their standards, minuscule by mine, living in Sutton Place luxury just down the street from Greta Garbo and Mary Martin. I cast about.

The New York Times, and DATAMATION in a very different way, were full of criticism of IBM. The Watson Empire was doing gloriously; 7090s and 7080s and 650s were pouring out of the factories, World Trade was burgeoning, customers were being convinced that their opportunity to buy as well as lease was a New Birth Of Freedom.

But there were mutterings: computers take away jobs, computers invade privacy, computers make decisions for us, computers are dehumanizing: turn us into mere numbers. Old stuff today - current discourse for decades. New in 1961. I rolled up my sleeves and wrote Tom Watson.

IBM is on the griddle, I said. People are beginning to worry about the computer: it puts them out of work, it looks like Big Brother, it will dehumanize them. "I'm sure you have PR types combatting these attitudes. How about stressing the really good things IBM, and that new social tool the computer, might do for everybody? Be positive," I said.

It worked. Rather to my surprise, I was hired by Dean McKay to do a study I proposed to call "Social Gains From The Computer Revolution". I holed up in Sutton House, breaking away only to walk the poodle Déodat or when Elizabeth was especially enticing, and in two weeks produced a rather handsome set of proposals. The title had evolved into "Social Problems and the Computer Revolution". I sent off copies to McKay and his people, and to Mac Smith. And I sent a marked-up copy to Tom himself.

McKay wrote, "Attached is our check for \$1115.00 [I'd charge five or ten times as much today] covering your consulting services If we do not utilize any of the ideas included in [the report], you are indeed free to offer them to others. Thanks for your help." Nice!

In sending a copy to Tom Junior, who was not likely to read the whole thing himself, I had attached a very vigorous cover letter which I was sure he would read completely, and had therefore built in a summary of the report and my four proposals. I give the letter in full:

415 East 52nd Street
New York, New York
9 August 1961

Mr. Thomas J. Watson, Jr.
Chairman of the Board
International Business Machines Corporation
New York 22, New York

Dear Tom:

Since 19 July I've been at work on a position paper for Mac Smith and Dean McKay. They asked me to summarize briefly some of the negative aspects of the computer revolution, and to expand in some detail several

projects which would present the computer - and IBM, its main sponsor - in a favorable light. Since the assignment arose from your interest in my earlier expressions of concern, I thought you might like a copy of the report and a short summary of your own place in my proposals.

First, though, bear with me while I write frankly about IBM, about you, and about the American scene. In twenty years, barring nuclear disaster, IBM is going to be the largest corporation in the free world; even now it is one of the best known, one of the most profitable; it leads in research; it has a tradition of public service. Perhaps most important of all, it has a personality; it isn't faceless, committee-ridden, reactionary. To a very great degree that personality is an extension of your own, and of your father's. The leadership of IBM in the corporate milieu and your own position in IBM, in the business world because of IBM, and on the American economic and political scene independent of IBM, impose real obligations. In spite of what you wrote me in 1959 [after the Cal Tech incident], I remain convinced that IBM at your behest, and you independently, can and should contribute new ideas, new leadership on the national and international stage.

For one thing, you have far more freedom of action, far more freedom of intellectual choice, than a Webb [NASA], a McNamara [Pentagon], a Kennedy. You are firmly in the saddle; you can muster the resources of IBM and, I believe, larger resources among your peers. But most of all, and central to my proposals, you owe it to the culture IBM is transforming to reach out for awareness and responsibility.

In the report I point out that the computer is an outstanding artifact of that transformation, that it personifies automation and centralization and complete information. And I point out the obvious, that IBM is the computer, that it in the same way personifies all the information machines, all the technologies involved. There's a lot more to the technological explosion than computers, and a lot more to computers than IBM - no matter; you are going to be the target.

I've recommended some fairly forthright positions as regards mechanized decision-making, the computer as Big Brother, and so on. But for once in my bull-headed life I advise caution: in the area of technological disemployment. Keep your own house in order, use the available palliatives generously, keep your company intelligentsia informed - and avoid any official position if you can. Meanwhile, establish IBM, and yourself personally, as valued spokesmen, as advocates of scientific progress for social good.

On the positive side, I have listed four projects:

1. A television program, "The Two Cultures," designed to describe new advances in science, deplore the breach between men of affairs and men of technology, and present IBM as a bridge between them. You and Sir Charles Snow would be the first guests, and I would hope you would use the program further to present yourself to a broader segment of the population.
2. A computer simulation of the complete metropolitan New York transportation pattern: a city planning tool of unprecedented power. Until a fine-grained model of everything from pedestrians to ocean liners is available, piecemeal solutions now advocated are foredoomed. You would play the same role in the program that Richard Mellon did in the reconstruction of downtown Pittsburgh.
3. Computer services for the proposed U.S. Disarmament Agency for World Peace and Security (S. 2180), or for the U.N. Here you would decide whether IBM or its World Trade subsidiary should make the offer, and frame the approach to Rusk or McCloy or Humphrey, or to Hammarskjöld.
4. A detailed computer simulation of the entire American economy,

private, public, and military. This would be a tool available to the Congress, to the Executive Branch, to major political parties, to trade associations and unions, to the universities, to the press. The idea is to quantify and rationalize discussions of the national purpose, and to clarify our vision of economic growth, full employment, assistance to needy nations, and scientific progress.

With the help of a few of your friends, you would organize the sponsoring committee. The technical task would be performed by a non-profit organization, financed originally by your committee but ultimately self-supporting. The operation would furnish a tool, not recommend policy; it would be non-coercive, non-political; your names would guarantee the power, the availability, the morality of the tool.

I end the report by saying of this last project, "... as in few other areas of human effort, we see clearly the power of the tool which IBM sponsors, the intelligence amplifier that can help us determine as well as achieve our goals." More than anyone else in the free world, Tom, you have that tool at your command.

Sincerely,

Watson wrote back immediately, first thanking me and then saying, "Frankly, several of the projects you recommend cause me some concern since they might lead us beyond what I would consider to be the proper role of a corporation in our society. Nevertheless ... I am asking our people to give them most careful consideration."

I replied, "Your concern about the proper role of a (large) corporation in our American society is natural, and an important parameter of any discussion about positive contributions by computer technology. I wonder, though, if my ideas are really so different from your own, or just expressed less magisterially?"

"I'd like to suggest a further report on exactly that topic: should a corporation participate in The Great Discussion, the determination of national objectives; should it openly advocate social improvement; what can it do that other 'forces' in our culture can not? If a written report seems too formal, I'd like at least to talk with you about the matter, and also about your personal role."

Alas, he shied away. Replying again immediately, he said Dean McKay and his people would go on studying "actions they feel we should take as a corporation", and asked me to "continue to contact Mr. McKay ... on those areas of our activity in which you feel you might be able to contribute."

McKay wrote (on September 14: the whole interaction took only four weeks):

Dear Herb:

I have had an opportunity to discuss your report with several people in the company.

They were unanimous in their praise for your lucid and well-written presentation. However, the consensus is one of doubt as to the suitability of IBM's leadership role in the specific projects.

We know that some work is being done on the urbanization problem, and we hope to contribute our particular competence and skill when appropriate. This is also true in regard to the disarmament agency for world peace.

Whenever our federal government or others who have the authority and responsibility to tackle a social or economic problem need our assistance, we would be more than happy to provide it. But we doubt that it is appropriate to take on the functions of existing institutions just because we possess a unique competence.

As to the television suggestion, we have never made the basic decision that it is sound for us to undertake an advertising program aimed at the

general public. We must make this decision first [it took twenty years]; after that we would then focus on the choice of a television show.

It seems to me now that this was the closest I ever came to the levers of power. In later years I climbed to the top of the Federal civil service, and bid for minor appointive positions. But these would have affected Uncle Sam's computer policies, not the broad economic scene, not the disproportion between armament and disarmament access to computer power, not the New York traffic tangles, let alone the gap between Snow's Two Cultures. If Watson Junior in the Sixties had been Watson Senior in his prime, but with the enormous and growing power of latterday IBM at his fingertips, and if I could have reached The Old Man as easily as I had reached Young Tom, would he have had McKay say, "We doubt that it is appropriate ... just because we possess a unique competence"? I think not; he gloried in the unique competence of "the IBM" - and in his own.

29 HORRID HAROLD AND THE EUROPEANS

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In Chapter 29 you will encounter

(in order of appearance):

Contributing Editor *DATAMATION* *mastheaded me from 1959 until December 1963*
European computer hardware *Poughkeepsie knew more than Paris*
ITT *great but strange international communications conglomerate*
Standard Telephones and Cables *Stantec was building ZEBRA in the west of England*
Standard Electric Lorenz *SEL was building the Air France reservations system in Stuttgart*
Marc DeFerranti *from the Australian branch, he had worked for LaPierre of GE*
Harold Geneen *he was a pioneer of Bottom Line ugliness*
DocInc *easily overwhelmed my Cleveland company's proposal to NASA Greenbelt*
Hotel Amigo *in the heart of business Brussels*
A suggestion for ITT Europe *"a special extra-national [computer] entity"*
Dinner at La Maison de Cygne *Marc was also a gourmand*
SEL Stuttgart *best part of the visit was the name of my hotel*
Ferranti Computer Department *headed by Peter Hall; Bernard Swann was at ANCCAC*
Boz de Ferranti [27](#)
The ATLAS computer [27](#)
Bengt Carlson *he gave the gory details about the Los Alamos STRETCH*
Hal Bergstein *new editor for DATAMATION from the May 1961 issue on*
Burroughs B5000 *Polish notation and stack architecture, and a stunned sales force*
WSJ *the Wall Street Journal often twisted the knife*
PR people *suave at IBM, professional at GE, coarse at ITT*
An address in Who's Who *I sent my complaint to Horrid Harold's home*
An early disappearance *Marc stayed in Europe, but faded in five years*

Not all of my adventures stemmed from IBM. My lovely 1954 tour with Dorothy and my 1956 honeymoon with Elizabeth, plus the ICIP acquaintances and gossip, plus the DATAMATION overseas news in every issue since I had become a contributing editor in November 1959, had given me perspectives very different from people in World Trade New York or even the de Waldner types at IBM Europe who were still hiding around behind the Place Vendôme.

For one thing, I was still very much interested in hardware. Watching Palmer and Haddad and Rochester, and especially Frank Hamilton, whose 650 was making waves in the user community worldwide by now,

had made me feel good. I wanted to keep up, although I could no longer be creative. The gulf between salesmen - and IBM was using natives, as The Old Man had decreed decades before - and French engineers at the manufacturing plant out in the bush was unbridged, and indeed there was only detailed redesign going on anyhow. There would be fancy stuff in the next four years, culminating in major contributions to the 360 systems in 1964, but it was just starting.

What that meant was that the Paris executives knew about competitive sales but not competitive design, except indirectly via intelligence collected in the U.S. and fed back to Paris. Red Dunwell, sweating over STRETCH and HARVEST back in Poughkeepsie, knew ten times as much about the Gamma 60 as the European locals, and had heard it at an American conference.

I knew, for instance, that the dozen ITT national companies all over Europe had substantial computer design and manufacturing capabilities. I had talked to van der Poel, who designed the ZEBRA that Stantec, Standard Telephones and Cables, the English ITT company, was butchering. I knew that Bell in Belgium was a subsidiary of ITT and not connected to the American phone company, and that it made a curious pile-'em-up magnetic tape drive pictured in DATAMATION which was being peddled (very poorly) across Western Europe. And especially I knew that the German company SEL, Standard Electric Lorenz, was really very good, and was designing one-off airline reservation systems for airlines like my Air France.

Now while I had been at the top of the user community, I felt pretty amateurish as a Senior Consultant. How could I use what I knew? I wasn't even very anxious for fees; what I wanted was to get in on the action - in Europe, because I could see my knowledge of that scene was unusual (and because I could also see I was not exactly everybody's favorite back in Manhattan).

Back in the Evendale jet engine days I had had occasional exchanges with Marc DeFerranti, who was a department head for LaPierre over on the manufacturing side. His gang did almost no business with my 701 and 704s, but I was a weird and wonderful figure all over Jim's huge empire, so Marc (always first names, remember?) and I did have contact. I knew from meeting his nephew Barry at ANCCAC that their branch of the Ferranti clan had been in Australia for many years, although I never found out details until Boz became a fairly close friend.

As my lawyer and I were hassling C-E-I-R, and as I was exploring a facilities management contract with NASA Greenbelt on behalf of "my" Cleveland company, I came across an announcement in the Times or the Wall Street Journal that DeFerranti, who had left GE some years before, had been appointed vice president "for Europe" by Harold Geneen, the well-known president of ITT, and would be basing in Brussels. I put it at the very very top of my lists, since it was already pretty certain that the NASA job I wanted was wired for Documentation, Inc. and its president Mort Taube, and that my paper outfit would soon collapse.

I no longer remember how I reached him; perhaps by telephone in New York? Certainly I did not cable Brussels. But somehow I arranged to meet him there, in his new office on Boulevard de l'Empereur. Bought my own air ticket, and I flew coach! And needless to say, after the wonderful times they had shown me, on Air France: March 15, 1961.

I put up at the Amigo, through Sabena, on which I had flown from Orly. It was my first visit to Brussels; I had driven through Belgium after ICIP in my Ivory Lady, but north of the capital. I looked forward to the restaurants.

Marc could not have been more cordial. For one thing, he was lonesome in his fine new office, with only a secretary as yet, and he was having a time scheduling trips to his national companies without a central staff to help. It turned out the job was indeed new, and would be what he made of it. He was an intelligent man, and forceful, and a graduate of the Generous Electric management practices, but it was obviously not a simple task.

I told him of my adventures in European computing circles. "Marc," I said, "you have six or seven powerful electronic outfits. No one of them, except just maybe SEL, can buck even Bull or Siemens in computers, let alone IBM Europe." I didn't tell him that the various IBM national companies, driven by the spirit of Watson Senior, would cooperate in a way the ITT affiliates had never dreamed of: he already knew!

"Now," I went on, "if you were to set up a special extra-national entity at SEL, or maybe even here at the Belgian outfit - not out away from everybody like the fatheaded GE computer venture, but with the facilities of an established shop - you could pull together a design team, drawing on Stantec and SEL and Bell and the nutty Norwegians, who gossip says are building crypto equipment, and then farm out the manufacturing all over your kingdom. Sales would have to be national, but you don't need to worry about that for a year or two."

What I asked him for was a consulting assignment to go around to the best three or four countries with his imprimatur, see what they were doing, and make a simple report. "You can suggest the idea to Geneen back in New York as your own, Marc, and tell him you dug me up out of your GE past to look at possibilities for you. I need a fee, and expenses, but nothing outrageous; the payoff would be to help organize the new outfit and run the customer services and such, with a shot some day at the top slot, if you decide to go ahead."

I felt much freer to talk to him than I ever had with Barney Oldfield. I was an absolute outsider, and certainly not any kind of threat inside ITT. And we shared an ex-GE viewpoint.

Well, it worked. He made a date for dinner; like me he was a *bonne bouche*, and he took me to La Maison de Cygne on the Gran Place, and paid from a pad of francs that could have choked a horse, saying he was having trouble with American Express! And when I checked out at the Amigo I found the unobtrusive secretary had already arranged to pay the bill. Nice!

I had reservations back to New York via the Ferranti plant in Manchester, where I planned to talk to Peter Hall, head of the Computer Department, and Boz. Because of that date I was nervous about going to Stantec, which was off in the west of England besides. But I suggested Marc might let me make a one-day visit to SEL in Stuttgart, sort of to seal the bargain, and he agreed. I got the Amigo concierge to buy my train tickets, which meant that they got unexpectedly paid for when Marc picked up my tab. He notified the national manager that I wanted "to look on [his] behalf" at the computer projects in that part of SEL.

I went directly to the Graf Zeppelin, where the Brussels concierge had booked me, and the next morning took a taxi to the electronics "laboratory", following instructions waiting for me at the hotel. There was a small language problem, which could have been an attempt to avoid Marc's instructions. But I ended up with an executive named Schmidt who spoke British English and drove a big Morris sedan, peculiar in Brussels.

He showed me the pieces of the Air France reservations system, and the youngsters working on it had enough English to tell me some of the specs. But Schmidt refused to describe the details of the contract. "You should ask Mr. Ferranti," he said. I told him I didn't want to know about money, but about delivery dates and testing and installation. No matter.

We had a long lunch out of the plant, and he delivered me back to the hotel in time for me to see a little of the town, do a late checkout, and catch the overnight train. It had not been a huge success.

I reported to Marc next morning that I had seen and heard very little, but on the other hand nothing to change my thinking that real work was being done. "Not a boondoggle like the stuff at Electronics Park back in 1956," I laughed. Turned out he didn't have a copy of the Air France agreement in his Brussels files - or so he said!

I said I would go back to New York and work him up some ideas. "Try only the basic concept on Geneen," I said, "but use the rest of what I furnish later, as you go around to your various national companies. You'll

have all sorts of regular stuff to pursue, but if the computer capabilities are paraded for you, you'll have a scenario to work from."

I asked him for two hundred dollars a day, and told him I'd only take a week or two, and have a letter waiting for him when he got back from his next New York trip. We shook hands; I was elated, although I could see it was just one of a hundred management inventions he would be accumulating in the first months of his assignment.

And I at least would recoup my air fare!

The Ferranti visit on March 21 went well; I had done my ATLAS homework about the STRETCH delays at Los Alamos (or in Poughkeepsie, to be exact), and reported the interview with Bengt Carlson in DATAMATION. I was startled to be given a copy of the article they had just sent to LA about their huge machine, which they hoped would do better than the two American giants.

Parenthetically, the article appeared in the May issue with a fine picture of Peter Hall, but was somewhat overshadowed by an equally big story about the Burroughs B5000 and its novel stack architecture. Also it was the first issue of DMN under Hal Bergstein's editorship, and carried the first gossip about Seymour Cray's 6600. A blockbuster!

Back at Sutton House I was beginning to put together my ITT ideas. I had not gotten any business from Ferranti's, but I had material for one of my "Plus and Minus" columns, and hopes that if Boz and Peter Hall mounted an ATLAS campaign in the States I would see some action. Then one black morning I found in the Wall Street Journal a notice that Horrid Harold Geneen had struck: Marc was out, and literally overnight! The reporter speculated that it might be related to the fact that he had been involved in the antitrust action that had so occupied Jim LaPierre back in 1957 and 1958.

I didn't believe a word of it. Surely any negotiations, either via executive recruiters or by ITT internal personnel people, with anyone on DeFerranti's level - and for such a fancy job - would have explored such involvement.

I played the "Contributing Editor of DATAMATION" role to the hilt - after all, I was Number Five on the revised masthead. But all it got me was access to some very crude PR and personnel people at ITT headquarters. Accustomed as I was to IBM suavity and GE professionalism, the complete lack of concern for ITT's reputation, for Horrid Harold's already unfavorable image, and needless to say for poor Marc, astounded me.

I tried to penetrate the WSJ precincts and to reach the reporter who had the byline. Not a chance. I tried getting advice from Fred Hoar at UNIVAC and even from a PR man back in Evendale ("... no longer with the company, Mr., ah, Grosch"). "They play rough down there," seemed to be the story.

It wasn't my petty little fee. I was unhappy for Marc, and hoped maybe I could help with my connections - a note to Tom Watson, or Ray Eppert of Burroughs, or whatever. But I couldn't reach him. He wasn't in Who's Who, or the corporate data bases (fewer then than today). I tried to get an indication of where he lived from the ITT switchboard: ouch!! I even called Brussels long distance, hoping to get the secretary at his former office; the New York operator reported the number had been disconnected.

I wrote a long and careful letter about "the idea Mr. DeFerranti had wanted to explore, about evaluating ITT national company digital computer capabilities across Europe", citing my adventures in the U.S. and for C-E-I-R in England. I sent it off to Geneen, asking for an answer or a referral "in view of his [Marc's] sudden departure".

No answer - nor had I expected one. I then made up another copy, with a curt covering note saying that "the enclosed correspondence has probably been intercepted by your office, who are undoubtedly having some difficulty with Mr. DeFerranti's dismissal", and sent it to his Manhattan apartment (he was in Who's

Who even if Marc was not!), requesting "the courtesy of a response".

I mailed it on a Friday. Wow! Monday morning I got a blistering phone call from an ITT lawyer about invasion of Mr. Geneen's privacy, disregard of business ethics, and on and on. When I got a word in edgewise I pointed out mildly that a simple one-paragraph reply to the letter I had sent to Geneen's office would have closed the matter, and that it was "Mr. Geneen's" lack of courtesy rather than my own that was reprehensible. I would have expressed myself with my customary frankness about what I thought of his boss, but realized that the caller might be recording me!

Marc never recovered. He found a job with some sort of steel company back in Pennsylvania as head of their international operations, escaped from there to become a group executive for Plessey's in early 1966, in charge of the telecommunications business, but retired the next year for reasons of health. He went back to the U.S. and disappeared. He was only 62.

30 NO REST FOR THE WICKED

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In Chapter 30 you will encounter

(in order of appearance):

Dause Bibby *from IBM Golden Boy to president of RemRand*
Howard Engstrom *the link between RemRand's ERA and mysterious Fort Meade*
University of Texas *President Ransome refused a gift UNIVAC I for Austin*
Fletcher Jones *chief founder of Computer Sciences Corporation, but miserable*
Mort Taube *an early name in information retrieval, he started DocInc*
UK quarantine *the dog breeders discouraged the immigration of computer professionals too*
Pioneering again *I was the first freelance computer consultant to move overseas*
Monte-Carlo *first I talked to Rainier's business-development man, in the palace*
The Alfa Romeo Spyder [26](#)
The Simca Ranch Wagon *a teensy engine and yellow headlights, but for a teensy price*
Hôtel Balmoral *what I needed, but a long way down from the Hôtel de Paris*
Monaco PTT *good mail, cable and telephone services compared to France and Italy*
Jim Miles *vice president of sales for Control Data, and he knew me*
The Sperry Rand law suit *they claimed Bill Norris And Co. had been bad, bad!*
Ari Onassis *his Greek enterprises swallowed much of Monte-Carlo*
Prince Rainier and Princess Grace *he loved her, and so did the Monegasques*
Résidence Auteuil *for a while, a great view of the Mediterranean*
Holiday skiing *not in Cortina, not above Innsbruck - but on the Arlberg Pass, yes*
Hospiz Hotel *the only one in St. Christoph, and it had a vacancy*
Slivovitz and lots of sekt *what a Christmas! what a St. Sylvester!*
A CDC contract *tour fifty European computing centers, but conceal the client's name*
DATAMATION [27](#)
Sweet coffee cream and square pillowcases *adjusting to Monte-Carlo was fun*
Grosch's Second Law *"no one gets a foreign assignment who wants it"*

After the brief excursion back into Watsonland, and after spending the small but welcome fee on Manhattan living, I began to realize it was going to be uphill for a long time. The adventures disguised it, of course: I got so caught up in gaudy inaugurals and circling the Matterhorn and Mount Aspiring I tended to forget that DATAMATION only paid a hundred bucks an article, and that my gross income from two Ferrantis, a Watson and an Olivetti hadn't been much over a thousand.

I had a small commission from Dause Bibby, who had recently left a secure vice presidency in IBM and come over to the opposition. I had been snooping around his RemRand bailiwick on lower Park Avenue, trying to persuade Jay Schnackel and Howard Engstrom and other disconsolate types to find a place for me on the ERA if not the Univac side. All I remember today is the non-self-levelling elevator! But Dause and I rather liked each other, and out of nowhere he asked me to go down to Austin and see if the University of Texas, his old Alma Mater, would be interested in the gift of a UNIVAC I.

There was by this time the beginnings of a computer science or at least a numerical analysis group down there, and I was pretty sure Dave Young would not want an old business-oriented machine, especially as UNIVAC IIs were being installed and Grace Hopper was writing software for a UNIVAC III in the Philadelphia suburbs between COBOL meetings.

But I dutifully trotted down, found the president, an arts man named Ransome, very pleasant but skeptical, reported negatively to Bibby, and strolled (yes, walking distance, just like Galactic Headquarters) back to the apartment. "Two days' fees, but that's it!" I told Elizabeth.

I couldn't get a "no" out of Engstrom, let alone a "yes". I was pretty sure my NSA references had been positive, but there was so much inertia in the whole Norwalk/Whitpain/St. Paul aggregation it wasn't very important. I quit calling; looked like I was dead in the water with Remington Rand too.

There were other Robbies around. I could probably wiggle in with the Hardeyes who had tried to buy into C-E-I-R, or do something for the Mystery Men around Hughes Aircraft. I could see weird operations everywhere. On the other hand, for every one of them there seemed to be Fletcher Joneses and Mort Taubes already practiced at starting them, and my Cleveland attempt to do my own thing, with real experts like John Lowe and a big-money track record with von Braun, had not only failed but had not taught me much. Looking back from the Nineties, I probably discouraged too easily: should have tried several more entrepreneurial directions. After all, I was batting .500 with NASA; "no" at Greenbelt, but a great "yes" at Huntsville.

But I liked being in a substantial outfit like IBM, or the jet engine operations of GE. My special ability seemed to be to build fast, but in an environment where resources to do so were in place. Assuming I was to be in Coventry on the U.S. scene for a while, why not look further afield? Boz and Roberto certainly knew what I could do, and commanded powerful organizations - and I loved the overseas ambiance. I talked it over endlessly with Elizabeth, who found the idea of a European Connection enticing but didn't quite know what to do about our wonderful but feeble Aunt Grace. "And they won't let Little Boy into England", she pointed out.

I had made a slight diversion down to the Côte d'Azur after my shot at SEL Stuttgart. Just a couple of days, and mostly to look at Monaco. Elizabeth and I had done the tourist bit in 1956 from Beaulieu-sur-Mer, but in 1961 my concerns were housing costs and telephone service and such.

Over the next months I did desultory library research on setting up in Europe. Uncle Sam sent me brochures on doing business in various countries. There were pamphlets at the New York consulates. I boned up on transportation: had the OAGs, and had brought back the Thomas Cook rail guide from Zermatt.

I was pretty sure if I just asked either Basil de Ferranti or Roberto Olivetti for some kind of job, even with a better idea of what I could do for them than I really had, they would turn off on me immediately, send me downstairs to people who had no interest in my coming aboard, and never enjoy talking to me again. Maybe not Boz, but the dog-quarantine law made a Manchester or London spot dubious, and outlying places like Australia, where I might really have cut a swathe for Peter Hall and his Mancunians, had the same exclusions. I had cautiously poked at Swann in Sydney, and been told that Ferranti staffed its European offices with indigenes, like IBM.

I daydreamed about pushing ATLAS on the continent, from an office in Manchester but with Elizabeth and Grace and Deo basking on the Riviera. Trouble was, I didn't have the dense mesh of connections I had out in California. Slowly the idea crystallized that I should go over for a few months, see what I might do for a British or European or even American firm, spend as little as possible ... it was all very iffy, but not ridiculous. And, to skip many many chapters ahead, it worked. Barely!! I was as usual a pioneer; there had been early American explorers like Ike Auerbach, but no independent consultant had actually upped anchor and come over permanently.

Used as I was to California and Arizona, I put a sunny climate high on my list of requirements. And in spite of the much lower costs, the Franco and Salazar regimes in Spain and Portugal (and my complete lack of Iberian professional contacts) made those choices unattractive, along with the Mezzogiorno and Greece. That left Northern Italy and Southern France - and Monte-Carlo. The latter's tax advantage was not important immediately, since there was nothing to tax, but I was alerted to the problem facing foreign quasi-residents in France, and assumed it would be worse in chaotic Italy. Quite possible to survive in the cracks if you were a young student, and lived like a pig, and moved every month or two, and didn't have a car, but I didn't want to do that.

My look in March persuaded me that I could rent a studio in Monte-Carlo and live unobtrusively for many months, without registering with the police. Not possible in Nice or Cannes, I thought.

Looked like I might even get a telephone, the wait being only a few months versus over two years in San Remo! And mail service was allegedly excellent.

I could live in a new high-rise, and have a car with non-Monegasque plates, and eat in good places. And if the cops came for me, I could move on; a couple of kilometers in any direction and I would be in France! Besides, I had gone up to the Palace and talked about computers to Rainier's business development man, an American, so I could always claim I had started out to be a good boy. In fact, I had.

About cars: I had flown out to Los Angeles in November of 1960 and driven the Alfa back, with a ticket on the Pennsylvania Turnpike for going so fast the troopers had to have me picked up at a toll booth. Happily, they were so taken with the cute scarlet Veloce that they only charged me with 80, although we agreed I had lost them at about 110! After I photographed my gorgeous wife standing next to it with the Sutton House doorman Manuel, I put it in the garage next to her Chev, and it gathered dust until I reluctantly sold it. Paid the rent for some months, of course, but how I hated to do it!

Now I took the residue of that sale and went to an agency in Rockefeller Center which sold automobiles to tourists tax free (sort of), for delivery overseas. I studied their brochure, worked over my hoard of motor magazines, reluctantly put aside thoughts of Porsches and Mercedeses, and ordered a cheap Simca Ranch Wagon, a three-door with a teensy engine and absolutely no options, for delivery in Paris with "red" - that is, French tourist - plates. Cost me just over \$1400, total; those were the days!

I thought seriously about going by boat, but the nicer liners cost a lot compared to steerage on Air France. Besides, it seemed, oh, opulent. In the event, I took AF0700 on the Monday before Thanksgiving, November 27. But as a result of looking at sea travel, I found out how to send a foot locker of books and papers (the very trunk I had bought for the same purpose to take to Harvard by Greyhound in the summer of 1939) on the Hamburg-America line, and forwarded to the Lotti in Paris besides. For a third of the air freight price, too - and arriving ahead of me.

As I write I am somberly reminded that 32 years and 11 months later I reversed the process, and flew back to the U.S. from Europe with even less baggage, also to start a whole new existence. On KLM instead of Air France, though - and I knew a lot more about New Mexico in 1994 than I did about Monaco in 1961!

My air log says in faded ink, "New worlds to conquer!" and "6-45" for duration, but nothing about the food. It had been my sixth eastbound Atlantic crossing; the westbound KLM flight in 1994 was my 128th. I

landed at Orly Tuesday morning.

The next day I found my way to the suburban Simca factory and took possession of my new friend Ranch. Shuddering at the skimpy shift lever and the yellow headlights, but happy with the two-tone blue paint job, I drove back to the Lotti, loaded my footlocker and ski gear and two big suitcases and elegant first-class Air France carry-on into the back of the wagon, and headed out.

It was an open fall, and I enjoyed the leisurely drive. I had no schedule any more; the Simca factory had been the very last line on a long and complex listing. I knew there would be no problem with a hotel in Monte-Carlo, at the end of November. I spent two nights, including a rather lonesome Thanksgiving, on the road.

I chose the Balmoral, many many notches down from the Hôtel de Paris I had greatly enjoyed in March. They offered a low weekly rate, and after I bargained in Franglais for a while, pointing out their restaurant was closed until late in December and that they had no garage for my wagon, did even better. Actually there was street parking until the holiday English arrived, and that was cheaper than under cover, and available 24 hours a day besides. It turned out to be a good choice, and I stayed there until I was permanently established.

Just before local closing time I tackled the PPT, which had an elegant office on the boulevard des Moulins and seemed to do a big business in fancy Monaco stamps (the currency was 99 per cent French, with an occasional Monegasque coin). Had to work in French, but with the Sutton House number written out in advance, I managed to reach Elizabeth from Bête Numero Un. It would have taken an hour in Nice; in Monte-Carlo, five minutes. That part of my planning was right, it appeared. I gave her the Balmoral details; had written her from the Lotti with confirmation about the Simca, but she had not gotten the letter yet.

She broke in to tell me that a Jim Miles of Control Data had been trying to reach me about helping them with a legal problem. I groaned. "That might have been real business, sweetie, and I just missed it. Well, call him back and tell him to send a night cable to the Balmoral. He probably won't, but I'll keep my fingers crossed. Give him the phone number too, but tell him the cable is a lot more reliable." We talked about Manhattan weather, and the problem of walking a reluctant Deo in his raincoat, which had been my job, and laughed edgily. Tensions!

I had a talk with the concierge at the hotel. He agreed to forward cables and phone calls if I went on a trip (I was thinking ahead to Christmas), and said the PTT was very good about such things. "Also the instruments here in the hotel are always working, Doctor; not like Beausoleil!" He was referring to the French area bounding the principality to the north [actually, only a few streets north], which was a separate entity with its own mayor and police, and inferior services.

In 1961 the Balmoral did not have a teletype, but in spite of it being a Sunday the PTT delivered a long night letter next morning from Minneapolis. Jim, who was the sales vice president for CDC but was chosen to get in touch because he knew me, asked my terms to testify as an expert witness for them in the upcoming trial of the Sperry Rand law suit, saying that my standing as a "very well known" user would support their defense of the designs they were working on, which the ERA branch of RemRand was claiming. The whole shemuzzle is as dead now as Jim Rand, but it was a burning issue in 1960 and 1961.

I cabled terms, and hung about the principality more than I had expected to see what would develop. Turned out air mail to Minnesota only took four days, so we were able to exchange contract stuff rather briskly. And there were all sorts of wonderful new experiences for me, both in the tiny town and out in the countryside with Ranch, to keep me from biting my fingernails between communiques. We settled on \$200 a day; the beancounters tried to beat me down on the grounds of lower costs in Europe [1961!!], but I pointed out I had a base in Manhattan to support, and had saved 'em initial ocean transport besides. Today it would be \$1000 a day, I suppose - especially from a Monaco base. We closed the deal.

My major concern between CDC contacts was to find an apartment. There were no easily accessible listings: the window stuff in elegant real estate offices was all sales, and at unbelievably high prices. This was at just about the high point of Onassis' presence in Monaco; he had bought out the Société des Bains de Mer, which owned the Casino and most of the hotels and beach spreads, and the flood of rich Greeks was at its peak.

The Grimaldis, the ruling princes, had controlled things since long before the rich English had begun wintering in the last century. But times had changed, and brutes like Onassis could buy almost anything, just as the Arabs were to sweep up everything decades later.

Rainier, probably genuinely carried away by love rather than in calculation, had found a solution: he had married lovely Grace Kelly, and her presence was reviving everything the Monegasques valued. She had been in the palace for five years when I arrived, and was already much loved for herself, as well as for having produced a male heir, and for helping the prince stick a thumb in Onassis' eye.

To jump ahead a little while we are waiting on Control Data, I saw the royal couple only a few times, and always in ceremonial roles - in the center stand at the Grand Prix in May 1962, for instance. But I joined the Scotch Club at the Casino, and several times saw Onassis across the room, usually with Callas. Indeed, one night after watching Fidelio at the Nice opera, I ventured up to his table to ask the wonderful woman who had sung the lead if she would dance with me (she said no). His bodyguards were not happy.

December wore on. Encouraged by the CDC exchanges, and wanting to further reduce my expenses (the Balmoral still cost more than I could afford on a continuing basis, although the telephone and telegraph and concierge services were valuable), I had found a real estate agency, and a studio apartment in a Résidence Auteuil, a tall skinny building whose view of the Mediterranean would be cut off some day by a much larger structure already going up, but with unbelievable slowness. Elizabeth and I had watched our excellent view of the bronze Seagram Building disappear behind an ugly new apartment, and the latter had gone up a story a day as we agonized. In Monte-Carlo, the obstructing edifice was rising at about one story a month, and being considerably downhill from my Résidence would not be a threat for a year or more. But its presence was enough to discourage people from buying apartments in my building, and I was able to rent, and even to rent by the quarter.

I knew from my overseas friends, and from a great deal of careful reading, that almost no business would be done anywhere in Europe during the two weeks or more of holidays. I had planned from Manhattan to do some inquiries first, or I would have delayed my own move until early January. So I had come, and now the Control Data matter had prevented travel, and the holidays were close. I settled for the apartment as of January 1, arranged with the Balmoral people to store my trunk and a suitcase, closed out my account with genuine thanks, and headed off on December 19th.

I arranged with my well-tipped concierge that I would keep him informed of my whereabouts, so that he in turn could have the PTT forward calls and cables. He was to hold letter mail unless we agreed by phone he should forward it; I had told Miles to use night letters "over the holidays" if he needed to reach me. The trial was tentatively set for mid-January, when there would be no trouble with airline reservations.

I had hoped to ski, or even do some winter climbing, in the Dolomites. But the open winter meant not enough snow; Ranch and I drove to Cortina, and I thought the scenery stupendous, but skiing was impossible. I stayed one night at the Alaska, and renewed my Courmayeur-type enjoyment of alpine lift riding. But the town was empty.

The hotel people were courteous; they could see I would not stay, so they tried to help me find snow. "The Arlberg," was the consensus. Dorothy and I had been in Innsbruck, but I was nervous about the Hafelkar - like the runs down from the Tram at Squaw, too tough for my abilities. So I decided to try St. Anton, and to drive to it over the Arlberg Pass itself, which the Alaska porter said was open (a bad sign!).

My maps, which were mostly Michelin, although later I would acquire a lot of Italian Auto Club folders, suggested Bregenz, but it was a puzzle how to get there from Cortina. Looking at them today, I don't recall the route. But somehow, just a day or two before Christmas Eve, Ranch and I found ourselves climbing the west side of the Arlberg. There was snow; there was a stream of traffic bound for St. Anton, over the pass, and lots of skis and luges. It began to get dark. At the very top of the pass road there was a small but elegant-looking hotel and a sign identifying it as the Hospiz. I had no Austrian guidebook, but it looked interesting. I pulled into the carefully plowed parking area and went in. The village, a tiny scattering of houses, turned out to be Sankt Christoph; just a dot on my best map. The latter showed a major lift system, however!

I later found out the hotel had been booked for weeks, for the holidays, even before the snow came. But I was fortunate; there had been a cancellation by telephone just a few minutes before, and when I presented myself at the desk I got the small but pleasant single room.

In earlier chapters I skipped reluctantly over my ski pleasures at Squaw, and just a little way back hardly alluded to the snowy glories of Zermatt. So you will not be surprised if I say very little about daytime excursions above the Arlberg, using the major Galzig lift right across the highway from the Hospiz. I will say instead that I had a wonderful time after skiing, when instead of the hot wine of California or the Valais, I reveled in slivovitz, fiery Balkan plum eau de vie.

The holiday festivities were continuous, and I made friends with a Gothenburg couple and two German bachelors, who will appear a little further on in the book, at sea level. I taught the Twist (very poorly, need I say, my IBM-cafeteria tango lessons having worn off) on the crowded dance floor. It was the OK thing with sophisticates in December 1961, and I had been to the Peppermint Lounge in Manhattan only a few weeks before. Got me several lovely partners, but only for dancing, much application of sekt, German champagne, to the contrary notwithstanding. I thought of my lovely wife vegetating back in New York, but not too often!

Then wonderful news: a long cable from Minneapolis was forwarded from the Balmoral, and informed me that the altercation with Sperry Rand had been settled, and that instead of my testifying at the trial, Bill Norris, the chairman and CEO of Control Data, wanted to hire me to visit possible future customer locations in Western Europe. The message stressed confidentiality, but pleased me no end by saying they were on the verge of a major decision and wanted to move very rapidly. Also Miles omitted the usual CDC attempt to go cheap, and offered my \$200 a day right out!

I had visited the gloomy St. Paul factory where production of the 160A and the 1604 was beginning, and Miles had tried to show me some of the new stuff Seymour Cray had under way, but Surly Seymour had chased us ignominiously away in spite of Jim trying to tell him I was a friend who wanted to help, not an annoying customer. I had talked to Norris, whom I knew slightly from his secret life in Crypto, and at some length to Miles, about doing a tour to help them decide about a European entry, and I had had hopes that it might actually happen. But after the Sperry Rand suit was settled, of course ... and now, it was!

I have the airmail letter about the expert witness thing, forwarded from Sutton House to the Balmoral, and I have a handwritten copy of the start-up message. It says:

```
MINN 937 48 19 401P= PERCEVOIR 6.96 FRS=  
REEXPEDIE DE MONTECARLO= LT = DR HERBERT  
F R GROSCH HOSPIZHOTEL ST CHRISTOPH  
ARLBERG AUTRICHE
```

please telephone collect bill norris at home et paul or miles at home
minneapolis or at control date minneapolis soon as possible regarding
consulting

```
JAMES G MILES CONTROL DATE CORP  
501 PARK AVE MINNEAPOLIS MINNESOTA  
USA +++
```

I do have the hotel teletype copy of my reply, which has an annotation that it cost 460 schillings

tel aufn innsbr
hospizhotel sta
bitte ein brieftelegramm mit geb beim
empfanger an :

james .g. miles
control data corporation
st. paul ,minnesota ,u.s.a.
telephone to home

am on top arlberg pass skiing your pleasant cable forwarded monaco this
afternoon telephone usually good here but authorities report transatlantic
troubles today please try from your end after 10am your time any day hotel
hospiz st. christoph telephone st. anton austria 48115

seasons regards you and bill
herb grosch
+++

Sending it collect was obviously not possible. And the time difference being seven hours, I was clearly not planning to miss my skiing. The hotel's stamp says 23.12.61 .

I was amazed to find they did not want me to come back to Minnesota and collect papers, sign a contract, and pick up a cash advance [very important]. Instead we worked the telephone, and an agreement, in full legalese, was to be waiting at the Balmoral (copy to Sutton House, where Elizabeth was waiting with bated breath). I was not sure yet about mail at my new apartment!

Still have my carbon of the draft. I show altering the address to Monte-Carlo from New York, and a correction back up to \$200 a day (Jim claimed it was a slip). There were other problems, including expense matters: "All living expenses shall be covered by a per diem of \$25 for each day spent away from basing point [my insertion], which need not be accounted for by Consultant." I see I agreed with "Travel time at night or on Saturday or Sunday to be excluded", which I would not do today.

The machines referenced were the 160A, 1604, 3600, and Cray's as yet unannounced 6600. The most interesting word in the six-page document, however, was in the sentence "the name of the Company is to be retained [sic] by the Consultant ...", by which the lawyer meant "withheld", or "held in confidence" or some such.

Another section said that CDC had already looked at joint venture possibilities in Europe (much to my surprise), but that any "general observations of the Consultant shall be reported"!

I'm making it sound stupid, and it wasn't. The material about what they were looking for, probably verbatim from Miles, was right on. They said emphasis was to be on "large computers", which we had agreed to months before. They listed a fair number of applications ("technically-oriented markets") and included "atomic energy areas", but shied away from cryptography. Well, it was 1961, although I'd guess Norris had been told years ago about Colossus; we'll never know.

This is a good place to refer to the rather pointed conversation Hal Bergstein had had with Bill about CDC plans, which was published in the December DATAMATION under the stupid title "How to Make Money in Computing", along with the first word that Seymour's powerful 6600 was under construction. Both items were extremely important for me, and Elizabeth faithfully forwarded the magazine, which was waiting at the Balmoral for me to consult as I continued negotiations. I was Number Four on the DMN ever-fluctuating masthead at the time, and my article about specifying, selling and supporting NORCs, LARCs and especially STRETCHes ("Monster Marketing"), which had appeared in the previous issue undoubtedly had confirmed Norris and Miles in their desire to recruit me.

As soon as I had recovered from St. Sylvester, which was the Austro-German name for New Year's, I packed my souvenirs and my skis and headed back to the Mediterranean. There had been a fairly heavy snow on the 2nd, and I couldn't get enough traction with Ranch's skinny little Parisian tires to climb the last few meters and over the pass summit, so I turned down and drove very carefully in the opposite direction; took an extra day. No chains in St. Anton!

There was no problem keeping busy back in Monaco. I had to sort out and supplement the scanty and very French furniture and equipment in my studio, which meant for instance buying linens and such. I got a Peugeot [yes, same company] coffee grinder, found a shop which had a great selection of coffee beans and confitures, learned how to shop in the Beausoleil market for blood oranges and other interesting foodstuffs I had not bought in Manhattan.

The challenge for the next months was coffee cream; with all my reading in French and English, it still took me weeks to find out that I had to ask for crème fraîche liquide (plain crème fraîche was like sour cream back in New York). Moreover the dairy in Monaco-Ville made very little, and only one or two stalls at the Monte-Carlo (not Beausoleil) market ever carried it - and it often was soured when I got it back to my tiny kitchen!

But glorious croissants were fresh every morning at my bakery by the foot of the steps down from my parking area, and only 64 centimes apiece. When the cream had not soured, I made myself wonderful Continental breakfasts.

In the next two weeks I not only settled in, met my concierge, learned how to get my letters, and all the other artifacts of my new arrangements, but finalized the CDC contract. I still have an exceedingly curious parchment-like [quasi-Ozalid] copy of the major hand-written letter I sent Miles, which starts by saying I was not waiting to find a typing service in or near M-C. It ends:

15. If you can scrape up anything on the 6600, please send it. Hal Bergstein is my principal source, and I'd rather have some specs directly

If these items make sense to you, you can have a revised agreement in my hands here by the 25th or so. Please cable before that, though - same address - so I can start making my dates (probably in Turin and Milan) for the 29th and 30th.

Thanks for the proposition - I'm real anxious to go to work on it for you.

Sincerely,

It was dated "16e janvier 1962", and was almost certainly the first letter out of my new address. Alas! it turned out later that no one in Minneapolis had the faintest appreciation of my Frenchness - especially no one who was going to be shipped over. It was during this time that I began to laugh sadly about Grosch's Second Law, although I had been a case in point myself with Tom Watson in December 1957:

"No one gets a foreign assignment who wants it."

That's double-barreled; on the one hand, if one wanted as I had in 1957 to have an overseas job, the desire was an automatic disqualification; on the other hand, the one who was selected and shipped out willy-nilly never wanted to go.

31 BEYOND THE ALPS LIES ITALY

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In Chapter 31 you will encounter

(in order of appearance):

Ranch [30](#)

Bill Norris [20](#)

Surly Seymour *a hardware design genius, Seymour Cray thought customers a nuisance*

Jim Miles [30](#)

Burroughs B5000 [29](#)

Everett Calhoun *did a curious SRI report on European computing in 1957*

The ICC *International Computation Centre at EUR in Rome*

The concierge network *tour multilingual Europe with just English - but take money*

Oceanography *at a U.S. Navy installation in La Spezia, and on a 1101 at that*

Tactic A *"I'm just one of the boys"*

The Hassler *old luxury, and at the head of the Spanish Steps*

INAC *Rome's Institute for Applied Mathematics*

Vacca, Ercoli and the Mark 1* *still functioning since I visited them in 1956*

Roberto Olivetti [27](#)

Vitroselenia *a Raytheon affiliate at work in the wilds of Sardinia*

Annie Seggiaro *she ruled the empty ICC roost*

Philco *a Mann is not enough; send money too!*

Frascati *a nuclear lab linked to CERN and Livermore*

Car-sleeper service *"What a way to go!" said Ranch as they hauled us north*

Don Pendery *sentenced to Paris by Galactic Headquarters*

Semantics of retrieval *your own little gray cells did it best in 1962*

Hotel Continentale *they razed it later but left La Scala*

The ELEA family *last offspring of Mario Tchou*

University of Milan *"half as old as time", but air-conditioned*

Principi di Piemonte *Turin luxury perfumed with white truffles*

Fiat Mirafiore *ahead of Dearborn and Wolfsburg in automation, but not much computing*

The Norris Report *a 96-page letter which I doubt he read*

I had gotten the cabin fever pretty completely out of my bones in Sankt Christoph, and learned to trust the funny little ranch wagon on the long road back. I missed the vigor of my scarlet Alfa Spyder, the elegance of the silver 190SL, and the bulk and ferocity of the huge American convertible that had preceded them, but clearly the tiny Simca was a good choice for my 1962 needs. It was with a light heart that I replaced the ski gear with a slim leather suitcase full of clean shirts, and an attaché case bulging with address books and blank CDC call report forms, and set off to answer Norris' questions.

He and his middlewesterners had made it triply hard for me. They had given me almost no information on what they were going to offer. I realized some months later that they were nervous about the 1604A, since the 1604 had really been designed on Jim Rand's premises, that they had not yet delivered many of the small 160As or even begun production on the 3600, and that Surly Seymour (as I had already christened their resident wizard Seymour Cray) had not let anybody except Bill Norris himself know much about the 6600.

Second, Miles had demanded that I not identify Control Data as my client. Indeed, he had asked me to pretend I was just collecting dope for an ACM or DATAMATION article. I told him I lied very poorly, and that most of the people I planned to visit would want to feel there was something more in it for them - another possible supplier, say - than just adding to my rolodex ["database" hadn't been invented in 1962]. Or adding to my writing income!

He used this as an excuse not to furnish me with much material about CDC. After all, if I was not to identify with them In my usual suave fashion I told him not to worry; most people I visited would assume I was working for Burroughs, since the B5000 had just been announced in North America. Miles was not

amused.

Third problem was a complete lack of overseas support. Control Data didn't have the faintest trace of a presence in Europe: no agents, no bankers, no customer inquiries recorded. It turned out later that several nuclear outfits like Atomenergi outside Oslo had written for information about the 3600, but this had not been put together for Norris or Miles when they talked to me. Used as I was to centrally controlled IBM, I was amazed at the small amount and poor quality of CDC staff support.

So I was on my own; well, if the Minneapolis guys had ever had passports, or known beans about Philips or Fiat, they wouldn't be paying me to make a Grand Tour!

Before the Simca pulls away from Reésidence Auteuil I ought to tell about those address compilations. I had culled the dope about all my foreign contacts, from my astronomer correspondents in the Thirties to the man from Aldermaston De Carlo had had me leak the STRETCH story to in late 1958. I had a clipping file on European computing landmarks. I had a weird SRI report on computers overseas, compiled by an Everett Calhoun, who knew almost nothing about computer usage, and precious little about the hardware, but was a whiz at report writing; an economist, I judged.

I brought along my membership lists from ACM and the IRE. The Brits had been in business for five years, and I had joined the, correction, The British Computer society almost immediately. Trouble was, I needed installation information, not the shop addresses of engineers or college addresses of professors.

Manufacturers like IBM and Ferranti had just what I wanted; CDC presumably had a similarly confidential list of U.S. installations and near-installations. I was undoubtedly safer, I mused, and certainly cheaper, than industrial espionage!

There were amusing photographs, pages of concise computer descriptions, and even an appendix about large-machine service bureaus ("computer time-hire"), in a fine little book the DSIR, Department of Scientific and Industrial Research, had brought out in London in early 1961. I had already studied it closely. But of course it covered only England. It contained the first data distinguishing the English Electric KDP10 and the new KDF9 however. There was a German equivalent, and a second edition of the latter, and I had those too.

But above all I had a secret weapon, the plans for which I had unearthed in Rome while Elizabeth and I were honeymooning five years before. Under UNESCO auspices, a bunch of third-rate Italian bureaucrats and second-rate European academics had founded the ICC, the International Computation Centre. The idea was to beg some fairly powerful machinery from bedazzled manufacturers like IBM and ICT and Siemens, and offer cheap time on it to needy professors from Burma and Liberia and Paraguay.

Nobody bit. A superset of academics had kicked off IFIP, as I've described earlier, and although also an appendix - vermiform, for sure - of UNESCO, the Federation had ignored ICC and its empty ten thousand square foot EUR machine room.

Bureaucrats never give up and absolutely never go away. The tiny ICC secretariat sent out survey sheets, compiled a looseleaf notebook of "international" computer centers, and sold a few dozen copies. They struggled to update it, and I was on the mailing list!

The compilation was so unbalanced as to be laughable. It had all the computer installations down to desk calculators, in Belgium. It had a budding lab in Zagreb. But it had nothing at all about the huge shops in California tin airplane factories, nothing about Sandia or Hanford, nothing about ERMA. There were pages about university shops. Johnnie von Neumann's offspring were still mentioned, and SEAC and SWAC - and they had mined the stories in early MTAC, and the discontinued ONR listings.

My carefully up-to-dated copy covered Austria one hundred percent, Britain ten percent (51 installations), and the U.S. less than two percent (84 outfits). On the other hand, I knew a great deal already about North

America and the U.K., and very little about Austria. I prized the stupid thing above rubies.

Indeed, anxious to get even newer updates, I had put a Rome visit at the very top of my travel plan. I needed to do half a dozen Italian calls anyhow; I simply opted to do them first.

The ICC compilation had listed a naval installation at La Spezia with an ERA 1101, *mirabile dictu*. I sent them a telegram from Monaco, saying that I was passing nearby "on my way to visit major computer installations in Rome", and would call for a few minutes on the 29th. I addressed it to the Scientific Director, SACLANT ASW Research Center, and did not give a reply address. On Sunday the 28th the Ranch and I headed east along the Riviera di Ponente.

La Spezia is half way between Genoa and Leghorn, and indeed is the only harbor between the two; we had only 290 kilometers to go, but there was no *autostrada* in 1962; the drive was Sunday-exciting, even in January. There was no Italian Michelin yet, either, but I had heard of the Jolly hotel chain, and quickly checked in at the local one, although the reception was startled to have me appear without either a reservation or any useful amount of Italian.

Once embarked on such journeys, I used the concierge network for each next step. The Jolly man, who of course spoke good English, called his counterpart at the hotel I had chosen in Rome, and reserved for me. The Rome concierge phoned ahead to Milano when the time came, and the latter, to London. All language and the-hotel-is-fully-booked problems disappeared, and the phone charges and my generous tips were going to be paid by Lucky Jim Miles.

The scientific director of the Navy facility turned out to be a Dr. John Ide, and his computer man was a chap named Wood. They were actually employees of Sirimar Corporation, which was a commercial offshoot of Penn State. They ran the operation for the Striped Ones, and helped the latter fend off the seductions of NATO, which indeed took over the facility two years later. Ide was an oceanographer, so I pulled Tactic A ("I'm just one of the boys") on him. After I had run through Maurice Ewing and Frank Press and the Watson Lab punched card machines, and he had marvelled at those dear dead sound channel calculations, he was putty in my hands.

Problem was, he really didn't know how the 1101 had gotten to Italy or when. "It was here when Sirimar took over," he stated. And what he really wanted was a Woods Hole-type oceanographic ship, not a 1604A. Years later I found out it had come from the National Security Agency!

I was interested to hear that Brother Wood was bothered by motor generator set problems, just as seven years before I had suffered from my GE air conditioning add-ons, not troubles with the 701 itself. He indeed contemplated a data reduction bottleneck if Dr. Ide ever got his yacht, and before I checked out of the Jolly I marked him down as a good 1604A prospect.

Nobody in the whole shop seemed to realize they were in Italy, and only a few kilometers from the best antipasti in the country, let alone wanted to help me on my mission. Their bosses were four-stripers in Naples, but their hearts and gustatory preferences were in Pennsylvania! I told them how good the steaks were in Florence, but they weren't listening.

About Tactic A, which I used in eighty percent of the 48 calls on this tour: I posed as a Real Computer, an ex-scientist with a good doctorate, a pioneer large-installation manager, a fellow IBM victim (or IBM insider, if the visatee was a Grim Gray Giant enthusiast). I was not a pollster, not a reporter, not a salesman - just One Of The Boys, if perhaps a little more ancient and a little more famous than most. A lot of them knew me, and had even passed through the Watson Lab or WHIRLWIND or Evendale or Phoenix, or heard about von Braun's shop (it was in the ICC compendium) or about C-E-I-R.

I said I had clients back in the U.S. "who hope to introduce their big new machines internationally", and had hired me to feel out the market. It flew nicely - and indeed, quite a few anti-IBMers guessed Burroughs. Few guessed Control Data; at least the big shots at Univac and Burroughs and National Cash

were known to have passports!

The Ranch and I went on down through Pisa that afternoon, slowing to fifty clicks for the tower, and turned inland toward Rome. Today the autoroute would turn off above Pisa, but we did not pick up the then-under-construction Autostrada del Sol until after Florence.

The last 250 km. went quickly; we were late for the early evening traffic, and drew up amidst the Ferraris and the Rollsies at the Hassler entrance about nine, fashionably in time for dinner.

I called next morning at INAC, as the Applied Mathematics Institute was now known. Picone had retired, and his successor Aldo Ghizzetti was in Paris romancing UNESCO (on behalf of ICC, of which he was de facto head, I was told). But Vacca and Ercoli welcomed me delightedly, rehearsed their more recent experiences with the old Ferranti machine, and filled me full of Italian background information and a good choice of gossip about Ferranti Manchester. I was able in return to tell them that Kelly Gotlieb was not satisfied with the IBM 650 that Toronto had put in in 1958 to replace the sister Ferranti, and was angling for a Big Scientific: say a 1604?

That let me bring up Control Data, without saying I was involved with them, and I was not surprised to have Roberto say that while Cray was revered by the designers at Olivetti, no one expected a Minnesota firm so tangled in AEC security to ever come to Italy. I described the 3600 and the 6600 and made Paolo's mouth water.

I took Vacca to lunch, and found he was about to go over to a new Italian subsidiary of the LfE, Laboratory for Electronics, in Massachusetts, and hoped to be the director (he had found his visits to Cambridge confusing). He said Ercoli was bound in a more academic direction, and implied that with the two of them departing, the old One Star and the ancillary computer operations would soon be abandoned. "The universities will offer services," said Roberto. "Milano is in bed with Univac, and Pisa with Olivetti and Bull." He implied both the academics and the salesmen would regret it; I made copious mental notes.

Olivetti was offering an ELEA 6001, designed by the amazing Mario Tchou, to all the university shops. It was about like an IBM 1620, Vacca said, and he had recommended a unified group around a 7090-size machine. I guessed that his reluctance to pass on details about the 6001 ("Roberto [Olivetti] will tell you all about it when you see him") was due to his having signed a nondisclosure form - and he was going to go on working in Italy, not emigrating.

In my trip report I said "1604-type" instead of "7090-size"!

The other item in my report, which I had already entered in my country-notes for the big final Letter To Norris was that INAC worried about the shortage of trained computer people: hardware and software, high level and medium. The educational system wasn't turning out a fifth of the entry level men (and virtually no women) that would also be needed, but on-the-job training could help there. The Banco di Roma had started up a 705 installation, and on IBM's advice was recruiting internally and externally for trainees, but such a one-application shop didn't need many seniors, and IBM was loaning two or three.

It had been a friendly start in an important country. The La Spezia boys hardly counted as Italian, but INAC was central, at least for CDC. When I got back to the lovely room at the Hassler, I still had time to check on the Raytheon affiliate, Vitroselenia, which von Braun's gang said were helping the military with a sounding rocket program - suborbital, that is.

I talked on the phone to a Dr. Greco, who was most unaccommodating. I asked him to refer me to someone in the Air Ministry, and he said "IBM already knows all the people there"; obviously thought I was still wired.

He had a 1620 on order, but his site was in Sardinia. Good grief! "We used Alabama youngsters in Huntsville," I laughed. Not possible, he said, "Even Napoli has problems". I figured the CDC boys might sell

him a 1604A in a couple of years, providing they shipped a suite of missile programs with it. Ex-Sardinians from Lower Manhattan with NYU degrees would be a plus.

Vacca went with me to visit a Dr. Benzi of the C.N.E.N., the nuclear energy administration. He was planning a machine (I guessed another of the ubiquitous 1620s), and did not want to recruit until after its arrival. Really! Even Roberto was startled. I tried to put him on to the computer operation at Harwell, but could see his eyes glazing over.

And I did indeed drive down to EUR, the exposition area, to find out how the ICC was doing. A poor type named Mussard had been named director, and was doing his directing from Paris; Ghizzetti was head of the governing board, and apparently the only one that counted. In his absence the redoubtable Annie Seggiaro ruled the empty roost. She remembered me from her mailing list.

They had had a major pitch from Philco. A fellow named Mann, whose trail I was to cross a dozen times in the next weeks, had tried to interest them in an S2000. If he had offered the machine free, and maybe a few Philco people to run it, it might have worked - but the cupboard was bare. My trip report says "a dismal visit".

The afternoon was much better. I drove to Frascati and visited the national laboratory of the C.N.E.N., already a major collaborator with Berkeley and Livermore, and CERN in Geneva. A Dr. Turrin and several assistants told me about their computer experience. They had started by buying time on the University of Bologna 650, cast about for 704 time outside Italy, hired their own 1620 last August, and were already up to eighty hours a week.

My notes say Control Data would need to "speak physics" to get in - and that IBM Italia emphatically did not. Also, "Service imp." [underlined three times]. "At least a 3600, in 1964."

I don't remember where I had dinner; I had checked out of the hotel, and probably ate rough. But I remember vividly the night's adventure. The Simca and I stole furtively back into Rome, found a dark loading dock around behind the Stazione Termini, and drove fearfully into an end-loading box car - ah, goods wagon.

Abandoning my light blue friend and the box of loose brochures that was beginning to fill up, but clinging to my attaché case and my pretty valise, I found my way to the first class sleeper cars and went dubiously to bed. At crack of dawn, I was in Milano. *Incredibile!*

I did this car-sleeper maneuver several times that year, for Control Data and on my own account. It let you drive your own car, but do overnight train journeys. Mostly it was used by vacationers, over routes operated only in the summer; more than twenty years later, I did s'Hertogenbosch/ Ljubljana with Mazda, wife, and Pekingese! But a few business routes kept going all year, and my friendly Thomas Cook rail compendium knew about them. And, though I didn't tell Minneapolis, it was fun!

About that brochure box in the Ranch: I collected printed material everywhere I went. It went to swell my big archive of IBM machines, ten years of clippings from BUSINESS WEEK and, lately, DATAMATION - and conference proceedings worldwide. I had stuff from my Tokyo and Sydney adventures, from my short struggle with ITT, from C-E-I-R. European friends sent me stuff from their first meetings, which had started in 1953.

You wondered about commercial equivalents. Someone in IBM, for instance, probably had a copy of every single piece of paper I had socked away - and a huge bundle of proprietary information, carefully shielded from RemRand, Uncle Sam, and customers. I had never, in a decade of trying, been able to get on a mailing list for BUSINESS MACHINES, the internal publication. Only after moving to Europe, and flashing my Monte-Carlo address, had I finally managed to get the monthly IBM World Trade newspaper, and then only through the friendly offices of Don Pendery, who had just been shipped to World Trade Europe in Paris.

The difference was the retrieval mechanism. For old disciplines like medicine and law, and say organic chemistry, the semantic confusion was reduced. But in a wild, frantically evolving trade like computing, with intentional upheavals of the current jargon almost monthly, a professional archivist was lost. I had an imperfect but completely personal mental "list" of my holdings. It would have been great to have an imaging capability, a tremendous hard disk, a laptop of Pentium capabilities - alas, they were over three decades away. I made do with Hercule Poirot's "little grey cells".

Milano was familiar to me, where Rome had been novel. I had had the only completely tailor-made suit I ever owned, fabricated out of magnificent dark silk by a shop across from La Scala. I had stayed several times at the now-vanished Continentale, and had had lunch with Roberto Olivetti and his Chinese-Italian chief engineer at Aldo's, close to the new Palazzo Olivetti in the Via Clerici.

I admired the Galleria (as did architects back in Houston). Roberto was cordial, even after he understood I was scouting for an unnamed competitor. He showed me around the beautiful office building, still not three years old. The only equipment on display was a transistorized desk-top called the Programma 101. "We have an ELEA center in Ivrea [the Endicott of Adriano, his father] and will soon have several university installations."

I asked him about the 9003, which was aimed at business, and was pleased when he was honest about "troubles with the programmers". I asked him about the story that they were mostly Canadians. He looked at me owlishly and said, "Fosso vero [I wish it were true]"! I laughed dutifully and said they were probably lost among ten thousand typewriter mechanics in Ivrea. "Pisa," he smiled.

Well, it was nice. I noted that the 6001 was somewhere around the CDC 160A, and with dubious peripherals; clearly, though, it was aimed at the ubiquitous IBM 1620. Norris And Co. would not be interested in the 9003, and I didn't have a brochure to send them anyhow.

That afternoon I made an unusual call at the Centro di Calcolo Elettronico of the University. The director was a Dr. Cavedon, who was on the RemRand Italia payroll. He had just weeks ago put magnetic tapes on his RRUnivac SS90, a machine well below the 1620 or 650. Turned out the university gave one-third support, and the Univackers put up the rest and sold services.

He told me about Fiat, which had an interest of some sort and operated larger RemRand equipment in Torino, where I was going tomorrow. He startled me by claiming Olivetti had a 9002 installed "upstairs" in the Via Clerici building, and that they had started programming courses for customers the year before.

I wrote a long report on this minor visit, giving a list of the applications they were handling: "Larger machine soon. Already at 14-16 hours a day. Personnel less a problem here." I suggested a 1604A or 3600, joint with Fiat. Perhaps I was somewhat carried away by the fine air-conditioned lab, built into a red sandstone building "half as old as time".

Elsewhere there was a big 7090 with ten tape drives, the most advanced scientific installation in Italy, and a certain target for Control Data even if they were reluctant to spread out over Europe. But I knew quite a bit about this bunch, which was in Ispra, up toward the lake country, and CDC had great connections via Sid Fernbach and such. What I really wanted to see was Fiat, about which I knew almost nothing.

This involved my first business visit to Torino. I put up again at the Principi di Piemonte, a magnificent but stuffy member of the CIGA chain, and went out to explore the restaurants and sniff the white truffles which perfumed the downtown arcades. In the morning I drove to Mirafiore and hunted up the Fiat research laboratory. My host was a Dr. Bruno Provero, who wanted me to come back soon and meet the research director, a Dr. Bono.

Provero and his staff had had a successful CPC installation, but now ran most of their bigger stuff at the university in Milano. They used a dialect of FORTRAN called F-2 and wanted me to help them find big-

machine time in northern Europe that "could read our programs". On Univac mag tape? Or as CPC decks?

They were unfulfilled ALGOL fans, besides. Under "Salesman's follow-up action" I wrote, "These people are very proud of themselves, and very sure they are right - just like GM. Actually they are babes in the woods, even in Italy ..."

I wanted to see the gigantic factory, which was the most advanced in Europe in 1962, and full of automation. No soap. I drove back to Linate, the short-haul airport, found a garage to provide covered parking for a week, and flew off to London.

Digesting my Italian experiences was not easy - and if I had started with, say, Germany I would have been swamped. Big machines were arriving, but mostly for banking and such. The scientific ones that Control Data did well were just coming to the nuclear establishment, and nowhere else yet. But the market was small, and Italy was very different from Minnesota!

Two months later I wrote in my final report to Norris:

The Country: In many respects the Common Market boom has been strongest and most sustained in Northern Italy. Even Germany's "miracle" has levelled off slightly. But the Italian situation is peculiar; grinding poverty still exists in the south, corruption is still rife (note the scandals about the new Leonardo da Vinci airport near Rome), the social-political balance is still uncertain. Italy, more than perhaps any other industrialized country in the world, is a country of extremes. It can be a good market for huge computers - indeed, some of the extremes favor such a possibility - but it poses many problems.

And many of these, I repeat, are social rather than technical or financial. For instance, highly personal management: the giant corporations or nationalized industries are each headed by father-figures of international stature. These men make all major decisions, down to levels far below the ones that concern CDC. And they have neither the time nor the inclination to learn much of the burgeoning computer technology. They do not rely on consultants; they do not listen to academic advice in the very few cases where such is available. Promising young men, crown prince types, are now sent to the fancier business schools (IMEDE, the Harvard-Nestlé Foundation experiment in Lausanne, for instance); their influence will be felt, but not immediately. Even more than most of Europe, top management is an intuitive, secretive, restrictive function.

On the DP side there are already many over-enthusiastic orders reminiscent of the early 1950s in America. But the tools of science do not seem to benefit from such contagions. Thus the Pirelli skyscraper does not automatically imply pure research at the company laboratory, and a 7070 at Alitalia does not imply an interest in OR. If a Mattei (ENI) or a Faina (Montecatini) or a Valletta (Fiat) were to develop a passionate interest in our brainchildren, as Wenner-Gren once did, almost any development might follow. But such men are hard to reach.

Many Italian businesses - banks and shipyards as well as airlines and power companies - are controlled by IRI (something like our RFC), which is even larger than the state petroleum trust, ENI. Cooperation and coordination flourish in such an atmosphere, in spite of the obvious quasi-socialistic pattern, and these could lead to giant planning enterprises of 6600 magnitude. So far they have not, largely because advanced economic and econometric thinking is entirely lacking in the major universities. And there are no Rand Corporations or Brookings Institutions along the Po !

I then did similar sections on trends, competition, probable customers, service centers, programming, and CDC entry. The whole thing reads very well indeed from a Nineties perspective. Looking back at the results, however, I realize that Norris had not yet seen the humanistic light - on the road to Damascus, I

joked years later - and the rest of his troops looked only at my estimates of numbers and types of machines, and for which customers.

It was not only Italians who lacked vision!

A MAN'S BEST FRIEND IS HIS COMPUTER

— BUT A PEKINGESE IS A BETTER LAPTOP

In the next chapters of the book you will meet computer friends - or at least old acquaintances - with numbers like 650 and 1103 and 7070, and names like CPC and ERMA and STRETCH. But there will be other computers mentioned, mostly European, that you do not know. In order not to extend the Casts of Characters, lists including the ones that may be new to you are given at the end of pertinent chapters, and these are summarized at the end of Chapter 50 (pp.457-59). Some were great; some were even popular; almost all are now forgotten. Most of them were Best Friends to some eager men and women.

COMPUTER LIST FOR CHAPTER 31

1604A [all machines mentioned are included, even IBM ones]
1604
160A
3600
6600
B5000
STRETCH
KDP10
KDF9
ERMA
SEAC
SWAC
1101

701

650
MARK 1*
6001

1620
7090
705
S2000
704
P101

9003
SS90
9002
CPC
7070

32 IT HELPS TO HAVE FRIENDS

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In Chapter 32 you will encounter
(in order of appearance):

The Savoy [Hotel] and its Grill *at a tenth its 1998 rates, my home from home in London*

Charles [E.T.] Goodwin [15](#)

Jim Wilkinson *first numerical analyst to make the Royal Society*

Sandy Douglas [26](#)
RCA *mysteriously their 501 had migrated from Camden to Kidsgrove*
Stan Gill [27](#)
UGC [University Grants Committee] *more camels than horses, at least with computers*
Alan Turing [11](#)
Bletchley Park *secret home of COLOSSUS and the ENIGMA crew*
Goodwin, Michie, Turing, Good and Welchman *some of that amazing crew*
Ferranti *oh, if only they could have gotten their act together!*
Manchester University *IBM needed Williams' tubes for the 701*
D.G. Hawkins *"a hard rock ops man" for Electricity computing*
CEGB [Central Electricity Generating Board] *biggest of its sort in the whole world*
Jack Howlett *never had a computer man that good at Los Alamos*
Harwell *the research arm of the U.K. nuclear establishment*
Aldermaston *the weapons design arm of same, getting a STRETCH*
A.E. Glennie *I had illegally briefed him for De Carlo*
J.Corner *"extremely well informed", especially about STRETCH*
Dave Wheeler *still committed to Cambridge and to Wilkes*
Maurice Wilkes [19](#)
C-E-I-R Inc. [26](#)
Herbert Robinson [26](#)
Les Fox [19](#)
Oxford *might support a big machine - but chargebacks??*
Farnborough *the Royal Aircraft Establishment but with paper tape*
Chris Strachey [25](#)
Arch Johnston *ran the overseas computers of Socony New York*

My exchanges with Jim Miles had left me with the distinct impression of haste (which I understood) and of a desire to minimize my expenses, or at least the number of days I would charge them. And I was aware of how much needed to be covered in England to bring my knowledge of big computing there up to date, and do a reasonably complete survey for Control Data.

My adventures in the Savoy Grill on behalf of C-E-I-R were recent, of course, but had been directed at people, rather than machines and markets for machines. I had looked at the ITT affiliate the year before, but it was a very small part of the English computer scene, and of interest only as competition for the CDC 160A.

So I had a lot to do, and had to cram it into one week. Obviously sauntering into the Savoy Sunday evening and starting to make arrangements the Monday morning was not the way to go. So from Monte-Carlo, after moving into my little apartment in January, I had written off to E.T. Goodwin, the head ("superintendent") of the maths division at the National Physical Lab, and asked him to help.

Charles, as everybody called him, was a kind and helpful type (many years later I would hold a similar job at the Bureau of Standards, and tried to remember to be as helpful; "kind" was more difficult). Also he was above the competitors; it seemed like dirty pool to ask Stantec or Ferranti to route me around. Sandy Douglas owed me for the C-E-I-R job, but he would want to know more about my, ah, sponsors than they would want me to tell him; yes, I'd certainly see him, but not put myself in his hands.

Well, Charles came through magnificently. I still have the chart, worked up on funny NPL computing paper (demy legal cap, he owlshly informed me) on which he had arranged much of my visit and displayed options for the rest, in neat former-desk-calculator-operator style. Down the side he had eleven ams and pms, and across the top the initials of ten men he had contacted for me, and there was an elaborate key and a page of notes. And he called me after I arrived, to make sure I had it all, and would indeed come out to see him the next morning!

Flying up from Milano had not been easy. There had indeed been fog in the Channel ("Continent cut off"), and Alitalia had put down at a primitive airfield near Bournemouth [!!] and bussed us to central London. But Charles being welcoming on the telephone was restorative - and a superb meal alone at Kettner's, with a burgundy called Wine Of The Infant Jesus, and a spectacular armagnac, finished the job. (I avoided the Grill because I expected to host several dinners there in the next days.)

I took a green doubledecker bus out to Teddington and found Goodwin's old-fashioned office, near the DEUCE room which had housed the Pilot Model ACE when I first visited in 1954. He had arranged for Stan Gill to drive over from Cambridge, so I was able to talk to three highly informative experts in the first one-eleventh of my visit: a wonderful start.

Three, because Charles had brought in Jim Wilkinson, his chief numerical analyst and even then the world's best practical matrix computer. He was to get the ACM Turing Award for his contributions in 1970, and made the Royal Society a little later. Wilkie was a big user of NPL and university equipment, and had visited frequently in the U.S., so his opinions were current, and took account of the 7090, and what was available and promised in CDC country.

Charles still had the Pilot Model ACE, now over nine years old, but relied heavily on a successor machine, the DEUCE, which had evolved from the ACE and had seen moderate production at English Electric in Kidsgrove. He described that company as very good, but "reluctant to really go in heavily", which surprised me somewhat since they were selling a business-oriented machine called the KDP10 and promising late-1962 deliveries of a scientific counterpart, the KDF9.

"Ah," said Wilkie, "they're doing the KDF9 themselves, but they got the KDP10 from RCA in the States; it's a 501 with British components". I wanted to know where they got their transistors, but nobody at NPL knew.

They had put magnetic tapes and old-fashioned mercury delay lines on the later DEUCEs, but both K [Kidsgrove] machines had core memory. The scientific machine sounded about as powerful as the Control Data 1604A, but at least a year behind in deliveries. I could see how NPL would revel in a 1604A, let alone a 3600. But would Her Majesty's purse spring for American machines when it was unwilling to buy my friends a KDF9? "For the military, perhaps - and you know there is a STRETCH on order for Aldermaston," sighed Goodwin.

Gill, who still had close connections to Cambridge, said that the University Grants Committee was being pressured "from Whitehall" to buy only British computers: ATLAS instead of STRETCH, KDF9 instead of 7090. "You'll hear about it everywhere," he smiled.

All three wanted to hear about "my" STRETCH, and marvelled at American crudity (Charles called it "forcefulness") when I described how I had been served walking papers in the lobby of the Jack Tar. Wilkie had read about my tongue-in-cheek creation of the Polynesian Information Processing Society and was concerned about the disappearance of Hastings, whose strange creations he admired.

And while they all seemed to know as much as I did about U.S. computing, they hung on my every word as I described Tokyo and the JEIDA Building.

The morning went swiftly. Stan was quieter, both by nature and because he was going to take me back to town and fill me in on his new connection, but Charles was bubbling with the arrangements he had made, some of them with people I had not met. We ate in the canteen [ooogh!]; I refrained from doing Kettner's for them.

Looking back four decades, I deeply regret not talking with them about Turing. He had killed himself only three or four months before I came to NPL in 1954, but I did not know how much he had contributed to ACE - and COLOSSUS was an absolute secret until 1974. I thought of the man as a pure mathematician; if I

had read his mother's 1959 memoir I would have realized he was an important machine designer and a bench electronic. But she knew little about his crypto work - and no one I knew had read her book until after the Hodge superbiography appeared, or at least mentioned her obscure effort in my hearing.

After the curtain went up on the ULTRA secret, I realized I had been surrounded for years by people who had worked at Bletchley Park, who had links to NSA long predating mine, and who had really pioneered digital electronics: Goodwin and Michie and especially Turing in the U.K., and I.J. Good and Gordon Welchman in the U.S., and several Americans at NSA. In 1962, I hadn't a clue.

I no longer remember what kind of car Stan drove, nor whether he had pleasure in such beasts, as I did. We arrived in Newman Street in central London, having talked vigorously about computing personnel all the way. He felt there were severe problems at top and bottom, but reasonable supplies of programmers (as I had, he relied heavily on women) and maintenance men.

He had just been appointed Director of Programming Research at Ferranti, and was de facto head of their London Computer Centre. He had a typically European connection continuing with Cambridge, and did not offer anything about salaries and such, but clearly it was a major career move for him. "Will you need to move to Manchester or London, Stan?" I asked. Not decided, he said.

The Centre had two PEGASUSes and one SIRIUS, with an ORION coming. It could not begin to afford an ATLAS, but would have commercial access to the University of Manchester machine. I had told him I was being funded by "a competitor or some such", so we talked about the U.K. situation in general. He did say service work was profitable for Ferranti and had top management support, and that he did not need to "sell". I asked if enough walk-up business appeared without salesmen, and he said there was value in problems "on their own merits". My trip report said, "Means it gives a private view of the shortcomings of one's own machine."

We went back to the education thing, and he emphasized that fancy men and women got picked off for university before the new polytechnics could get their hands on them and teach them any down-to-earth practices. The same thing happened in the U.S. later, but the broader river of young people flowing through the diverse American school systems kept the result from being so important.

We parted reluctantly. I saw him a dozen times later, notably at the Stockholm IFIP meeting with his son, but I never felt closer to him than in his new 1962 office.

One of the men Goodwin wanted me to meet was completely new to me. He was a D.G. Hawkins, manager of the Central Electricity Generating Board Computer Centre in the CEGB headquarters, Gordon House, in Greencoat Place. I poked around for mutual friends or experiences, and turned up CIGRE and Pier Abetti (who had the 705 in GE Pittsfield). Can't remember if the E in CIGRE stands for "Electricité" or "Européens", but GR stands for "Grands Réseaux", the giant nets of high tension power lines. Pier designed and built big transformers; CEGB used `em.

I can't do better than quote my entire report, including appendages:

PROSPECT FOR: Next, a second 7090; THEN two 3600s, or a 6600 if there were several others about.

REPORT: This is another very good prospect. Operates gigantic closed shop of 150 people, including two punched card installations and PACE analog. Very nice physical setup (for London). A hard rock ops man (reminds me of John Lowe) with power engineering and OR history. No DP to speak of. Very skeptical hardware and software deliveries of Ferranti - says he personally quashed ATLAS order (I think very likely true). Likes big resources IBM but resents high prices. Has not been subject old California-style Poughkeepsie highhandedness! Says petroleum people do reasonable transportation (OR) work but he would do much larger ones [sic] on sufficient machine. His systems group also going toward real-time control; this is

largest integrated electrical distribution and generation [system] in WORLD by considerable margin - all UK!

COMPETITIVE INFO: Has 709, almost phased out; 7090 one shift, expanding; wants disc file and another 7090 for security of operation. His standard: 98% availability of at least one machine:

ACTION:

1. Give him early dope on 3600 and 6600. He told me the 7094 announcement is out.
2. He's not interested in #1 of any machine, nor in #1 of US imports even if many in US.
3. Attending TVA-Ontario Hydro meeting in April somewhere in Tennessee. Pick him up? Don't disclose my lead unless you want to.

Reminded me of my good years in GE Evendale. Hawkins was doing something his bosses wanted badly. He had sensible and powerful superiors in a huge, rich outfit. And unlike among the U.K. bankers and department store owners, and Whitehall types, technology was his bosses' bread and butter, rather than a mysterious threat.

Charles had arranged a dinner date for me with Jack Howlett. I took him down to the Grill and plied him with smoked salmon and Carlsberg, and beef, and burgundy. We hit it off immediately. He was running a shop like one of mine, at Harwell, with a building under construction and staff expanding and a big ATLAS coming. His part of the AEE was the newly reorganized research arm, and pretty well outside security; indeed, he could play games with Oxford (I noted in my trip report that Fox was resisting).

He hoped that the smaller ATLAS Buckingham was getting via the UGC would break the ice with the academics. I disguised my strong doubts by saying Buckingham should get "a disinterested 'manager' [a Rex Seeber] who would want to serve the colleges equally"; Jack agreed, and then admitted he was on the selection committee for such a person.

We talked about Los Alamos, which was beginning to show faint signs of wanting to do unclassified work, and that brought up Livermore, and their plans to get a Cray machine. Needless to say, I plugged Howlett as a major candidate for a "6600 or better" in my report, and pointed out he was to get his machine at the end of 1963, or even later; there was time.

I knew better than to recommend sending Surly Seymour over to meet Howlett; SS regarded even the sexiest users as annoyances, and most of them as contemptible. He didn't even want users to change their problems around to make more sophisticated use of his brainchildren - just that they go away and not bother him.

They ahemmed us out of the Grill when the after-theater crowd thinned; Jack sent me a note saying he had never spent a more pleasant four [!!] hours. He remains a monument to U.K. big-computing today.

Next morning I was in Aldermaston, the AEE weapons design center. Glennie, to whom I had illegally leaked the STRETCH specs in early 1959, introduced me to his boss Dr. Corner, and we had a great time talking ATLAS versus STRETCH, Ferranti versus U.S. IBM and U.K. IBM, and looking at their handsome 7090.

My report says:

"Corner is very conservative but extremely well informed and willing to talk. They feel English problem is lack of interest in computer approach at top managerial and government level - 'their' Sir Wm. Cooke almost only exception, and perhaps petroleum outfits - Shell, BP."

I added that Aldermaston was the "best prospect in England if STRETCH flops". I had worried what to say about the C-E-I-R orders, but found they knew more about the situation (even about Jack Strong, and the

backup 7094 order, and the building on Wilshire) than most computing buffs in the U.S.

I was not an old friend of Glennie's, and British reserve would have been disturbed if I had gone into the gory details that had titillated Charles Goodwin and Stan Gill. But word gets around!

On the train back to London I relaxed. Things were going well, thanks to old relationships. I set the Savoy hall porter to work on telegrams northward, and on Scandinavian hotel reservations. And I skipped one meal.

Next day David Wheeler came down from Wilkes' lab in Cambridge to spare me the trip. I took him out of the hotel for lunch, and found confirmation for my Monday and Tuesday stories but not too much new stuff. He said Maurice, who was in the States at the moment, had tried to get the UGC to give him an ATLAS, had turned down a possible KDF9, and was sort of planning to assemble his own machine from [donated?] Ferranti parts. I summarized Wheeler's own concerns as:

"down on ALGOL for publication, let alone usefulness in actual machines; skeptical character recog. work in UK, and machine translation everywhere; still enthused over microprogramming ideas Thinks 6600 simplicity better than complex look ahead".

and added that Cambridge will have access to Buckingham's small ATLAS and Howlett's bigger one. Apparently all they had at the moment was a much-modified EDSAC. No wonder Stan Gill had drifted away.

The University of London Computer Unit was within walking distance, and Dr. Buckingham was eager to talk Wednesday. He had a Ferranti MERCURY with "limited store", and expected to get his ATLAS "in 12-14 mo.", which seemed optimistic to me. He told me a third of his support was from the university, only a third [I was surprised] from the Grants Committee, and a third from British Petroleum.

I reported "Gossip (not from interviewee) puts latter at £600,000 for five years, or \$336,000/yr." - don't remember who told me.

He was planning a new building, which given the speed of 1962 construction or remodelling in Central London made his opening date even less likely. I wished him well.

Now, Sandy Douglas was waiting for me in his office in the Kingsway. We had much to recap; he knew Robinson had fired me, but not - he claimed - why. I had been told in Teddington that Robinson had recently put one of his own friends in over Douglas, but also not why. The stories about the week before were true; 52 "staff" had been dismissed.

The new top man was Maurice Kendall, a famous figure in British statistical circles who would give class to C-E-I-R Ltd., but who didn't know one end of a computer from the other. Herb Robinson had come out of those circles, and cast back because as a renegade - Arlington, Virginia - and worse, a Yorkshireman, he yearned for the Oxbridge patina. It was dumb, and Sandy was too formidable a politician for it to last.

I wrote:

".... - they share IBM Newman Street 7090, have about a shift of work (largely LP [linear programming] - customers carefully not identified). This is steady; they might get own machine when they have a shift on IBM machine already sold; 7094 announcement important because much of the LP is double-precision floating work, so 7094 is maybe five times 7090 at 20% extra rental."

"But won't you be able to buy 7094 time from IBM?" I asked. He said it wasn't clear whether they had a 7094 coming, and grumbled about unimaginative local management. "Maybe you can get `em to hire away Maurice?" I cracked.

We agreed to meet at the nutty Cardiff meeting of the BCS in September; it was the first conference outside the London/Oxbridge ambience, and we were both skeptical.

"Sell him a 3600 before he orders his own 7094," I advised. "But watch out for finances; Robbie is tricky."

Les Fox had come down for lunch Friday, at Goodwin's suggestion. I scolded him for not bringing his attractive wife Paulene, and pointed out I had reserved on the Embankment side rather than the business-lunch Grill hoping she would come. He had a lot to say, negative about the UGC which scanted him because he had a computer (his Ferranti MERCURY, working 168 hours a week). Good for ten years, they told him!

He took a chance and ordered a KDF9 for "about £230,000", intending to do charge-backs, even inside the Oxford colleges and labs. I was puzzled by his emphasis on service costs, but now realize they came out of his day-to-day budget, the smallness of which also kept him grossly understaffed, rather than from what we now call a "capital" budget.

Anyhow, he was paying for two-shift maintenance on his present machine, planned £12,000 a year for the KDF9, and said Ferranti wanted £25,000 to service an ORION, and IBM was "even worse". Considering much lower wages in the U.K. I suppose that seemed a lot, and I passed it on to Miles; it seemed cheap to me.

The Royal Aircraft Establishment (Farnborough) had a late model DEUCE, but only with paper tape. The head of their computer activity, a chap named Hollingdale, had come out of NPL, so Charles had lassoed him for me. He came to dinner at the Grill, and we split a monster Dover sole, partly because it was Friday.

We traded names; I did "One Of The Boys" as of the engine business, and he said Rolls Royce was Number Two in computer use, behind De Havilland, and mentioned Val Cleaver. He told me English Electric also had an aircraft division, and that the RAE was going to give that bunch one of the nine KDF9s it was ordering from the computer side of the house!

He was doing mostly test data reduction and performance tabulations, and yearned for graphic output. His people used a primitive DEUCE assembler, would prefer ALGOL, but were going to settle for FORTRAN (I told him he was lucky).

After I had worked over Goodwin's "availables" chart I had called Chris Strachey, who had been my second choice for the C-E-I-R job, and asked to see him. Since the idea of taking a pizza had not yet dawned in Europe, I brought a bottle of excellent claret [alas! he didn't open it].

Since he was only a machineless consultant like me, I did not have the same criteria in discussing the scene. I can give his qualifications best by quoting the body of my report on the visit:

Strachey is the original NRDC computer designer, and among other machines did PEGASUS for Ferranti. He does a great deal of classified work - lately on EMIDEC 2400, which he likes largely because it has a large core memory (16,000 words). He views English software [note 1962 use of word] with a jaundiced eye - lack of support, also lack of top management appreciation. Doesn't expect a major upturn in English computer or data processor orders for 5-10 years, "until the younger men get into the Establishment". No opinions about the Continent. Likes McCarthy (MIT) work on novel function-oriented programming languages [LISP?].

Does not admire ATLAS - too gimmicky, as we would say. Thinks it will work but will have little software.

Reads pretty well after thirty-six years! Strachey was terrific, and not at all Surly. His premature death in 1975 diminished our trade, and worldwide.

Before the evening calls I had casually walked in to the English Electric Computer Service Centre, also in the Kingsway. They heaped me with brochures and told me there were 18 firm KDF9 orders in addition to "a great many" KDP10s already installed.

They had a late model DEUCE with a KDF9 coming, and claimed to be so busy they were shipping work to Kidsgrove's KDP10. Since the latter was chalk-versus-cheese incompatible with the DEUCE, I doubted the yarn. The technical man, a Mr. Davis, said EE was doing £5 million a year "in this field".

What a week! And it wasn't over yet; somehow or other I had tripped over Arch Johnston - probably in the Savoy lobby. He was the head computer coordinator for Socony Mobil International, and had his office only a few blocks from my Manhattan apartment. We got together for a few minutes Saturday morning.

He had four 1401s in London, Paris, Hamburg and Geneva [?]; punched cards in Italy, Nigeria "etc.". He was heavily involved with IBM because of the 7090 in New York, and said if data communications improved he would put in a 7074 somewhere. My notes say, "This is important for Europe" - data communications, that is - and recommended a New York or St.Paul salesman talk about the problem with Arch [don't think they did].

I checked out of the Savoy; for all those lavish meals, and six nights in a decent room, the bill was £142/2/8, not counting two quid for the hall porter. Gawd! It would be two thousand today, and a twenty quid tip!

I took a wonderful London taxi out to Heathrow (the hall porter had bought my ticket, of course) and headed south for Scandinavia.

COMPUTER LIST FOR CHAPTER 32 (*, new in this chapter)

160A
DEUCE *
Pilot Model ACE *
7090
KDP10
KDF9
501 *
1604A
3600
STRETCH
ATLAS *
COLOSSUS *
PEGASUS *
SIRIUS *
ORION *
6600
709 *
EDSAC *
7094 *
2400 *
1401 *
7074 *

33 MORE AN ANTIQUE ROMAN THAN A DANE

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In Chapter 33 you will encounter
(in order of appearance):

Expense cards *tiny little things, to record such pleasures in so many currencies*

Car-sleeper service 31 Belle Terrasse [restaurant] *Tivoli closed for the winter, but!!*
Niels Bech *Danish computer pioneer: "a leader, and much loved"*
Regnecentralen *government-supported Danish computer institute*
Peter Naur and Jørn Jensen *disciples, of Bech and of software*
Konrad Zuse *the German Babbage; a towering European pioneer*
Alan Turing [11](#)
Christian Gram *gave me the Bech memorial volume in 1978*
Kommunedata I-S *major service bureau for Danish governmental data processing*
Eastern Europe *Bech perceived an almost-closed but receptive world*
University of Warsaw *Turski got an early GIER*
ALGOL *an early virus, spread partly by Americans*

"South to Scandinavia" at the end of the last chapter was correct. I wanted to get to Copenhagen over the weekend, but first I flew down to Milano and reclaimed Ranch, from a garage near Linate. I drove with great pleasure back into town, put up at the Continentale again, and relaxed in Italian anonymity.

I did a classical seafood antipasto at Da Alfio on the Via Senato, but went dutifully back to my room and wrote up my last English reports and notes. In the morning I counted my various monies and started my funny expense card for the new week ("Carried 20NF, 40sh, 100SF, 10DM, 20100 lire, \$2152.06" - must have changed my last English money to Italian at Heathrow, and the U.S. was mostly a letter of credit).

The doorman produced my insignificant Simca with faint disdain, put my two bags in back, and saluted me off. I drove gaily north through Como and between the lakes. The weather was good, and I beat most of the Sunday traffic. I went up as far as Chiavenna - the great Splügen Pass road at the end of the valley had been closed since late October, of course. I brooded over my maps, and the unattainable heights. I don't think the San Bernardino Tunnel had been opened by 1962, and anyhow that was out of the next valley west. The hotel had packed me a box lunch with a big bottle of San Pelligreno; I enjoyed it.

My little excursion over, I dropped down to Como again and crossed into Switzerland. My objective was a loading ramp at Chiasso, where I put Ranch to bed in another goods wagon. This time we had a major car-sleeper adventure; we would span the entire country, go into Germany at Basel, hitch onto the DBB, and end up next morning in - Hamburg!

Today you have to start in German Lorrach, across from Basel, and the service only runs four summer months. But in 1962 it ran all year, and there was a Swiss restaurant car for dinner. The big problem is to be sure you have reservations; I had solved that by having the Savoy send over to the London office of the Swiss railway and buy the tickets for Ranch and Human - ah, Dr. Human!

Next morning the two of us drove to the Hamburg airport, bringing back memories of 1954 (for me; it was a first for the Simca). The locality being much freer from pilferage than Linate, I parked my little friend cheaply in the open and flew away to Copenhagen, not realizing what tides and tempests would intervene before I would see the blue miniwagon again.

I had arranged to meet my host for dinner; not yet having experienced his gusto, I was a little startled when he showed up at my hotel with two young associates. He swept us off to the Belle Terrasse in Tivoli, bought rounds of drinks and a wonderful meal and wine and beer and liqueurs - and picked up the tab. What an introduction!

This was Niels Ivar Bech, founder, director, chief engineer, head salesman and fund-raiser for Regnecentralen, the Danish computer enterprise. His young disciples were Peter Naur and Jørn Jensen; Naur was helping him with his IFIP tasks (Bech was program chairman for Munich) and Jensen was doing a software package for his GIERS.

My call report began, "What a ball of fire this boy is!" I had been startled to find he had made eight GIERS

in a year, and shipped all but the Regnecentralen unit, on which software and "an impressive microprogramming experiment" [my wording] were being tried out.

Bech said that for Denmark it was IBM or local talent (him). Brits were nowhere, Siemens coming up but "far behind in software", and the universities would lose their few good people to such companies.

"Lucky youngsters," I smiled. Bech laughed hard but his disciples were shocked, even after I told my Watson Lab and Evendale stories.

I reported to CDC that Bech expected four hundred 1401-and-up machines in Denmark in five years, up from forty in early 1962.

His Number One machine had an Analex printer (good) and Ampex 400 tapes (not good). He still had the old DASK, which was a Danish copy of BESK, the Swedish one-off, and used excellent paper tape equipment for input and output. Jensen was unhappy that they had no tape-to-mag-tape converter. I said cards were the way to go, and was trampled on; turned out they had also designed and built the RC2000 paper tape unit!

The acronym GIER stood in Danish for Geodetic Institute Computer, and the Number Two the institute got in 1960 was used until the mid-Seventies. Parenthetically, my introduction to Control Data (when I could run up the window blinds) led to Bech installing a 1604A in August of 1963 for service work, while he was developing his RC4000 computer.

I will be writing later how I returned to Regnecentralen at the end of May, but this is a good place to tell more about Bech, who was a Danish Zuse, the discoverer of a dozen great young people, and a vivid and exciting human being. Just as I did not appreciate Turing until I read the Hodges biography, so I did not grasp the full abilities of Bech until I was given a copy of his memorial volume in 1978. My wife Nancy and I, and the Peke Ginger, were guests of Aarhus University for a week, and Christian Gram made the presentation.

Bech had died in 1975 at 55, and his disciples and admirers immediately produced the wonderful book. Gram, for instance, did the chapter on Regnecentralen and the Danish universities. In paper covers, with dozens of illustrations, and with English chapter summaries, the book is a joy to look at.

The man's drive toward a unified Scandinavian computer enterprise failed and the manufacturing side of his institute dwindled away, but the service arm mutated into a powerful governmental center called Kommunedata I-S which did the data processing for all Danish towns and provinces. We will meet it at the OECD in 1969.

All my heroes were innovators. Not necessarily in computing: Watson Senior did management and salesmanship, and Neumann did jet engines, and von Braun spacecraft. Most of them were leaders, but not all; many were warm human beings. Bech was surely a leader, and much loved. I wish I could have known him better.

One almost forgotten innovation was Bech's interest in Eastern Europe. He sold a GIER to the University of Warsaw - Turski's first good machine, I would guess - and a small RC4000 to a Polish chemical plant for process control. Regnecentralen pushed into Budapest, Prague, and especially Sofia, but the effort slackened after his death in 1975.

Another powerful Regnecentralen thrust was pioneering and effective support for ALGOL. That annoyed me in 1962 because I disliked its provenance and its professorial originators. But I noted that Naur's version ran on DASK and was about to run on GIER, months and months ahead of the academic counterparts, and applauded Danish skills.

I recommended to Miles and Norris that they consider Copenhagen as their Scandinavian center because

of Bech and Regnecentralen, "But the importance of locating the maintenance people near their first customers points to Stockholm or Gothenburg."

There was another comment in the Competition section of the Danish chapter of my final report which makes me feel badly as I read it today: "IBM gets orders because - well, because Bech may trip up, or vanish as Mario Tchou and Ralph Meagher did, but the Watsons go on forever. So even at 6-8 times GIER prices, there are plenty of 1401 orders." Sssaaah!

COMPUTER LIST FOR CHAPTER 33 (*, new in this chapter)

GIER	*
1401	
DASK	*
BESK	*
1604A	
RC4000	*

34 THERE IS A TIDE IN THE AFFAIRS OF MEN

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In Chapter 34 you will encounter

(in order of appearance):

Niels Bech 33 Train ferries *the sleeper berth was comfortable if the ferry rolled less than 15°*
Linkøping *unlike much of Sweden they still did a full smorgasbord*
Børje Langefors *he and his former boss had visited me in Evendale*
SAAB *made great fighter planes, very good automobiles, and ahem! the D21*
Facit *had graduated from adding machines to rather good computer I/O gear*
SARA, D2 and D21 *but nobody had had a CPC!*
European computer rentals *IBM charged about double, in Sweden*
Tryggve Holm *father figure of the entire SAAB enterprise, including electronics*
IBM Stockholm *but they had an RCA 501 (or was it a KDP10?) in the show window*
Arne Lindberger *he had been stomped at the Watson Lab by Ellie Krawitz*
Swedish Computer Board *unlike Regnecentralen they had to ask for their money each year*
The 1962 Hamburg floods *the Elbe rose, and reminded me of the Brutus quote*
K-O. Tuvlind *the medics did an early-Sixties expert system on his two Wegematics*
The Reuterskiolds *threw a nice party to recall good times on the Arlberg*
Linie aquavit *even after a long long ocean voyage it is still potent*
SAS *they only promised Hannover, but after 1954 and 1956 I trusted them*

I had already taken my luggage over to the station before Bech and his "boys" carried me off to dinner. I would have checked back into the hotel and stayed another day, but by this time I was nailed to a schedule by railroad reservations and prior appointments. I could see I had tapped into a free-flowing aquifer of Scandinavian (and indeed, continental) information. But alas! I had to be at SAAB in the morning.

We stretched the dinner out, and then adjourned to the Faience Bar and kept on talking. Naur wanted to know about his English friends and about the IBM crew back in New York; Bech had heard about the C-E-I-R venture in London and wanted an update. I carefully avoided mentioning Japan!

Only an hour before train time Bech loaded us into his rather nice car and drove me the three or four blocks to the station, ignoring my protests as I gathered was his wont. Swearing to keep in touch, we parted at the entrance.

I reclaimed my bags, extracted the London-bought tickets, found the proper spot and sleeping car, and climbed aboard. I had a single, of course, and the berth was down, in an older car than the Swiss one I had ridden up from Chiasso. Chamber pot!

It was half an hour to departure, so I was able to walk around the wonderful old high-arched station, admire the lovely girls and women, and buy some boxes of Berg marzipan as ongoing gifts. When the train pulled out I sat fully dressed waiting for The Big Event: it was my first night train ferry ride, and I was armed with an English enthusiasts' book called something like "Train Ferries of the Western World".

The train, the book and I were to be loaded, well after midnight, onto a ferry primarily designed to cross the Øresund (several times a day, but only once at night). Pushed on by a Danish shunter and pulled off by its Swedish counterpart, the night sleepers did not have to be divided; there were only three or four. The book said the daytime trains had to be split; there were parallel tracks.

I didn't dare look around the boat itself, but I did watch wide-eyed as huge turnbuckles were connected to several eyes on each side of each car and tightened down with crowbars. The car ferry book said that operation "in northern waters" continued until rolling of more than 15 degrees was encountered; now I could guess why lengthwise bunks were not used in European sleepers!

These operations across major water gaps in the rail network had begun before WWI, continued - believe it or not - during both wars, and are still operating in many places today. The one across the English Channel, the night Arrow into Victoria, which I rode a few years later, has been discontinued; the one across the sound between Denmark and Sweden still operates, and will do so until the tunnel/bridge between Copenhagen and Malmö is inaugurated in 1999.

Thrilled and wakeful, I climbed back into my bedroom, took off my clothes at last, and rolled with the ferry. I had forgotten about Jim Miles and Bill Norris. Minnesota had nothing like this.

The attendant got me off very early in Linköping; the schedule provided for most passengers to breakfast in Stockholm, many kilometers up the line. Børje Langefors, who had visited me twice in the U.S., met me with two juniors and carried me off to the hotel he had arranged, and fed me a fair copy of an English breakfast, with - to my amazement - scrambled eggs: good ones.

SAAB stood for Svensk Aeroplan Aktiebolaget, and the company was prouder of its fighter aircraft than of its then rather unattractive automobiles ("best in the world in climates like ours", I was told). My host was a chap named Dr. Lindström, head of the Electronics Division; under him Langefors ran a major computing shop, servicing mostly the airplane boys.

There was a division marketing man named Kuentzel, who proudly told me they were on the verge of announcing their new D21, and that I would be the first American to see the production machine.

I was amused to hear they were buying Philips cores and stringing their own memories; Bech was buying complete core planes from Plesseys. I reported this and much more to Control Data, and added "nicely built, ultrareliable from military and user experience".

Gave me a chance to see the new Facit high speed paper tape punch and reader, and to lift a discreet eyebrow at Potter magnetic tapes, which I had never seen except at the Joints, in the U.S. They gave me a tour of the old SARA, which I faintly remember was related to BESK, and their own D2, which Langefors had had to use for two years while yearning for his D21. Somebody admitted there was a 7070 hidden away in plant accounting, doing loathsome things like payrolls.

They said cagily the price would be "much cheaper than American", meaning IBM. Kuentzel said the IBM rentals - the 1956 agreement to sell machines had hardly affected IBM Sweden - were nearly double the U.S. rates, and I wondered very secretly to myself what CDC would do in that respect. Not double, it turned out at CERN in later years, but marked up quite a bit.

A luncheon had been laid on in my honor at my hotel: a full smorgasbord, and with much aquavit and toasting. I had already heard that the famous display was getting too expensive for most restaurants, especially at lunch, and was delighted to find the word had not reached the, um, hinterland. I made a short speech of thanks, comparing the feast favorably with Italian antipasti and praising the D21 effort.

I don't know to this day who was the prime mover behind SAAB's entry - somebody above Lindström, I'm sure; perhaps Tryggve Holm himself. What they needed was not Plessey core planes, but a Niels Bech. In the next decade they fiddled with the idea of a Scandinavian enterprise, probably goaded by Bech and his people, and lured by his Eastern European dreams. SAAB had resources; it was no GE, but any outfit that could design, build and sell really good fighter planes in the world market could have challenged IBM and Univac.

Half the troop waited around while I checked out, and escorted me to the afternoon Stockholm train. Nice!

I had reserved from London at the Grand, and due to the good offices of the Savoy was given a fine room facing the harbor and the palace. I walked for miles - ah, kilometers - around the town center, not yet torn up by the "improvements" of the next two decades. It was cold, but the snow had been neatly cleared away.

I had been avoiding IBM offices and computing centers, but I had known the original Swedish Applied Science rep Arne Lindberger when he was training at the Watson Lab in 1949. I quote from my trip report:

He was out of town, but I got the royal treatment anyhow. DATAMATION is widely read! There are 5 7070s in, two more later this year; "very many" (equals, I hear, over 40) 1401s in and on order; one 7090 in Defense Establishment. Also, big joke, an RCA 501 on the ground floor - big windows - of this office building!! Service bureau with some DP work, says Ahlgren [manager of the IBM Data Centre]. He has a 650, with 1401 coming. IBM [Lindberger?] trained its own systems analysts, now uses them to in turn train customer analysts. Has manuals for punched card machines in Swedish; wishes it had same for 7070 - 7090 but gets along without. Feels each 7070 needs 30-man organization. Has a time persuading DP customers of this [in 1962? I'll bet!]. "Technical customers no problem; train themselves" says Lönnquist [marketing manager]. See little hazard from British machines or RCA or Rem Rand; some from SAAB and Facit. Has no printed dope yet on 7094; prob. true.

They fed me a magnificent lunch at the Stallmästaregarden, just out of town, and decanted me at the Grand afterwards. I left messages for Arne.

I referred in my final report to the Matematikmaskinnaemnden, whose Wenner-Gren Center I staggered off to in the late afternoon. This was the Computer Board that built BESK years before - a larger version of Bech's operation. I wrote, "The latter [Danes and Norwegians] are free to put funds they earn back into their own developments; in Sweden the service bureau income from BESK goes to the government, which may or may not pass it back in the form of a larger budget next year." So said the boss, a Dr. Dopping.

Uncle Sam made me do the same thing with the Bureau of Standards 1108 six years later; great way to smother the Bechs and the Grosches!

The Savoy hall porter had fixed me up with a sleeping car reservation for Oslo, and a hotel. I'll tell about that snowy adventure in the next chapter, including a flight back into Sweden.

I got to Gothenburg in the very late morning Friday [16 February], due to ferocious weather, and saw immediately that onward travel arrangements had to take precedence over my earlier local appointments. Floods had closed most of the bridges across the Elbe, and heavy rains had damaged the runways at the Hamburg airport. Poor Ranch was undoubtedly hub-deep (my concierge got through, with great difficulty,

and reported no major problems in the parkings).

I changed my ticket to fly that evening to Hannover, and asked SAS (remembering past good performance) to see that I somehow was transferred to Hamburg afterwards. "Many other customers are affected, sir; not to worry," said the young lady. But I did.

For one thing, the carbon copies of my first 21 call reports, from which I would have to construct half my final document, were in a folder in Ranch, along with brochures and such. Even if my little wagon survived rising waters, the flimsies might not!!

Putting these grim thoughts aside, I went off to my postponed meeting at the Chalmers. This was at the ADB Institutet [Data Processing Institute] of the Chalmers Tekniska Högskola, where I looked forward to a reunion with a hot academic, K-O. Tuvlind.

I had met him when he had relay machines, now replaced by two ALWAC IIIEs, locally called WEGEMATICS. Gothenburg was a shipbuilding town, and Tuvlind serviced the towing tank researchers of his own polytechnic, and structures engineers at the Foundation for Shipbuilding Research nearby. I was impressed.

He was also a mine - ah, tank - of information about machines, as such user managers always are:

This is first place in Europe that has been favorably impressed by Philco. Also very knowledgeable about RCA 601. Dubious of [Swedish] resources, even SAAB D21; does not like IBM and does not feel English firms will follow up promises. "Rem Rand does not exist here" he says. Also says RCA 501 in Stckholm would sell time if properly managed, but is being used only as a showpiece. Will probably go IBM next if he can get rid of his inexpensive but unamortized "WEGEMATICS" ...

I hit an unexpected novelty in his shop: a down-to-earth experiment in computer-assisted medical diagnosis [!!!]. The Varnamo Lasarett [clinic?] had already made six thousand human-doctor diagnoses, and Tuvlind was processing the matching 266-question patient questionnaires "machine-diagnosed by various programs in an attempt to maximize agreement with reality" - a 1962 expert system experiment!

I had met the Reuterskiolds at the Sankt Christof hotel, and promised to call on them if I got to Gothenburg. That was of course before I knew about the Control Data adventure, and I called them from Copenhagen to ask if I might have a short business visit at the Swedish Shipping Association office, and then come to their apartment and relive St. Sylvester. After the weather did me in, I begged off the interview but was told to be sure to come to the apartment, where "a few friends were gathering to celebrate Friday" - I still suspect it was to meet me, but Reuterskiold was too suave to put it that way.

Anyhow, with only an hour or two to plane time, I found myself welcomed by his lovely wife and half a dozen handsome couples, all eager to tell me about the storms around Hamburg and hear first hand about my Japanese trip (which had been prime chatter at the Hospiz). I loved it, and loved the hors d'oeuvres and the Linie aquavit [across the equator and back, before bottling]. But in the end I had to scuttle: a wonderful ending to my Scandinavian tour.

When I put it together later I ranked Sweden as second only to Germany for a Norris entry: "... only the British know more about computers than these people. The Germans have so much more potential business I have to put them ahead [but] this would make a neat northern outpost".

COMPUTER LIST FOR CHAPTER 34 (*, new in this chapter)

D21 *
SARA *
BESK
D2 *

7070

1401

7090

501

650

7094

1108 *

ALWAC IIIIE, also called WEGEMATIC *

601 *

35 SIDE TRIP INTO NORWAY

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In Chapter 35 you will encounter

(in order of appearance):

Hotel Bristol *prices then and today are amazingly high*

gravlax *much-marinated smoked salmon, very good at the Los Angeles Scandia*

Regnesentral *wanted me to go away, but not enough to call me a taxi*

Instituttt för Atomenergi *had already written Minneapolis for data on the 3600*

Jan Garwick *extremely vigorous ALGOL enthusiast who later went to White Sands*

Tor Haavie *planned to buy "a really big KDF9"*

Maintenance under strict security *Haavie trained people on his own payroll*

English Electric *unless a KDF9 arrived, they would sell only toasters and such*

Telefunken TR4 *Garwick had been doing an ALGOL compiler for it*

Kristen Nygaard *later he fathered SIMULA*

Elliott 502 *an unexpected order for a process control application*

Sperry Rand 1107s *Gordon swept Norway with 'em in 1965*

In the previous chapter I disappeared from Stockholm and reappeared in Gothenburg two days later. What happened was that due to the geography of that part of the world it made better use of my time and CDC money to go up to Oslo at that point in my tangled itinerary, and to switch from lovely or at least exciting trains and ferries to air travel.

I flew into Fornebu late in the afternoon of Wednesday February 14, and put up at the Bristol as arranged by the Savoy porters. Even then, over thirty years ago, prices were amazingly high, but I gritted CDC's teeth and went out solo to Blom's for dinner. This was I think the very first time I had had gravlax in Scandinavia, having been persuaded to try it first at Scandia on Sunset in Los Angeles (a five minute walk from my 1960 C-E-I-R "office"!)

I had sent introductions by letter, and cables later, to the national computing center Regnesentral, but drew a humiliating blank when I showed up; no one admitted having heard of me, or to have seen my communications, and when I gave up the receptionist was reluctant even to call me a taxi. First such business in 26 visits, which looking back from hundreds of such arrangements and failed arrangements in later years was an excellent ratio.

I boarded a strange ultra-wide suburban railcar in a fairly heavy snowstorm - part of the weather ravaging Hamburg, although I didn't yet know it. This took me to the Instituttt för Atomenergi in Lilleström, which in spite of the peaceable name was primarily an attachment to a military establishment. They had a big Ferranti MERCURY, which because of security I was not allowed to see (of course I had British brochures and programming manuals already).

My introductions, from Stan Gill in London, were to Jan Garwick and his boss Tor Haavie of the institute, who nevertheless did most of their work for the weapons boys. They were startled at how I had been repelled at Regnesentral, but I had to refuse most of their offers of help because of my departure for Gothenburg next morning.

They first told me about their own needs and those of the KDRE, Royal Defense Research Establishment, next door. Turned out they were planning to buy a really big KDF9 for about \$2 million, which made them a solid prospect for one of Seymour's 3600s, or even for a cut-down 6600.

The major problem seemed to be maintenance under security. If I could have made a sales pitch for CDC instead of talking vaguely about "a new company on the European scene", I could have pointed out that what they thought of as heavy restriction was child's play to anyone involved with NSA - about what it took to get through to the visitors' desk at Fort Meade, let alone inside!

Their solution was to require their suppliers to train Haavie's own people to maintain the computers, which worked poorly for the Ferranti machine and, I warned them, would probably not work at all with English Electric. They said it worked well with a tiny ITT subsidiary "which made special equipment for KDRE" (I knew from my abortive explorations inside European ITT in 1960 that the special equipment was cryptographic; of such linkages are security breaches created). I said such accommodations were easier for small local outfits. They replied gloomily that EE was strong locally only in consumer goods. Like toasters, I asked? Exactly, Haavie sighed.

Also they wanted two to three times 7090 speeds, which my memory of KDF9 brochures did not substantiate.

Getting onto software topics, Garwick (who was an irrecoverable ALGOL nut) said he had a private agreement to do a compiler for "the largest Telefunken machine", and that they had written him two days ago to suspend work. In my contact report that evening I said this had to be the TR4, and indicated some sort of shakeup.

While we were gossiping a junior or a secretary was running down Kristen Nygaard of Regnesentral, who seemed unrepentant about the morning, and arranged for him to have dinner with me at the Bristol.

I thanked the two men for their welcome and their help, told them my client would almost certainly be in touch "in a couple of months" and headed back to Oslo. It was pitch dark at four o'clock, and snowing; school was just out, and the youngsters were skiing [!!] home.

Parenthetically, Garwick, who had much of Niels Bech's drive but none of his suavity, emigrated some years later, ended up in the American Southwest - White Sands or some such - and died at the beginning of the Nineties. He and ALGOL were each unfulfilled, and in Garwick's case it was a tragedy. The KDF9 didn't do as well as it deserved, either.

Nygaard, whom I was to see several times in the next few years, was an extremely expert programmer, and would have been another ALGOL supporter except that he was about to embark on a competitive language of his own (this would be SIMULA, of which more later). I took mental notes of his ALGOL denigrations for my own later use. As for hardware, he told me the center had a DEUCE, which I knew from Teddington, and that it was permitted to sell machine time and a little consulting. Looked like a potential 1604 customer to me, and I so reported.

He also told me of a 650 in Bergen, in a cooperation named EMMA. There are RAMACs and 1401s on order in the DP community, he said, curling his lip. I was much more interested to hear him say the electric utility had ordered an Elliott 502, which sounded sensible, and an order I had not heard about in England.

I asked about the university (Oslo) and was told their people had not been able to penetrate MERCURY security; sounded like another 1604 prospect.

In my final report I suggested that Norway could be a good customer country, but that CDC would want to base "on Stockholm or Gothenburg, I think, or even on Copenhagen". What actually happened was that the European CDC venture first ignored Scandinavia while operating out of Luzern and Frankfurt, then opened expensive offices simultaneously in Copenhagen, Stockholm and Oslo, and lost most of its momentum and a wedge of money.

In a later chapter I'll describe how one super-salesman swept up and down the Norwegian countryside three years later and in one month sold more 1107s than all the 1604s and 3600s Control Data ever planted in Nordic countries. The name of Seymour Cray opened a few doors, but Norris And Co. were poor at the middle game and lousy at closing, especially in Europe.

COMPUTER LIST FOR CHAPTER 35 (*, new in this chapter)

MERCURY *
KDF9
3600
6600
7090
TR4 *
DEUCE
1604
650
RAMAC *
1401
502 *
1107 *

36 DEUTSCHLAND, DEUTSCHLAND ÜBER ALLES

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In Chapter 36 you will encounter

(in order of appearance):

1962 Hamburg floods [34](#)

Vier Jahreszeiten *a great hotel and restaurant on Hamburg's Alster*

White asparagus *a fantastic substrate for fantastic sauces*

The Berlin Hilton *"social center for Berliners and foreigners alike"*

Hahn-Meitner Institute *named for the man and woman who discovered atomic fission*

The Siemens 2002 *my first view of what Heinz Gumin had described at a JCC*

Facit 34 DFG [Deutsche Forschungs-Gemeinschaft] *computers for institutes and universities*

Berlin young people *there were too few; 1999 is very different*

The Wall *not the Berlin one, but the invisible one between German industry and Academe*

Heinz Zemanek *the chief figure in Austrian computing, and later head of IFIP*

The Telefunken TR4 35 Dusseldorf *my Arlberg friend showed me the night life and its lovely denizens*

Muster of Krupp *furnished me with a yarn about the stuffy PTT that I used for decades*

MPH *too long to spell out, it had gone from a CPC to a Dutch X 1*

"eecks een" *how to pronounce what van Wijngaarden and Loopstra built in Amsterdam*

The German Census *fed länder data from ten 1401s into the Wiesbaden 7070*

Fritz Bauer *"Here flourishes the dread monster ALGOL"*

Astronomisches Rechen-Institut [09](#)

Klaus Wenke *drove the heaviest technical computing in Germany, on a machine in Paris!*

BASF *part of the old AGFA, they lost Wenke when they told him they only promoted chemists*

Fraulein Hoffmann *I thanked Wenke's great secretary, who had helped a dozen times*

Standard Elektric Lorenz 29 Daimler-Benz corporate accounting *"Ugh! Know nothing but [German] IBM*

..."

The Bayerischer Hof *high society center for the Munich carnival; I had a chauffeur's room!*
Hans Radmer *clapped a tam-o'shanter on me and swept me away*
M-P-I *the great Max-Planck-Institut für Physik und Astrophysik, decorated for Fasching*
Prof. Biermann *ran the astrophysics side, and liked computers; Heisenberg ran the physics*
5,800,000 DM *IBM did a 7094 discount, and CDC could have done a 6600*
Piloty and son *key figures in the IFIP62 meeting coming to Munich in August*
PERM *they showed me it was still being used by students after eight years*
The open shop [16](#)
CDC location *Munich best, I said, and then Dusseldorf or Hamburg; they chose Frankfurt*

When I set out on the Control Data mission, I expected to end up recommending West Germany as the prime target for big scientific machines. The mentions of Germany as I toured my first five countries had not changed that expectation, even those I heard in Britain, which clearly was well ahead of Germany in computer sophistication. So it was with much excitement that I embarked for Hamburg - well, Hannover, as weather dictated.

When Dorothy and I had driven around in 1954 we had admired the amazing recovery, enjoyed the food and the white wines, and goggled at the spire of the Ulm cathedral. My adventures while attempting to understand the European ITT empire in 1961 had given me some feel for native hardware, the Huntsvillers and my German visitors in the U.S. had told me something about the user community, and ACM contacts and the UNESCO sessions said the academics were hot in software [not true by my practical standards, it was to turn out]. But I had not visited non-manufacturer computing operations, and I looked forward to doing so.

First little Ranch and I had to conquer the elements, however. SAS put me down after dark on the south side of the Elbe, and bussed all the Hamburg passengers - most of the load, of course - eastward toward the flood. The very last bridge before the East German border was still usable; I no longer recall its name, but a 1990 atlas suggests Dannenberg. Anyhow, we crossed, and turned back toward Hamburg avoiding flooded highways and minor bridge troubles. The driver gave us a commentary in harsh dialect which I couldn't understand, but I was so pleased at being back on schedule again I didn't care.

My reservation was at the Vier Jahreszeiten, the first time I had stayed at that wonderful hotel. They were forgiving of my late arrival, and apologized that they had to give me a suite [!] because the "inclement" weather had hindered departures. But, they said, since it was a Friday night the restaurant would still accommodate me if I came down promptly. Ah, did I ever!

I've stayed at the Four Seasons, as the name means in German, perhaps a dozen times over nearly thirty years, and eaten in the restaurant more often than that. Although I wasn't so fortunate on my first storm-blown visit, I associate eating there with *Spargelzeit*, the white asparagus season; I learned to enjoy that king of vegetables hot with sauce Maitaise or sauce Mousseline, Italian style (fried in butter with parmesan crumbs), and cold English style with melted butter or with a strange house mayonnaise full of red pepper flakes.

Anyhow, on this first visit I had as I well remember a magnificent pork filet with roast potatoes, and a light French red wine, and a rich dessert, and went upstairs rewarded for travellers' diligence.

Next morning I reclaimed my poor neglected Simca from the airport parking, left it at a nearby garage for maintenance and cleaning, and flew off to West Berlin: my first visit. Tempelhof, scene of the most dramatic days of the Berlin airlift, still excited me, and the broken church at the center of things excited me still more. Also the Savoy had recommended the Hilton, which I thought strange at the time, but now realized they had done so because it was a social center for Berliners and foreigners alike, and not at all like an American Hilton.

After checking in, I took a taxi to the Wannsee area and the Hahn-Meitner Institute for Nuclear Research and introduced myself at the mathematics "sector", which along with doing blackboard research operated a Siemens 2002 for the physics crew. It was my first sight of major Siemens equipment, and this machine also had new high speed Siemens paper tape drives (not as neat as Facit's) and two IBM 727 magnetic tape units, which Egloff and Topker, the men in charge, told me were going into production in Sindelfingen "very soon".

When I reported all this to Minneapolis, I explained that outfits like this one, and the manifold Max-Planck-Instituts in various disciplines, were funded by the government DFG, Deutsche Forschungs-Gemeinschaft, which gave out computers - German-made if possible - along with operating funds. Or loaned them, in a sense. The recipients were not permitted to take in washing, or to use my old charge-back bookkeeping, and as a result much stupid academic work got done and industrial and DP applications were shunned.

I also noted that "Junior staff was almost all girls, and not enough of them" - a symptom of Berlin isolation - not knowing at the time that there were exemptions from military service for young males, who nevertheless much preferred Munich and Dusseldorf.

Topker said Siemens had "no real software capabilities", and that his people were having to develop an ALGOL dialect. I recommended Garwick, Nygaard, and the English but was stiffly informed Bonn funding would not be available to non-nationals even if they worked in Berlin.

This sort of thing continues even in EEC-reunified Germany, but seemed to me in 1962 and still seems in 1998 less serious than the wall [Wall?] between Academe and industry (let alone commerce). In the U.S. hungry professors work for computer companies and in aerospace, or start their own businesses or consult for Washington or whatever, and flit back to a better academic job when they feel strong again. Bright industrial and business types reverse the sequence. Great gobs of know-how, and not a few trade secrets, get distributed across the economy, and lots of new ideas for research are planted.

Nothing like that has ever been dreamed of in Germany. At most, a minor eddying between universities and institutes, and between the very fanciest industrial research labs and those institutes, takes place - one percent of the U.S. traffic. If the Herr Doktor Professor were to leave his enormously prestigious chair, he could never dream of returning; if a tenured type in New Haven dips a toe in commerce and doesn't like it, he/she can take an equally tenured post in Champaign or Pasadena and not an eyebrow is raised.

Mind you, even just across the border in Austria, or up in Denmark, the shortage of really powerful types leads to multiple positions. A Heinz Zemanek can run IBM's Vienna software lab, hold a fancy professorship, and carry a government title all at once. Not in Germany - and not in Japan, either, as I had discovered on my 1960 visit. The American system is much much preferable, but most academic cultures change slowly; European ones, very slowly. Greed speeds the process; pride slows it!

Well, back to Berlin: after a great night in Joel Grey/Liza Minelli country I flew back to Hamburg Tuesday morning and without disturbing Ranch took a taxi to the Applied Mathematics Institute at Hamburg University, where the famous Professor Collatz bought me a fine lunch and told me how he was building special housing for the Telefunken TR4 the DFG had promised him, with air conditioning "for the auxiliary equipment". Not for people!

I had bought Collatz' powerful text on differential equations for the Watson Lab library fifteen years before, and enjoyed the author, now white-haired. A babe in the woods compared to Wenke of BASF, in whose computer building the Hamburg shop would hardly fill the printer paper storage area (also air conditioned, and much more expertly!), just as Telefunken was a babe in the woods compared to much smaller IBM - at least, U.S. IBM!

Which reminds me to note that Collatz was running on a big juicy 650 with core memory, which must have hurt the DFG to rent or perhaps buy; made in Poughkeepsie, not Sindelfingen (and with FORTRAN, not

ALGOL: I congratulated him. He frowned at me, but he was a mathematician, not a programming theorist).

I told CDC "his" TR4 was to have 24K words of core [I guessed Philips, but never found out], and German tapes. The latter info startled the tape drive boys no end, as I'll describe in a later chapter. And I told Collatz he would need many many more staff to keep a TR4/KDF9/7090 busy, but he obviously wasn't worried about doing so.

Just as I had whisked away to Oslo in the middle of my Swedish visits, so I now broke off German visits to check out the Netherlands, Belgium and France. I rescued the Simca from its Hamburg maintenance and drove in clearing weather to Amsterdam, shuffling my carbon flimsies and stacks of brochures in the process. And I returned, from Paris and Rotterdam, Sunday night [25 February].

Picture us now in Dusseldorf. After checking in at the hotel recommended by the concierge at the Vier Jahreszeiten - I was now off the Savoy map - I called my lawyer friend from Sankt Christoph and had a great reunion, a terrific dinner, and a tour of the more sophisticated dancings, where Lorri was known and could fend off the gorgeous but expensively dehydrated B-girls. He asked me how I liked the Breidenbacher Hof, and was delighted to find I had been given a room with Chinese decor. They have a dozen such theme rooms, he said, and the VJ must have tipped them off it was your first visit to Dusseldorf.

Parenthetically, the city is now the center of Japanese interests in Germany, and naturally has wonderful but fantastically expensive Japanese restaurants, and a Nikko hotel.

I had no appointments in Dusseldorf, and had come mostly to be shown the town, as Lorri had promised at New Year's. In Hamburg I had asked also about hotels in Essen, which was my next computer stop, but the superb porter had obvious reservations. I luxuriated in breakfast, called the law office to compliment Lorri on his taste in dancings (and women, but I thought it safer not to say so). I reclaimed Ranch via an underwhelmed doorman and set off the few kilometers to Krupp.

The towns of the Ruhr all run together, and the autobahn exits as well. I was taking my usual precaution of buying a town map in the previous town, which is easier in Europe than in, say, New Jersey. So I had no difficulty in choosing a route into the heart of the enormous Krupp steelworks. I was surprised to find that my host had laid on an attractive interpreter, since he had some English, but I soon came to realize he was a perfectionist; his computer center reflected it. My report that night told the story; I give it in full:

Another terrific group. [Herr Muster is effectively the] boss of about 180 people, including key punchers and 12 407s and operators - acres of old and new P-C equipment, much of which is on the way out. Has a very sophisticated view of the place of the BIG machine at the center of the big firm.

Has specially built (fireproof) cases for 1100 (!!) reels of 729II tape, visitors' gallery, explanatory diagrams etc. etc. etc. Could be a very good U.S. DP installation. But he does OR, much scientific work, and hopes to make an approach soon to short (3-4 km) data transmission - hindered he says by the fact that the telephones are PTT-operated, so rules are old-fashioned and performance inferior. Would not use an IBM 7090 or 7080 "even if it were across the street" - wants control of the machine, and complete privacy (Krupp is of course esp. sensitive). [Why? Don't remember.] Thinks there will be little big-machine service bureau use [in West Germany] except for overflow and backup.

Has 7070 and two 1401s; I (estimate) over 20 729IIs; for P-C see above. His own people do maintenance, including cleaning tapes every two hours of use. Wow!

He needs to know about CDC. Would be a very skeptical listener, but worth influencing. His bosses would not run to a 7090 - costs too much. He wants to know about production control and numerical control. Aim for this guy if you come to Germany!

I said he would be ripe for a 3600 in "2-3 years", and made a mental note to keep track of the man; as impressive as Klaus Wenke, although much more DPish. When I asked about him in Univac Deutschland three years later, though, Otto Stitz said he had "left for another company" - unusual in Germany. I wish we had better shared a language.

This was the conversation that triggered an item in a hundred speeches and written paragraphs over my next 25 years. I had suggested to Muster that instead of relying on the PTT he put up a microwave link as North American had between plants, at least across his Essen area and perhaps further within the Ruhr. He said it was "strengsten verboten" and that the PTT might shut down services to all of Krupp if he played games!! Ah, how not to catch up!

I drove during the lunch hour [sob!] to Dortmund, where my Dutch friends had recently installed an Electrologica X I ["eecks een"] with 8K words of core. This was at MBP GmbH (Mathematischer Beratungs- und Programmierungsdienst [ouch!]). "This is a private service activity that started five years ago (like CEIR!)," I wrote. "Teaches customers, offers complete closed-shop services, especially in bridge design, pipe stresses, LP, and matrix work."

The entrepreneur was a Dr. H.K. Schuff, whom I would never have heard of except through Loopstra; it was entirely a German, perhaps even entirely a Ruhr, operation. He had a math/physics background, and started with a CPC in the late Fifties. He claimed he was running 22 hours a day seven days a week on his X I, which made me suggest him as a 1604A customer "in 1-2 years".

He showed me a high speed paper tape punch which I reported to Minneapolis as a "(Creed??) 3000, doing 300 char/sec", and said he didn't need mag tape. My notes say "He should talk to Krupp!", about tape, that is, and "very closed-shoppy indeed!"

That visit took only two hours, and I still had time to drive the long road to Wiesbaden and check in at the Schwarzer Bock, highly recommended by the Briedenbachers, in time to try their grillroom.

Wenke's Fraulein Hoffman had set me up at the Statistisches Bundesamt, which in 1962 was like our Census. This was continued into the Seventies, when I had contacts with their people through the OECD, but has since changed. My host was a Herr Zindler, in charge of the 7070 project. He had two 1401s at work, and his new machine was literally in crates waiting for air conditioning checkout (my notes said "here too!!").

It turned out that raw data was collected out in the ten länder [like states: Bavaria, for instance], munched up in their ten individual 1401s by almost identical software, and sent to Zindler on low-density mag tape. I told CDC he could benefit from a 1604, but it would have to tie to those remote 1401s.

I also wrote he thought a company "could make a real impression if it used outstanding and technical people - [Zindler] dislikes white-shirt punched card salesmen ... says Rem Rand is 'hopeless' and no other foreign outfit has been around, even Ferranti." I pointed out he excluded Siemens and Telefunken because they had no 1401-size machines planned, while CDC was about to start pushing the 160A. And I said not to send anybody calling "unless he knows statistics!" Of course they paid no attention.

I went back to the hotel for lunch, then drove off to Mainz for a valuable but unhappy academic visit. This was with F.L. Bauer and his sidekicks Baumann and Samelson, at the Institute for Applied Mathematics of the University of Mainz. "Here flourishes the dread monster ALGOL," I wrote, "and Fritz is one of its proudest papas. He met me as an old but friendly enemy, and we talked almost entirely about educational matters and avoided programming techniques!"

He had a Zuse Z22 "(tubes - there is a transistorized model Z23)" and a brand new 2002, with three 727 tapes not yet connected. And an actual running ALGOL. "His machines are powerful but do no commercial work ... A great waste of expensive facilities - and a little practical [experience in the] use of their

compilers would help, too!"

I drove next morning to Heidelberg, to make my only astronomical visit of the tour. I had arranged it myself, weeks back, and thought it a miracle that all the intervening travel, and the stormy weather, had let me keep the date. I went to the Astronomisches Rechen-Institut, which shared a tapeless Siemens 2002 with the ancient university. The director was a Prof. Dr. Fricke, whom I did not know, and the computer boss was named Lederle. My trip report said in part:

This is the most advanced (computationally) of the three great national ephemeris offices. Greenwich is poorest, Washington has a 650. These people are very knowledgeable indeed in the general field ... and talk ATLAS, ALGOL and IBM gossip with the best. Their machine is paid for largely by the German Forschungs-Gemeinschaft (like our NSF or British Univ Grants Comm) and they share it with Heidelberg University which does the housekeeping and the teaching.

Long and frank discussion about differences between university and industry people in Germany (these men are among the very few "neutrals") - one major factor in assessing your entry.

Wenke had offered to meet me in the Ruhr or in Wiesbaden, but since I had Ranch we agreed (via Fräulein Hoffman) it would be easy for me to call on him at home base and then drive on to Stuttgart. It was an enormous thrill to visit him in the very center of the world's largest chemical plant - rebuilt from scratch starting in 1945 - and see his new building going up, modelled in many respects after Building 305 in Evendale, but fifty percent larger. His 7090 was coming in less than a year, and he would obviously be ready.

Klaus and I were good friends, and I had twice asked him to work for me (failing only because his wife had no English, he said). He would in later years ask his bosses to be rewarded for his computer and LP triumphs by a major step up the Badische ladder, and would be bluntly refused because he had a super math/physics degree but none in chemistry. He remembered how well I, an astronomer [!], had been treated in Evendale; he was bitter, and in the end left the company. It was a genuine tragedy for him, for BASF, and for German computing.

But that was all in the future. I described him ("Call #1 in Germany", for a 6600) as:

A world leader in applying input-output (Leontiev) theory to process industry. Now has one of his senior men in Paris at IBM 7090 every night (rotating) to actually make runs - reallocation of costs on 4000 chemicals including solving 1500 equations in 1500 unknowns, with few [sic, but meant "many"] zeroes (!!! but there are relations), takes 10h on 7090 and he does this frequently. Now has Co. permission to tackle special LP job with 15,000 inequalities. Cooo!"

BASF had 50,000 employees in this one plant, with rail stations inside for commuting. This was the center of the old AGFA chemical empire, and was bombed flat in WWII. Early in the reconstruction they had rebuilt the guest house, and had restored the AGFA wine collection they had hidden from the thirsty American occupiers. Klaus took me there for an early dinner; unfortunately he was not a connoisseur or a big executive, but even so the wines were great.

I got to Stuttgart very late, but the meticulous Fraulein Hoffman, whom I had finally met and profusely thanked earlier in the day, had warned them to hold my room at the Graf Zeppelin (the hotel had pleased me in 1961, but the name was what drew me back). Next morning I went again to the SEL [Standard Elektrik Lorenz] Informatikwerke in the Zuffenhausen district, and this time met with a chap named Nathansohn, who was director of marketing for computer and related equipment. He said the people I had met before were "all away", which I doubted very very much.

Actually I got far deeper into SEL business than with Marc De Ferranti's 1961 imprimatur, mostly because

Nathansohn and his men read DATAMATION. I was shown "(first American, they said) the new Air France system which is stored program (like SABRE but much cheaper) ... transistorized but not megacycled." This was a follow-on to the hard-wired SAS and BEA systems.

They were still building their own drums, and were wiring their own core planes with Philips cores. What I emphasized to Control Data was that Nathansohn said their general purpose ER56 computer would have been competitive with the 2002, except the sponsor (DFG again) "insisted on change after change. Siemens had corresponding contract, refused to change anything, now sells 2002s 'like pancakes'. A nice phrase!"

His people also said the TR4 "had used Telefunken transistors that were no good and was set back tremendously - redesign, extra costs, etc.", which probably accounted for Garwick's software delay in Norway.

They were nice; I hoped to visit them again. As for CDC, I said nothing "unless you could buy `em from Geneen!". I was sure the other stuff they were making like the KA21 airline weight and balance computers, the Quelle department store order-fulfilment machines, and even an experimental OCR reader, was too far from Norris' game plan.

SEL gave me lunch in an executive dining room, not memorably, and sent me off with an introduction to the Daimler-Benz offices in the Wangen district - not the factory where my wonderful 190SL had been made, alas!

Turned out to be pure DP: the central accounting group (corporate stuff, not plant payrolls and such). I wrote "now on punched cards, next on 1401 with some analysis, 'in three years' on 7070 with some optimization ... there is a 1620 in the turbomachinery engineering group. ... Very stodgy and ignorant bunch of bookkeepers. Ugh! Know nothing but [German] IBM, and will certainly not use 1401 to advantage. ..."

I left the Simca at Echterdingen, the funny Stuttgart airport, and flew off to Vienna for a couple of days, as described later. And from Vienna I flew to Munich, for a little business and a lot of Fasching [carnival]!

I checked in at the Bayerischer Hof Saturday morning. It turned out to be the high-society center for carnival balls and such, and this was the weekend. But the Vier Jahreszeiten magic had worked (early arrival was also good insurance!) and my rather unfancy room was ready. First thing I did was to call my host Hans Radmer, who marvelled that I had gotten in at the BH ("sold out months in advance" he said, but I guessed those were the fancy rooms and suites. I was in chauffeurs' quarters).

Hans had been great fun on the Arlberg, and was like me unwived not only at the Hospiz but at home in Munich. Turned out he was some sort of editor at Blick or Twitch or whatever the local equivalent of Paris Match was, and of course was invited to all the balls and parties except the very top "Von und Zu" society ones.

"Too late to rent you a costume", he said, producing a large tartan tam-o'shanter. "Wear this with your blazer and look festive; if someone tries to turn you away say you are a Scot and live in Monaco and Manhattan!" So began two wild days and nights of Marvelous Fasching.

I particularly remember a Dschungel Ball in the Haus Der Kunst, with two thousand young dancers pounding so wildly you feared for the floor and walls. And weisswurst for breakfast Sunday morning, although actually I had burned off most of the beer and booze in excitement; Radmer, though, needed them!

I apologized for cramping his amatory style, because it was obvious he was a great favorite with women of all ages and propensities. I myself had gathered much lipstick and cupped many a lovely bosom, but had made no major conquest. "Fasching is like that," he laughed, implying although he had failed to score

Saturday night he had succeeded on many others.

Other German friends tell me Rio is better, but for me, that 1962 Fasching was the greatest carnival of my life.

It hadn't occurred to me when I made the appointment that even research stopped for carnival, but when I got to Biermann's address on the Ringstrasse Monday morning it was almost deserted. All the juniors, right down to the receptionists and secretaries, were out Jungle-balling and such - or recovering from same, or getting ready for one last dose on Fat Tuesday. And the halls were still decorated from their own internal parties!

But serious Biermann, who was the director for astrophysics of the Max-Planck-Institut der Physik und Astrophysik, and his electronics head Dr. Billing, were waiting faithfully. I tried kidding about Fasching but got nowhere; somehow I could not see either one in a tam-o'shanter!

Biermann had visited me twice in the States. It gives some idea of his stature to realize that in 1962 his opposite number as physics director was Werner Heisenberg. He had 150 senior staff and the physics side had 450; they shared support staff and a fine three-year-old building.

The key fact was that Biermann was keen on computing, and Heisenberg himself was not. So after Billing built the G-1 and G-2 at Göttingen, he moved the G-3 to the astrophysics side of the house in Munich. The shop also shared a 704 with the university, which gave them a good IBM contact in Applied Science bypassing IBM Deutschland and the DP blue-suiters.

I knew from earlier conversations that Billing's group was going to go into component research rather than build another complete machine, and approved. As usual, their dough came from the DFG, and in spectacular quantities; they did absolutely no industry-sponsored research, which did not mean their thin-film projects would not get to Siemens and Telefunken in the end, but did mean the transfer would be slow compared to the U.S.

"Wanted to order a TR4," I wrote, "(cash, 6,000,000 DM) or an IBM. Latter said '60% discount' as usual, so 7094 = 5,800,000 DM and is in the lead. I also think TR4 is 2 years away, 7090 six months (change to 7094 a year or two later). These people operate a completely open highly research-minded shop, very wasteful no doubt, and would suffer from a lack of ALGOL for TR4 - but Telefunken has contracted with another Munich group to write the latter, with Garwick of Oslo as a backstop. Lots more real hot poop about TR4 transistor trouble, Siemens programming ignorance etc. etc. ... ATLAS (20,000,000 DM) ... no discount!"

My final sales comment was REAL LIKELY 6600 CUSTOMER IF YOU GIVE DISCOUNTS!! Don't know if CDC ever called them.

Billing took me to lunch at an academic-type cafe, and Biermann and his quiet wife, repaying Arizona entertainment, took me to a lovely restaurant called Zur Kanne, expensive even by my standards. I could hear the tumult of Fasching mounting outside.

Before dinner I had fitted in a short visit to the rechenzentrum of the Technischen Hochschule, more to make a courtesy call on the wonderful old man of German computing, Professor Piloty, than to look for CDC opportunities. I already knew from conversations with him at UNESCO three years before that the TH and the university would share access to anything Biermann and Heisenberg were given. And I knew Piloty and his son were key figures in arranging for the first IFIP "do" in late August.

We talked also to Urich, whose young man Sägmüller turned out to be writing the Telefunken ALGOL, but I could not discover why, if the Unis and THs and M-P-Is "do no commercial work". "Curious. Sheer love of ALGOL?" I wrote in my visit report.

They showed me famous old PERM, still running after at least eight years, and even in 1962 with paper tape input only. It was a much-modified copy of the Scandinavian BESK, and its poor keyboard had nurtured half the bright young computer men of the country.

My major item said:

All these people (MPI also) very skeptical about expansion of large machines here [Europe] for technical work, but agree Germany is the most likely place. They feel there are no trained middle-level people, and none in sight. So only places where there are large open-shop possibilities can cope. I strongly and loudly disagreed and advocated closed shop and internal training ... revealing argument. Very obvious these academics don't even dream of our industrial use of 7090s - but there are reasons (no military, no oil, little aircraft or nuclear).

And I went back to the BH to get ready for dinner. That was the last of my German visits. Tuesday morning, stepping carefully through the carnival debris at the airport, I flew back to Stuttgart and reclaimed my neglected Simca, and drove soberly off to Bern.

In reading again the many pages of my final report to CDC, I find many second-hand items I had picked up. The first 705 III at Hoechst, praise for Zuse and his machines, many comments about the educational system - all worthwhile. But what I have written above gives the flavor fairly well. I repeat instead my advice about location:

... for several reasons I choose Munich. The probable boom in government and industrial research is one; the comparative lack of competition is another; the availability of personnel and services, low costs, and familiarity with Americans are considerable advantages. Then, Munich is like the American West: people from Hamburg will move to Munich, but Münchenerers won't move north. ... Finally, Munich is an intellectual center for our field; the IFIP '62 fling is proof, and if you announced or displayed your European entry in connection therewith, it would have doubled effect.

My second choice was Dusseldorf, my third Hamburg ("too much like Chicago"). When Control Data finally came, they went to Luzern, and when they were run out of there they went straight to Frankfurt. I think their Minnesota bank sent them!

COMPUTER LIST FOR CHAPTER 36 (*, new in this chapter)

2002	*
TR4	
650	
KDF9	
7090	
7080	*
7070	
1401	
3600	
X 1	*
CPC	
1604A	
160A	
Z22	*
Z23	*
ATLAS	
6600	
ER56	*
KA21	*
1620	
G1	*
G2	*

G3 *
704
7094
705III *
PERM *
BESK

37 OUR CARGOES ... BEAT THE DUTCH

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In Chapter 37 you will encounter
(in order of appearance):

Apollohotel *once upon a time, you could get there by canal boat from Schiphol
rijstaafel at the Bali instead of Japanese specialties at the Okura*
Edsger Dystra *major software theoretician at the Mathematisch Centrum and Delft
Delft University an intellectual powerhouse, even in astronomy*
Bram Loopstra *chief engineer on the X 1; he visited me in Phoenix!*
The Royal Dutch Shell laboratories *park behind Amsterdam Station and take the launch*
Rudi Lunbeck *a warm reception for me and my ideas*
Burroughs B5000 29 Ir. van der Poel *architect of the "British" ZEBRA, and much more*
Surly Seymour [31](#)
Amsterdam versus Houston *there was more research horsepower for Shell in Europe*
Rotterdam *not to mention the enormous refineries*
IBM Blaricum *not Endicott! their own private INSEAD and IMEDE*
CDC Rijswijk *years later they opened a vigorous center near the Hague*
Engineers on bicycles *in 1962 I wondered if there was still "a real interest in efficiency and excellence for
its own sake"*

The little Simca ranch wagon took to the autobahn as if designed for it. The two of us found our way out of Hamburg and across the lowering Elbe on the proper bridge, and buzzed away southwestward. It was a long haul, and I thought wistfully of the trains we had ridden together only weeks before. But it was in fact only 285 km to Utrecht, and doubling around to Amsterdam took only an hour more.

This was one of the hotel reservations I had made from London. In 1954 Dorothy and I had stayed at the Amstel, and had found it stuffy. With a car I could range more widely, and so I chose the Apollo, which is at the intersection of five canals and for a few years could be reached from the airport by boat [alas! no more]. I liked it, and stayed there several more times over the next decade, and also sampled five or six other places later. Today I would go to the Okura, for the sushi and sashimi; in 1962 I ate an enormous rijstaafel at the Bali.

Wednesday morning I called Edsger Dykstra at the Mathematisch Centrum. Aad Wijngaarden had warned me he himself would be away [in the U.S. as I remember], but of course I had met Dykstra in 1954 and several times since, so there was no problem. Later in the morning we were joined by Bram Loopstra, who had been with Aad when they visited me in Arizona, and who was now actually manufacturing and delivering X 1s. The first one was still at work at the center, fed by their own marvelous paper tape. I quote my report:

... The money is a local bank, the R/D by Delft [university] (and sub rosa by the PTT!). The non-machine math program is funded by the national research organization of the Dutch government.

This is an ALGOL center - and theirs RUNS! One of the 2-3 in all Europe that really does. And

they have their own paper tape reader (runs at 1600 char/sec, can be 5-8 holes, stops "on the hole" at 1400!)

Their work is largely internal - computer design, on computer; advanced students; ALGOL and such. They worry most about the shortage of (bright, young) people.

Actually they had performed their miracles with bright, not-so-young people: Aad himself, Loopstra, van der Poel. The youngsters had been drained off into the universities and by Dykstra purisms. But it was great to see another Bech-type outfit.

Rudi Lunbeck called during the morning, knowing my itinerary, and told me I was expected for lunch "on top of our building". I had not been too clear on a route, since his place was across the harbor - sort of behind the rail station, if you know Amsterdam. No, he said, there is a private parking, and the Shell launch runs every few minutes; he would meet it!

This was the laboratory, or at least the Amsterdam laboratory, of Royal Dutch Shell. I no longer know its height, but it must have been ten stories at least, and there was indeed a fine executive dining room on top, looking out over the water. Rudi, who acted like an old friend although we had only met two or three times, had brought a Mr. Ponstein and a vigorous type from the Hague DP group named Krajenbrink; we had a wonderful meal, much different from the usual sandwiches they would have had without my welcome advent.

Because it led later in the year to a C-E-I-R/STRETCH idea and contact with top brass, I give my visit report, noting first that Rudi, who was director of the computer group, had an old Ferranti Mark I*, PACE analog equipment, access to Krajenbrink's 7070 in the Hague, and 1401s galore:

This is one of the great technical computing groups in Europe. Their interests are broad, their accomplishments early, their support good. I was the more interested, then, to have them say they no longer wanted a larger machine of their own, but would prefer to buy block time on an ATLAS or some such. They feel ATLAS, like ORION, may be in trouble for lack of top Ferranti support now (it had it some years ago). Their choice for a successor machine, if they had to make a choice, would be Telefunken TR4 with English Electric KFG9 [KDF9, of course] a close second. They go frequently to Houston and know many of our "secrets", like the inadequacy of the CEIR-Caltex LP90 linear programming scheme. They have one an order of magnitude (decimal!) faster.

I burned to tell them about the 6600, and called them an absolute certainty for one "ON SERVICE BUREAU BASIS". I hinted broadly I had something to offer, and all three of them guessed a Burroughs B5000. Poor Norris! (Although thinking about it later I realized he was pushing Surly Seymour's creation a lot harder than the Detroiters were pushing their strange beast. Years later I was to recall those Burroughs problems when Texas Instruments was trying to pretend they had never heard of their own excellent ASC supercomputer.)

Krajenbrink said I probably had "seen a 7070", and we agreed I would visit him in the Hague next time. They poured out stories about van der Poel, whom I was to see later, and all came down to the boat dock to wave me off in true Dutch fashion. Wonderful!

I had already made weird plans for transportation, and these included spending the night in Rotterdam. So I was a little taken aback when my next visit turned into a long evening. I drove from the Shell parking to the Leidschendam area of the Hague, signed in at the Netherlands Postal and Telecommunications Laboratory, and had a brisk look at van der Poel's ZEBRA installation. He then climbed into Ranch and directed me to his apartment, introduced me to his wife, said tea would be along in a while, and settled in for philosophy!

Dr. Ir. [Engineer] W.L. van der Poel was one of the senior architects of European computing. He had come

out of university at exactly the right time, had done paper designs, had worked with van Wijngaarden on relay and tube machines, had been drafted by the PTT (which permitted him to help on the X 1), and in some strange way had designed the Stantec ZEBRA, which I mentioned in connection with my abortive ITT ventures.

" ... a most unusual bit-accessible, almost microprogrammed small/medium computer (about 160A size!)" I wrote. "Stantec did the circuit design from his logical design. It is clear he is disgusted with [British] Stantec and wishes he had gotten a Dutch or Scandinavian outfit to build it."

He poured this out across the carpeted coffee table, losing me a hundred times in technical details. He had the brilliance but not the business acumen of Niels Bech, whom he brushed aside with dismissive remarks about GIER; I was rivetted. "He should visit Minneapolis," I said in my visit report, imagining the first confrontation with Seymour Cray!

I lived in the Hague for three years at the beginning of the Eighties. Rereading my assessment of the country, its terrific people, and its 1962 computer possibilities in my final letter-report in the light of what I learned later, I think it accurate:

The Country: The most solidly based of the Benelux trio, Holland has a fully developed middle class, a very high level of technical industry, considerable under-unemployment [ah, 1962] - everything required for successful use of large computers except sheer size. And several of its enterprises, notably Shell and Philips, have that also.

It is not often realized how much heavy industry centers around the shipping facilities: petroleum of course, with four or five huge refineries (Shell at Rotterdam is the largest in Europe), petrochemicals, regular chemicals, rubber and plastics, coal and steel shipment [the Ruhr and much more]. My friends at Shell talk in terms that would be considered advanced even in Texas - in fact, their Houston people look to Amsterdam for much technical direction.

Dutch executives are less individualistic than their German counterparts, and far less so than the Italians. Committees are more in vogue; plans are worked out in exquisite detail and are reviewed frequently. And, like professional managers in America, they attend seminars and play business games on computers, and so on. It is not by accident that IBM put its European customer administrative "school" at Blaricum, near Amsterdam.

Labor costs are very low, and professional salaries only a little less so, compared to Belgium and Scandinavia and Switzerland - the countries one normally thinks of as comparable. In fact, only Austria and Italy pay less [1962] for middle-rank technical people. They still ride bicycles in the Netherlands! In fact, I have to admit I don't understand how wages can be so low when workers are being imported from the Mezzogiorno and from Spain. Not to program X 1s, you understand!

Perhaps we should realize that not everybody in the world really wants two cars. I wonder if there is not in Holland a real interest in efficiency and excellence for its own sake, not just as a path to material possessions.

I went on about higher education and such, and then buckled down to computers. It bears mentioning that after thrashing around for a few years, Control Data put a major center in Rijswijk, just outside the Hague, and it did very well. I have to say, however, that my advice had long before sunk into the sands!

COMPUTER LIST FOR CHAPTER 37 (*, new in this chapter)

X 1
STRETCH
MARK I*
7070

1401

ATLAS
ORION
TR4
KDF9
6600
B5000
ASC *
ZEBRA *

38 ALL GAUL IS DIVIDED ...

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In Chapter 38 you will encounter

(in order of appearance):

ITT [29](#)

Carl Grosjean [10](#)

Jacques Maisonrouge *not yet a Golden Boy, he was running a mainframe on Place Vendôme*

Gamma 60 *really only the second to run outside Bull itself*

A Sabena Sikorsky *my very first helicopter ride in Europe*

Ghent University *the "old school" professors are a roadblock*

La Maison du Cygne 29

And one of the fractious tribes Caesar wrote about was the Belgae. True, his Belgae were Celts, not Flemings and Walloons, but they hung about and disturbed his cross-channel planning, as they do in the Nineties.

I really did a visit in 1962 because I had a friend in Belgium whom I had not seen during my ITT travels the year before. This was Carl Grosjean, who had been the first foreign Watson Lab Fellow at Columbia, in 1948.

While I was laying out my route in detail at the Savoy, I thought about the problem of having even a nimble little French car in Paris; why not leave Ranch in Brussels, go see Grosjean, and fly or take a train down to my Paris interviews?

As I picked up stories about France in England and Denmark I began to whittle my call list. I had used up Phil Dreyfus, who seemed to be in Geneva most of the time nowadays; I didn't dare call on IBM in the Place Vendôme, and especially not on Maisonrouge; I intended to visit Grenoble and Nice and Marseille from Monte-Carlo. In the end I came down to Electricité de France for its Gamma 60, and some calls - if I could get the Paris phones to work, even from my hotel - to the Sorbonne.

On the other hand, I added adventure on the travel side. I got the Savoy to reserve me in Rotterdam the night of the 22nd (they chose the Parkhotel), and to buy me a helicopter [!!] ticket RTM/BRH/PAR, the latter being a downtown pad near the Eiffel Tower which has long since disappeared. That eliminated parking problems, since Rotterdam had plenty at its small airport; it avoided the long taxi ride in from Orly, and gave me my first European heli rides (the real reason, of course).

After I detached myself from the van der Poels I drove the few minutes to Rotterdam and checked in. The new center town engrossed me, although everything except eating places was closed before I arrived. I ate Chinese, and very good it was.

Next morning I left my Simca at the airport and climbed into a noisy Sabena Sikorsky. I was ticketed for

BRH, the downtown helipad, and it worked. I took a taxi to the main station and caught the next train to Ghent.

Parenthetically, the wind cancelled my heli into Paris next morning. The Sabena Sikorsky dropped us at BRU, the international airport, and they laid on a decrepit DC6 into Le Bourget (still, better than Orly!). I was early into the Lotti.

Back to computing. Grosjean had prospered, and was now director of the rekenlaboratorium of the university. He had planned for me to visit CENTRATOM, which had a MERCURY, but it turned out to be 50 km out of Brussels - too far. He had had a CPC, now ran a 610, and was waiting for a paper-tape 1620; was deeply involved with IBM and the grateful recipient of one of the famous sixty percent discounts. He also quietly used a CAB500 "elsewhere in Belgium", which meant not-IBM and not-Flemish.

I reported:

... much of his conversation revolved about how much better they [IBM] are than Ferranti, Rem Rand, etc. etc. He does crystallography, numerical analysis teaching [he had audited my Columbia course], and especially partial diff. equations of neutron and electron diffusion ... agrees that "the old school" professors are a road block in his kind of university; less, in technical "high schools". Expects major use of medium-to-small machines now that the Brussels Congo-slump is about over; sees only limited use of large machines except in manufacturers' service bureaus.

I suggested the faint possibility of a 1604A if he could share with the atom boys (since the MERCURY would be slipping as Ferranti lost interest).

Carl was happy to see me, and even offered to drive me the long way south to Brussels. I got him to load me on a train and wrote up my report in the restaurant car (no meal, but I did manage wine instead of candy-butcher beer). I was indeed expected at the Amigo, where I had stayed when visiting Marc DeFerranti a year before. I delved deep into Jim Miles' pocket and ate another fantastic meal at La Maison du Cygne on the Gran' Place.

COMPUTER LIST FOR CHAPTER 38 (*, new in this chapter)

GAMMA 60 *
MERCURY
CPC
610 *
1620
CAB500 *
1604A

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In Chapter 39 you will encounter
(in order of appearance):

Electricité de France *second only to the CEGB among the world's power networks*
J. Carteron *ran the second Gamma 60, and later the local arrangements for IFIP83*
Phil Dreyfus *an early French friend, and chief software designer at Bull*
Pier Abetti *designed huge transformers at GE Pittsfield with a 705*
SEPSEA *made the CAB500, very French and very mysterious*
IBM La Gaude *a wonderful research laboratory going up behind Nice*

The Grands Écoles *turning out the top administrators for all of France*
The Polytechnic *second most powerful of the above, it produced engineers*
Grenoble and Toulouse *second-rank universities very strong in technology*
European GUIDE *a user group run by Duflos of French ESSO*
Dause Bibby 30 Philco, Honeywell, National Cash and RCA *on the Champs-Élysées but ineffective*
Ferranti, Elliott and English Electric *even less effective than the Americans*
SEA and Schneider-Westinghouse *above and below tiny SEPSEA*
Bull *an important family enterprise on avenue Gambetta, with more than Gammas*
"The key to a new Europe" *students, said the head of the École Polytechnique*
IBM France *yes, and most of them wanted to work for IBM!*
Service centers *a 7090 on the Place Vendôme, and several others*
Programmer shortages *the French had begun to use women early on*
The French CDC location *I recommended the Côte d'Azur, not Paris*
Fraulein Hoffman [36](#)
Jean Miller [19](#)
The Guide Michelin *the Red Book was and is published at Easter*
Lasserre *worthy of its brand new third star*
Steak à la moelle *they gave me Charolais beef, thinking me not an American*

I left the Amigo in Brussels reluctantly, feeling I should somehow integrate the "headquarters city", as I called it in my report, a little further into my thinking. The fast trains of Japan and France not having been put in service, it took me five hours to the Gare du Nord in Paris, an hour center-to-center longer than flying. But I had a fine lunch and interesting scenery, and got to the Lotti in time for my mid-afternoon appointment. This was at the research laboratory of Electricité de France, the enormous French power utility, in the 6th arrondissement just south of the Étoile.

Somehow I had missed meeting my host at UNESCO in 1959. He was the operator of "the other" Gamma 60 - Phil Dreyfus had promised to show me the railroad installation, with its standby diesel-electric power and its banks of fallible line printers. His name was Carteron, and in later years he became a major French figure in IFIP, culminating in the local chairmanship of the 1983 Paris meeting, which I remember for the complete failure of the electronic messaging (the French PTT is much more adventurous than its German or Swiss counterparts, but much less efficace).

Since I had not met him before, I did not realize he had very good English, and he let me sweat through a long conversation, curling the lip at the barbarian; I did not mention this in my report. Also he overstated his involvement with the huge EdF network. Three years later Pier Abetti told me CIGRE had never heard of him, and that the réseau planning was done at the IBM applied science facility!

He did do major OR work in one of his sections, however, "and a great deal of nuclear reactor systems design" in his nuclear studies section, I reported.

Main story, however, was that he was so dissatisfied with the reliability of his Gamma 60 (he said "programming difficulty", which didn't make sense) that he had turned it over to another group to be used "only for bookkeeping". Wow!

My machine notes say "Had CPC, then SEPSEA [a new company for me] CAB500 (major customer), then second Bull Gamma 60; now expects 7090 'this year' to go in new building 15 km out from present central site.

"Unfortunately he would not talk much about Bull, except to say that like Ferranti they suffer from 'family direction'." I wrote.

I thought it was a good interview except for language problems at the time, but now realize I was being

jerked around by a grandes écoles type who was resentful of American leadership in the very unParisian computer game.

Because I never got to do those south-of-France calls in March my final report to Norris was more about the country and the people of France, and less about its computers. Although very long, I give it almost in full - partly as a sample, partly because of all my "country" reports it remains the most cogent.

The Country: To my mind, France is the most curious mixture of opposites in Europe today - in all of Europe, West and East. Torn to pieces internally by a hundred centrifugal forces [ah there, 1968], she yet presents a single bland face to the visitor. Her workmen create the most beautiful ocean liner, the most comfortable air transport, the greatest hydroelectric development in Europe - yet strikes and dislocations abound, and it is impossible to hire a carpenter who can frame a door. IBM is building a beautiful laboratory in the Var valley near Nice; an electron microscope is easy, but the towel holders in the lavatories are upside down!

France is a Mecca for tourists and businessmen from all over the world, yet I am not persuaded that visitors are welcome. The most powerful service bureau operation on the continent is housed in Paris - the IBM European Center - but Frenchmen object to the name: it should be the French Center! There are more institutes, societies (in the American sense of the word), and corporations (which the French often call societies) devoted to operations research and the rationalization of management processes in France than in the US and the UK put together. And there can be few European countries where more small enterprises operate in complete disregard of modern practices!

The political scene is important, even if Americans can hardly hope to master its kaleidoscopic changes. ... Yet IBM makes a tremendous effort in France: offices, factories, two laboratories, a big customer training program. And they have no problem at all. Have they mastered the problem, do they ignore it, or are they sweating it out? I haven't the faintest idea [1998 opinion: probably 'ignore']. But in my book the political problem is enough to push France, and especially Paris, two or three places down on the list of CDC entries.

French executives don't really like other Frenchmen very much but believe me, they prefer 'em to Americans! It is quite permissible to hand out technical manuals in English, but the chit-chat has to be in impeccable French. Far fewer senior managers speak English than in Germany, and those who do are not particularly proud of the skill or anxious to exercise it.

The key to technical adventures in France is the corps of graduates of the École Polytechnique. Without too much humor they call themselves the Mafia! And the new head of Rem Rand in France, the old head of the Gamma 60 effort at Bull, the IBM applied science manager for France, and the chap planning the La Gaude laboratory are all members. They usually have on their calling cards "Ancien Elève de l'École Polytechnique" - it's that valuable! These chaps are somewhat mobile; not as much as they would be in the US, of course, but they do occasionally make a switch.

Below this brilliant but small group there is a great void and, unlike the British, the French are making no substantial move to change the situation. The dead hand of the professor, the white-bearded holder of the chair of classical languages, is nowhere heavier than in Paris. Once you get out to Grenoble, very strong in physics and applied math, to Toulouse, even to Nancy and Stasbourg and the third-rank schools, the picture improves in its details. Unfortunately, national [university] policy is dominant; this is of course set in Paris, mostly at the Sorbonne.

Computers: The French made an early start at putting in IBM equipment, and 650s are everywhere. They were made in the Paris suburbs [no: in Angers], which more or less took the

curse off their American design, and IBM handed out academic discounts here earlier than elsewhere in Europe. There is an astronomical 650 at Meudon, with a 7070 requested; there are at least ten 650s in universities (including really remote sites ... like Nantes); the competition hardly exists!

By the same circumstances, France is the only European area with many 705s. Since I don't have good DP connections established in Paris yet, I have to rely on American sources: as high as sixteen installed. These aren't just in fancy places, like Esso where Duflos is head of European GUIDE, but in Normandy and the Saar and so on. Renard, who was head of Applied Science last year, said that Region Four (Galactic Headquarters lingo for France) would have more 7090s than any other WTC region in the world by the end of 1962. Only four are actually in, I think, counting Carteron's at Electricité de France, but many more must be on order. There will be another one inside IBM - they say - at the new laboratory at La Gaude near Nice.

As for those ubiquitous 1401s, even the venerable Banque de France has ordered one. Rem Rand in Lausanne estimates over 120 orders and deliveries in France already. I have no dope on 1620s, but would guess more than in any other Common Market nation by a substantial margin.

Talking of Rem Rand, Bibby has renovated the management in Paris and there is a good chance things will pick up for them. They are almost negligible compared to IBM at the moment. Of the other American firms, Philco and Honeywell made quick passes but without leaving much of a trail; National Cash has a nice office but is pushing the Elliott line, and has an actual 803 on the Champs-Élysées; RCA is represented but the big deal with Bull for 301s must interact with 501 sales; others may be around but have escaped my attention.

Of the English firms, Elliott is the only current effort. There are two or three Ferranti outposts, the best known being a PEGASUS in Amouyal's shop at the Atomic Energy Commission in Paris. Since the latter also operate a 650, a 704 (with 7090 in by now, I guess), a small Bull drum, much analog gear, and had a Gamma 60 on order at one time, the Ferranti machine was not exactly featured. In fact, I was told about it by the Oxford people! English Electric is talking KDF9, again according to Oxford, but I forgot to ask about DEUCES.

Olivetti had thought of France as their third country, after Italy and Switzerland. They had made no actual gesture, however, because of the Bull-Olivetti agreement. I don't know of any interest from Siemens or Telefunken; Loopstra has an Electrologica X 1 in his "factory" for a French location and gave me the impression another one was already in, but did not say where.

The French native picture is relatively simple. There is a "society", a corporation, called SEPSEA, a subsidiary of SEA (Société d'Electronique et d'Automatisme), which designs and markets a small machine called CAB500. The actual manufacturing is by Schneider-Westinghouse and SOM. This is a drum machine with its own paper tape reader (SEA 1080) and perforator. The elements are magnetic (SEA SYMMAG 200). Pretty small stuff; some microprogrammed flexibility but nothing like GIER; competitive with a poor 1620, I'd say. I had not seen one before this trip, so I was rather interested.

That leaves only Bull - and what can one say about Bull? They have a complete line: punched cards, peripheral equipment, small drum machine (the ET), the new unbuffered 300 system with some sort of Gamma (probably an improved Gamma 3) arithmetic and logical unit, and of most interest to CDC, the ill-fated Gamma 60. Roberto Olivetti told me in the summer of 1960 that he had seen "the pieces" and it had not run. Phil Dreyfus said in November 1961 they had "made" thirteen - I did not and do not believe it. In between, two at least actually ran: one at the French Railways ([enormous] payroll) and the other at Carteron's place. The

latter operation was so unsatisfactory Carteron gave the machine to some accountants and ordered a 7090, which may be in by now. Dreyfus and his boss are both supposed to have left, Dreyfus for ECMA in Geneva and the general manager for the US (both rumors unverified). Anyhow, I wouldn't exactly worry over the 60!

Trends: As unfavorable as Britain, but without the upturn I see ahead with a new British management generation. Mind you, the level of technology in France is already so high that continued and expanding use of machines, especially your 1604 and 3600 sizes, is certain. But the total will not rise too much; old and small will be replaced by new and larger, so some money will be spent - but there aren't any more "Mafia" to go around! So where do the intellectual leaders that could force our babies on a reluctant top management come from? More Carterons could do it, but you can count on precious few of those per decade - a small fraction of the Polytechnique graduating class, which already is too thinly spread.

I agree with Armand, the board chairman of the school, when he says the students (everywhere in the EEC, not just [Polytechniciens] in Paris) are the key to the New Europe. He says, "The real difference in France is not between the Right and the Left, but between the old and the young!" OK, I applaud; but in France there are many strong old men and few acceptably trained young ones.

Incidentally, IBM completely disagrees with me on this, at least officially. The Nice laboratory, however, is one of the few places in France where foreign researchers are to be imported!

Competition: IBM and Bull; pending reorganization at the latter, and a resolution of what Carteron referred to as "family" problems, I would not worry much. You would not be wise to run them down, let alone laugh at them; that would raise French hackles clear to Tananarive. Sympathy - that's the line! But they could revive, of course.

That leaves IBM, and I can't think of anywhere else on earth, even Endicott, New York, where their competition will be tougher. They have nearly every bright young man in France (in our field or nearby, you understand) already aboard or panting after them. This is another reason why I put France lower on the list than you may have expected. Of course you've licked `em before, but this would be very tough terrain indeed.

Probable Customers: Carteron for a 3600 or even a 6600; Amouyal at the CEA ditto - and lots of others one notch down, for 1604s. I'd avoid much effort on the discount customers - the university and institute types. IBM will wheel up a 60 percent deal, with time buy-back in addition, the minute the evil number 1604 is even whispered. Try, by all means - but don't spend much money.

I would look hard at the outlying heavy industries, and in odd corners. Sud Aviation and SNECMA (jet engines) come to mind, and the chemical complex around Marseilles. The Mafia stick pretty close to the Place Vendôme! And by all means check the many American outfits; not all of them love IBM as much as, alas, Socony and Esso.

Service Centers: The IBM one in Paris has a big 7090 installation, a good 1620, and two 1401s. They will probably take in some work on the Nice 7090 in a year or so, but not sell it actively. They also have a 650 in Lyon.

Bull has a center in Paris, with several machines but no Gamma 60 - and not too much work, except the usual customer checkout. They helped with the big Serre-Ponçon project two or three years ago.

The schools do not in general take in paid work, although the prohibition is not as formal as in Germany. If a professor consults for either a government or an industrial organization, some

of their work may get done on the computer center of the university; I don't know who gets the money, if any.

Many of the management consulting firms like SEMA will act as intermediaries in getting work done, and will sell programming and analysis in the process. IBM itself offers programming services in Paris; rather unusual in their operations. All the people I know who use that 7090 do their own softwork, however, so I haven't heard about quality.

C-E-I-R has an affiliate, Charles Salzman, but no business in our line as of last November. I have not checked more recently. Diebold is in Paris also. And Arthur Andersen, but not for DP work, I believe. There will be many more.

Programming: France is not too ALGOLized, being so strongly IBM. Bull never cared much for it either. So it's FORTRAN and FORTRANSIT, forever and (ugh!) ever.

The CAB500 has its own PAF (Programmation Automatique des Formules), an itty-bitty FORTRAN with multilingual printout. I have a manual; end of comment!

There is going to be a real push for DP programmers in a year or two. The supply of trainable young people is small; girls are still being unearthed, but even this source is drying up. Salaries are pretty well in line with the economy as a whole, except perhaps in Paris, where only headwaiters are paid adequately. [Programmers] have cars, not Alfa Romeos perhaps, but not 2CVs either. As for the more highly educated scientific types, they all work for IBM already. Even Carteron is worried.

CDC Entry: Be very conservative indeed about this one. I certainly think you can sell here, and my figures ... said so; I think you can do so rather quickly. But the risk is high, the growth not as spectacular as in several other countries - although admittedly from a big base - and the costs of doing business among the highest in Europe.

I have one rather daring suggestion to make, one which ties in with my own preferences and my own idea of very long-term trends in the Community: consider another location in France. Paris is worked over, and competed for, so vigorously that costs are just astronomical. Not only are there no programmers; there are no stenographers, no secretaries, no telephones - and the French themselves are fed up with it. Just as many New Yorkers want to emigrate, so do some very good young Frenchmen. The California of France is the Riviera, and IBM is as usual well up on the possibilities. They even persuaded Papo, one of the Mafia, to leave Paris (true, he looks to be a Mediterranean type).

There is also the Saar, if you don't go into Dusseldorf. And there is the French region around Geneva - but I think there is too little industry, and too little trend toward industry, there. The companies going there are just trying to get the benefits of Geneva while staying in France; good communications, transportation, and housing. But the costs are Parisian! [1994: still true!].

This was of course part of my reason for going to Monaco myself; the climate is magnificent (Los Angeles without smog), air and rail transportation quite good, the university (Nice) improving rapidly. Costs are higher in Monaco than in Nice, but there are tremendous tax savings. Switzerland and Northern Italy are accessible. California in the Twenties!

Marseilles is pretty unglamorous, but much cheaper - and it has a good industrial base. Perhaps Procter & Gamble would like a 160A? The climate is still very good. If Nice is the coming French Los Angeles, and Monte-Carlo its Santa Barbara, then Marseilles is Long Beach and San Pedro!

When I got back to the Lotti, by the way, I found a fine telegram from Ludwigshafen signed BASF. Actually it was from the Fraulein Hoffman who has already appeared in the Germany chapter, and it started, "Thanks telegram Wenke on vacation until 26. We arranged first visits 26 morning phone arrival Krupp Mr. Muster ..." and went on with details of a Dortmund visit that later fell through, and the visit at the Weisbaden Federal Statistical Office, and concluded by saying Klaus would go with me to see Fritz Bauer in Mainz, further arrangements when together.

I was reminded how much my terrific secretaries had extended my reach in Generous Electric; here this unheralded American (whom Wenke had obviously described to her in detail, as I had described him to Jean Miller) burst in on her quiet office, and she did just what her boss would have wanted her to do.

A weekend in Paris! Well, not the whole weekend - had to get back to my car in time for the first date "BASF" had arranged Monday. But I had time for two very expensive Paris dinners and a lot of Saturday walking.

About the Friday one there is a story. I had read in the Herald Trib during the trip that the new Michelin Guide, which would appear as always at Easter, was likely to promote Lasserre to three stars. After I got through with my telegram and other arrangements at the Lotti (rail travel back to Rotterdam, for example, and a reservation at the Alcazar for Saturday night), I dressed a little more sharply - a fancy English shirt and non-clashing dark tie, as I remember - and went to try the about-to-be-starred restaurant.

I was suavely welcomed in French, and in spite of not having a reservation and it being a Friday, was sent upstairs. A handsome young man in business suit, whom I assumed was family, said (in English) a table was being set for me, and in no time at all a tiny affair for one was carried out from the pantry and beautifully fitted out. He led me over, introduced my captain, and went on to his next guests.

I had a kir while I revelled in the big but not grotesque carte. I thought it better to order items I was sure of, since I had forgotten which specialties the Trib had mentioned and had left my 1961 Michelin in Ranch. I had a scallop appetizer, sort of a supercharged coquille St. Jacques, and steak à la moelle, à point.

To blossom out, though, I ordered [later] a wild chocolate thingie with caramelized oranges. Wowie!

Everything was magnificent. As I was doing a yellow chartreuse the young man appeared and asked if I had enjoyed the meal. Taking him seriously, I went through my choices including wine, praising everything, and said the steak was wonderfully flavorful but "not as tender as in New York".

He replied that "they" would have chosen Scotch beef instead of Charolais for me, but had thought at first I was Dutch! Now that, that, THAT is the real McCoy. And yes, they got their third star in April.

Sunday morning I reluctantly checked out of the Lotti and caught the best train to Rotterdam, and reclaimed the Simca. It must have been in a garage for repairs, because my expense record shows 135.20 guilders - but how could I have paid on Sunday?? My mind is blank. Anyhow, I drove to Dusseldorf and went on the town with my lawyer friend, as already described: a memorable weekend.

COMPUTER LIST FOR CHAPTER 39 (*, new in this chapter)

GAMMA 60
CPC
CAB500
7090
650
7070
705
1401

1620
803 *

301 *
501

PEGASUS
704
KDF9
DEUCE
X 1
GIER
ET *
300 *
GAMMA 3 *
3600
6600
1604
160A

40 VIENNESE WALTZ

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In Chapter 40 you will encounter

(in order of appearance):

Hotel Bristol *across from the Staatsoper; the Hamburg concierge had gotten me a superb room*

Vienna Opera Ball *the highlight of the entire society year, and still is today*

The Technical High School *had a 650 in its "Mathematical Laboratory"*

Herr Inzinger *"president" of the ML; I had met him for the first time at ICIP*

Interaction with the government *operations research calculations for aid money allocation*

Heinz Zemanek [36](#)

The Reichert Optische Werke *amazingly, they were using my 1946 ray-tracing formula!*

A Z11 *the very last of Zuse's relay calculators, still doing useful work*

IFIP bylaws *"guaranteed European-style do-nothing-ism"*

I had broken off my German visits, left my little wagon in Stuttgart, and flown to Vienna the morning of Thursday 1 March. The schilling was only four cents, so 150 from Schwechat to the majestic Bristol (reserved for me by the all-knowing Vier Jahreszeiten) did not faze me. I could feel excitement in the air, and soon found out that the Opera Ball, highlight of the entire Vienna year, was Friday night, and that the Bristol was the center of all the parties and dinners and suppers (ah, you knew, Four Seasons!).

As I unpacked I realized that the VJ introduction had gotten me a corner room with a tiny balcony overlooking the Opera entrance! I figured the thing to do was to have a snack Friday evening (not in the Bristol, for sure), go up to my room, and watch the loveliest people in that part of the world stream into the Ball. And I did!

Reluctantly, to business: the Mathematisches Laboratorium der Technischen Hochschule. I had met Inzinger, the "president", at UNESCO in 1959, and therefore knew he had a 650 with, unusual for Europe, floating point. He was cordial, and we settled in for a long talk. I quote my entire report:

This group primarily teaches and is not (praise be!) spending much time on programming theory [I was heartily sick of ALGOL, with Fritz Bauer yet to come]. Open shop for engineering professors, student problems in applied math and numerical analysis. Has own publication, like Schuff in Dortmund: (MATHEMATIK-TECHNIK-WIRTSCHAFT), worth having in your library. Cooperative program in solid rather elementary operations research, with state (i.e. national) planning and economic agency (not done in Germany!) - uses "transportation" program

modified from 650-user library for allocation of state aid to industry, highway improvement. I'm not sure how much the results are used, you understand - but I saw real output on its way to the appropriate ministers.

I reported he had three racks of Telefunken RA-463 analog equipment. I said regretfully the lab was too big for a 160A, too small for years for a 1604A. And I arranged to see Inzinger at IFIP at the end of the summer.

Heinz Zemanek, who lived around behind the cathedral in Blutgasse, claimed me for lunch and took me to one of his locals. I was to know him very very much better in future years; I thought of him at the moment as Mr. IFIP for Austria, and since I was not happy with the governance of that new body - I thought the bylaws guaranteed European-style do-nothing-ism, which certainly turned out over these next 46 years to be dead right - I warmed to him only slowly. Also he preferred ALGOL to his employer's FORTRAN.

After lunch I took a tram, chosen by Heinz, out into the near suburbs to the C. Reichert Optische Werke, and had a wonderful time. I went because Dr. Reuschel, the head of the computing department, had an old Zuse, a Z11. And I was warmly welcomed because he and his people, who didn't read DATAMATION and didn't know IBM from Siemens, had studied all my tiny parcel of optical papers (1946-48) and had had the Zuse engineers hard-wire my ray tracing formula into their relay [!!] computer.

"Runs 13h/day. About 1620 size but of course much older," I wrote. "Reuschel feels there is more interchange of information, techniques, and even personnel between industry and academic worlds in Austria, not only because of size 'but the professor is not so worship here!'" He had had some contact with Rem Rand (pushing the SS90) but "not scientific people - I could not talk on them."

I left reluctantly. One of the youngsters drove me back to the Bristol, and I stood entranced in the snow and cold on my balcony watching the beautiful women and ball gowns across the street from ten o'clock on. I've never forgotten it: a charmed introduction to a special city.

Two nights in my fancy room at the second best hotel in Vienna, plus two breakfasts and one dinner, plus service, came to less than a thousand schillings. Those were indeed, indeed the days!

COMPUTER LIST FOR CHAPTER 40 (*, new in this chapter)

650
160A
1604A
Z11 *
SS90

41 SWITZERLAND CUT SHORT

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In Chapter 41 you will encounter (in order of appearance):

End of the Secret Tour *48 visits in 39 days, and mum was always the word!*

A chronology *those visits, arranged by date instead of by country*

Swiss language/religion divide *the French were Calvinists and the Germans, Catholics*

The Schweizerhof *best hotel in Bern, and across from the railroad's computer center*

SBB [Schweizerische Bundesbahn] *German name of the excellent Federal rail system*

Hans Walter *remodelling the Bern station for his 7070, he became a friend*

Schweizertütsch *I really couldn't tell what he said to the waitress*

A computer center for European railroads *first, to keep track of a million goods wagons*

CERN *the best thing was not the physics, but the international scientific cooperation*

Bubble chambers *and the tracks recorded in them, provided numbers to be crunched*
Tape to tape to tape *and they did the payroll by hand!*
Hotel Richemond concierge *the help I badly needed to cope with a personal tragedy*
Mother's death *unexpectedly, back in Michigan, on Ash Wednesday*
The Monaco PTT *meticulously pursued me, to deliver a death message*
Final CDC report *I prepared it in Manhattan, and missed the box of brochures in Geneva*

We are about to embark on my last two visits of the Secret 1962 Tour, the circuit of possible future Control Data customers made without disclosing I was being sent by CDC. In May they would send me out again, this time flying their flag, to look for computer manufacturers who might buy wedges of Tom Kamp's excellent IBM-compatible magnetic tape drives. But that tour comes in later chapters.

I decided to describe the Secret Tour (48 visits in 39 days, including five weekends) country by country, rather than consecutively day by day. This was so that I could make general remarks about a country in one chapter, as I had in the final 96-page letter report to Norris I quote from so frequently.

For readers who are not at ease with such leapfrogging, I give a summary of the Tour:

Covers 48 computing meetings 29.01.62 - 08.03.62

JAN	29: SACLANT	La Spezia	CH31
	30: I A C	Rome	CH31
	30: Vitroselenia	Rome	CH31
	30: C N E N	Rome	CH31
	31: I C C	Rome	CH31
	31: C N E N	Frascati	CH31
FEB	1: C C E	Milano	CH31
	2: Fiat Research	Torino	CH31
	5: N P L	Teddington	CH32
	5: Ferranti shop	London	CH32
	5: A E E	Harwell	CH32
	6: A E E	Aldermaston	CH32
	7: C E G B	London	CH32
	7: University	Cambridge	CH32
	8: University	London	CH32
	9: C-E-I-R shop	London	CH32
	9: University	Oxford	CH32
	9: R A E	Farnborough	CH32
	9: E E shop	London	CH32
	9: Consultant	London	CH32
	10: Socony Int.	London etc.	CH32
	12: Regnecentral	Copenhagen	CH33
	13: SAAB	Linköping	CH34
	14: IBM shop	Stockholm	CH34
	14: Wenner-Gren	Stockholm	CH34
	15: Atomenergi	Lilleström	CH35
	16: Chalmers HS	Göteborg	CH34
	19: Hahn-Meitner	Berlin	CH36
	20: University	Hamburg	CH36
	21: Math. Centrum	Amsterdam	CH37
	21: Shell Labs	Amsterdam	CH37
	21: PTT Labs	the Hague	CH37
	22: University	Ghent	CH38
	23: EDF Labs	Paris	CH39
	26: Krupp	Essen	CH36
	26: M B P shop	Dortmund	CH36
	27: Statistical	Wiesbaden	CH36
	27: University	Mainz	CH36
	28: Astronomical	Heidelberg	CH36
	28: B A S F	Ludwigshafen	CH36

MAR 1: S E L	Stuttgart	CH36
1:	Daimler Benz Stuttgart	CH36
2:	Techn. HS Vienna	CH40
2:	Reichert Vienna	CH40
5:	Max-Planck Munich	CH36
5:	Techn. HS Munich	CH36
7:	Fed. railways Bern	CH41
8:	CERN Geneva	CH41

I drove most of Shrove Tuesday from Munich to Bern, dodging Basle as much as possible because I had heard they were carnival-prone. This is a curiosity about the divided country: the French-speakers are Protestant, and of course used to be Calvinist; the German side is Catholic, and has night clubs and such - and Carnival!

I put up at the excellent Schweitzerhof, close to the wonderful railroad station and offices and not far from the parliament buildings. I had made an appointment and hotel reservation from Monaco (don't remember why any more, but it had an unforeseen result). Telephoning first via the concierge to confirm I was still expected, I walked across the street and met Hans Walter, manager of the DP section of the Organization Department of the SBB, the Swiss Federal Railroad.

We became quite friendly over the next years, and he and his people visited me at the Bureau of Standards six or seven years later - and helped push my Porsche out of the NBS parking lot in deep snow, says my slide collection!

In March 1962 Walter had IBM (and RemRand!) punched card equipment, a simple 1401, and a small 7070. He had just finished remodelling part of an older building; "... a small but very well planned - even elegant - installation," I reported. "First he does DP: payroll for 30,000 people, the largest by far in all Switzerland; general bookkeeping; ticket accounting by agreement with three other national railroads. Next he wants to tackle OR stuff at the 7070 level - resource allocation, inventory control. Then finally he is active in committee aiming at daily freight-car reallocation, continent-wide ... He says Swiss PTT is restrictive too, just as Muster of Krupp complained of German, but he has the railroad's own teletype communications [tiny bandwidth] !!".

He took me to a spartan lunch in the executive dining room, and confused me by ordering for me in Schweizertütsch, of which the Bern version is unusually ucky. We had a long and cordial visit, and I suggested later to CDC that he would be an ideal lead into a major 6600 proposal for a multi-national-railroad center, quite possibly in Bern: "No real IBM competition at moment, and NO 60% discount!"

I consulted him about my Thursday visit at CERN, the European Centre for Nuclear Research in Geneva, where I was anxious to make a good connection. The Aldermaston and Lilleström people had said they would call after my visit and improve my entree, but the two sets of names they offered were different, and I had had no followup. Walter said I should go to the German DP manager, assuring me he had good English, and immediately called him and arranged a next-day visit.

Since it was for early morning, I reluctantly said my goodbyes, checked out at the hotel, and drove the four hours to Geneva. I rightly assumed hotel space was easy on Ash Wednesday, but had the Bern concierge confirm me at the Richemond just in case. The CERN people directed impecunious physicists into motels in adjacent France, but I knew better.

My visit was with a Dr. Lipps, head of the data handling section, "... from the Munich TH group, very cynical about Rem Rand [only 50 km away in Ouchy], glassy-eyed about his 60% IBM discount (again!) but has hopes of an ATLAS." He was running one shift on a rented 709, but CERN owned a very large Ferranti MERCURY and used it three shifts for general computing.

"Payroll is done by hand!" I laughed. As for data reduction, bubble chamber films were read semi-

automatically (target track chosen and setting made by eye, recorded by A/D converter onto paper tape. "Paper tape goes into MERCURY for first pass, comes out as magnetic tape (Ampex) which in six weeks from now will be 729-compatible, then finishes up in the 709 ... "

Under recommendations I said, "I suggested he look into EECO, EPSCO, Digitronics for some tape-tape converters. Money is not too difficult here, though not available on the Los Alamos scale." They are clearly ready for at least a 3600, I added, and maybe a 6600 "(but remember that 60%)".

As we got ready to go to lunch a call from the Richemond concierge came through for me. He read me a telegram from my father in Michigan; Mother had died in her sleep the morning of Ash Wednesday. I set him to work on air passage to Detroit, thanked my hosts for their shocked sympathy, and rushed back to downtown.

Mother was 75, not in good shape, but with no history of heart trouble. I was the only child. My wife Elizabeth was tied down in Manhattan by her ailing and much older Aunt Grace; I got her out of bed, told her the sad news, and agreed I would go directly to Michigan for the funeral and then back track to Sutton House.

The concierge, who knew only that I was going to CERN and had run me down through the reception office, had reserved a seat on the 1430 plane and had my bags packed and the bill ready when I returned (and probably had put off his lunch hour to be there when I came). I asked him as a special favor to see that the Simca was garaged somewhere near the airport (cheaply; I assumed it would be several weeks before I could return for it), and he assured me the key would be at his desk for my disposition. True European grand-hotel service, and I needed it.

The story of how the telegram was handled took weeks to sort out. If I had taken a cheaper apartment in France, it probably would never have reached me, but Monaco PTT services were excellent. Dad had only my apartment address in Monte-Carlo; when the PTT found I had no telephone they sent a messenger, since it was a death notice. He worked on the Résidence Auteuil concierge, who had only poor French, and the latter produced from his kitchen midden the partial list of dates and hotels I had given him.

The PTT then telephoned the Bern Schweitzerhof; the concierge there said I had been reserved in Geneva, and a copy of the US telegram was sent to the Richemond. No charges ever appeared.

After I got back to New York I called the realtor in Monte-Carlo to reassure him I was sending a rent check, talked to a young lady with excellent English, and she called the Résidence concierge and told him I would be back in a few weeks - and thanked him, I hope.

This chapter is about Swiss computers and my explorations for Control Data. I cannot remember the flight to Detroit, and I cannot remember how I managed the visit reports. The papers in front of me tonight are faded photocopies that look more like black-on-white Ozalids, and they give only the dates of the visits. The fact that my handwritten date for the Bern visit is given as 6-3-62 (it was the 7th) is perhaps a clue that I wrote it later.

I had salvaged my papers, but not the big box of computer brochures and manuals, from the back of the Simca before it was taken away, and was able to produce the 96-page document for CDC and have it typed and multilithed while in New York. I flew back to Europe on April 15, but that is the start of another chapter.

COMPUTER LIST FOR CHAPTER 41

1401
7070
6600
ATLAS
709

42 A DISQUISITION ON DATAMATION

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In Chapter 42 you will encounter
(in order of appearance):

DATAMATION [25](#)

Thompson Publishing *bought for a tax advantage, the first editors gave them a gold mine*

Sandy Lanzarotta [25](#)

"Contributing Editor" *euphemism for "columnist"; I was on the masthead for four years*

Bob Patrick *close enough to the action to stand in as editor during an emergency*

RAND symposia *an annual series of invitational wrangles about hot computing topics*

Fred Gruenberger *he expurgated and edited the RAND tapes; made a thousand readers happy*

Saul Gorn *took ACM's side in a debate about data processing and professionalism*

Hal Bergstein *succeeded Lanzarotta and continued the sophistication of the magazine*

Bob Forest *for a decade the moving spirit of DATAMATION, and father of the NCC concept*

The DATAMATION Party *most important social function at the Joints; invites were precious*

Charlie Asmus [17](#)

Phil Hirsch *Washington correspondent for the domestic section*

Angie Pantages *editor of the international insert, and charming besides*

NCC [National Computer Conference] *one-a-year replacement for the Spring and Fall Joints*

"twenty-five years in the better joints" *subtitle of the 1976 AFIPS history of the 45 since 1951*

Before I start around 1962 Europe again, I want to write about the good times I had in the pages of what was then the bible of the Big Machine user community. I mentioned in Chapter 9 that the magazine started in 1957, and the number of times I have referred to it and to its editors in later chapters has attested to my close involvement, as a contributing editor [columnist] for some years, and always as an appreciative reader. For over twenty prosperous years it told more of the story of our trade, first from what I will call the Los Angeles perspective - tin airplanes, and IBM blue-suiters disguised in sport jackets, and what went on in the RAND Corporation and at the Joint Computer Conferences - than all the competition put together.

After the first two or three years it broadened out, began to tell at least an American version of what was going on all over the computer world. It did fairly well into the Second Computer Revolution, when Ken Olsen and his remarkable crew flooded us with minis. It struggled with timesharing and that ilk, although it never laughed at the later idiosyncracies of the business in the gleeful fashion in which it had needled us early mainframers.

This was at least partly because, as it grew in size and in coverage, it was quite naturally taken over by professional writers and editors. Made it a much more handsome affair, and sold advertising wonderfully, and poured profits into Thompson Publishing. And for historians who need to know about the realities of the century's most remarkable accomplishment, as distinguished from the fairy stories told in the stupid general media, the self-serving stuff always available from public relations people, and the indecipherable and often misleading academic journal articles, there was until the late Seventies a pretty honest ongoing story in DATAMATION's pages. But the unique flavor and the humor came mostly from insiders, not from the professionals, and dwindled away.

It was later indistinguishable from a hundred competitors, and buried in a heap of daily and weekly trade newspapers and a thousand variegated newsletters. But in the early years it was great!

I saw a copy of the start-up magazine RESEARCH AND ENGINEERING while gallivanting around Tempe, and immediately signed up for a free copy. When the editorial office moved to Los Angeles and the conversion to the final name was complete [January 1958] my interest increased. Then Paul Armer and Freddie Gruenberger began reporting on the invitational meetings at RAND, and I appeared as a frequent and pungent commentator.

Suddenly the new editor, Sandy Lanzarotta, appointed me "contributing editor" [November 1959] and I was always between Number Four and Number Six on the masthead until January 1964, although moving to Europe reduced my presence in the pages after mid-1962. In the thirty or so issues during that period, I contributed twenty articles and made other appearances I got paid, although not much - \$75 or \$100 a month. And I never knew whether the "editorial advisers", who included Dan McCracken, got paid also; they wrote less frequently, and were not called editors. Bob Patrick, who started out as an adviser, was closer to the publication (in California) and actually took over as acting editor for a couple of issues when Sandy's successor, Hal Bergstein, got seriously bunged up on the freeways.

The first RAND Symposium published in DATAMATION reported the 1959 sessions. To give some of the flavor - remember that the material was expurgated! - here is an exchange between the late Saul Gorn and me on ACM and business data processing:

Gorn: Essentially, you're talking about something much bigger; something that even Ed Berkeley [founder of ACM, in 1947] didn't recognize.

Grosch: there were clear clues later of what should have been done We had, for example, the first announcement of LEO's success in England. Then there were the early attempts to get UNIVACs and 701s working on business problems. It was perfectly obvious that there would be a great deal of experimentation on using the machines for business, and yet the Alts and the Householders brushed it all aside and made it quite clear they couldn't care less.

Gorn: Well, at least now the Alts and the Hammings and the Householders are beginning to feel the way we do.

Grosch: Yes, but they are improving at the rate of one month per year and the world is going ahead at the rate of twelve months per year.

This went on for many closely-printed pages in two issues, and was read and debated up and down the trade.

As Bergstein and his much-loved successor Bob Forest began to draw heavy advertising, the publishers - who had only been looking for tax benefits in 1957, and certainly not to create a major trade-journalistic triumph - began a much-appreciated series of parties at the Joints. These were in their eyes for the advertisers, and were therefore quite lavish, with adorable bowls of shrimp and impressive ice sculptures and endless trays of hot goodies. And of course there were bars in every corner of the event room.

The editorial offices gave out much-desired fancy invitations. Some came in the mail, but most were handed out cautiously at the DATAMATION booth in the exhibit area in the early hours of the conference. It was first assumed that the advertisers would enjoy meeting the users and the prospective customers, but in the end the business people severed the two parts and held a smaller thank-you party for advertisers and let the by-then-famous bigger bash proceed unhampered.

It became such an attraction in the Seventies that a serious filtering, usually managed by my old friend Charlie Asmus, had to be set up at the entrance. The major figures brought spouses or dates, many of whom were a considerable draw in themselves. It was a part of the DATAMATION mystique, and was operated by Bob Forest in particular as a prime highlight of the twice-a-year conferences.

There was an interesting interplay with content. Many of the more sedate academic and governmental authorities were dubious about trade publications, and interviews, and writing articles (without compensation, if the editors could manage it). But even the stuffiest wanted to come to the DATAMATION Party, especially if their spouses were in attendance and liked shrimp and ice sculptures. Or booze!

So Hal and Bob and his successor John Kirkley made sure authors and potential authors and the authorities that they wanted famous DMN reporters like Phil Hirsch and Angie Pantages to have access to, got invitations. As the fame of the affairs spread, this paid major editorial dividends, and Bob and John used this to keep the publishers supportive and the meatballs coming.

There were experiments. For two years the magazine went semi-monthly, and still was comfortably swollen with advertising, but the strain was too much - and COMPUTERWORLD, a weekly, was beginning to draw heavily from the readership and to a lesser extent from the advertising. So that version was abandoned.

On the other hand, emphasis and reader interest turned heavily toward international matters and international computer trade, so a separate department of sometimes fifty pages or more was inserted into a so-called International Edition. I had a place on the special masthead of the insert when it was run by Angie, partly because of my overseas activities and partly because I was a bridge between the old "insider" gang of the Sixties and the professional journalism and prosperity of the Seventies.

I might forget to mention it later on, so I will parallel the mention of the semimonthly enterprise with mention of another Forest contribution. The Spring and Fall Joint Computer Conferences were a huge huge success for many years, but in the end the expense of the giant booth constructions and the shipment or local employment of large numbers of special exhibitor people began to tell. The exhibitors complained, pointing out that they also had to support specialist exhibits in areas like banking, and major operations in Hannover and São Paulo and wherever. They set up an advisory group and put Bob Forest at its head: the apogee of DATAMATION influence. It recommended one "Joint" a year, and I told the story in the 25th Anniversary [AFIPS] conference proceedings. It began:

The Joints are no more, at least in name - but long live the NCCs! I suffered the agonies of grim Philadelphia at the very first Joint [1951], not yet named "Eastern." I enjoyed the dubious sunshine of Los Angeles at the first Western, not yet named "Joint." I was on the JCC Board twenty years later when, hoping to retrieve the big exhibitors of the Sixties, our Industry Advisory Panel told us:

The time is out of Joint;

and we replied, each one of us,

"O cursed spite, That ever I was born to set it right"!

And we coined the name, National Computer Conference, to mark the creation of something new, yet old: still joint, but of all the AFIPS societies; no longer Joint, or Western, or Eastern, or Spring, or Fall.

That paper went on to give a conspectus of the 45 Joints held in those first 25 years. There were many more - once a year, as Forest had urged - but the for-profit competition waxed and waxed, and the conferences died, and AFIPS with them.

DATAMATION recorded it all. Pungently!

In Chapter 43 you will encounter

(in order of appearance):

My recently bereaved father *neither Elizabeth or I pictured him living anywhere near New York*

Memories of Grady Gammage *I missed him on a trip to Phoenix*

Tom Kamp *in charge of the start-up peripherals business for confused Control Data*

The CDC 606 tape drive *compatible with the 729, which IBM manufactured by the thousands*

Jim Miles [30](#)

Bill Norris [20](#)

Zuse and Stantec *along with other small-machine manufacturers, ripe for CDC peripherals*

A maintenance centre *much cheaper as a European entry for CDC than the whole ball of wax*

The second Control Data contract *full of beancounteries and lawyerisms - but I signed!*

Ranch [30](#)

Résidence Auteuil [30](#)

Roberto Olivetti [27](#)

Borgolombardo di Milano *site of the new electronics lab, and home of the ELEA family*

Martin Friedman *Tom Kamp's opposite number in Olivetti, and a Canadian*

Mario Tchou *Roberto's much-valued computer wizard, recently killed on the highway*

Relations with rich sons and grandsons *much easier if you were not on the payroll*

Ampex tape drives *everywhere I would go I would find them strong competition*

Super- and Hypertapes *Friedman wanted to make them himself, even if they were CDC designs*

Ivrea *the main Olivetti factories, where heavily mechanical peripherals would be built*

La Scala *it was a gala night, and tutto Milano was swarming to attend while I stared*

After Mother's funeral I had to go back quickly to New York and work up my report for Norris. I was concerned about my father, but could see he was surrounded by old and dear friends, and in fact did not seem too upset by the completely unexpected death. I guessed that he had had warnings he was not telling me about, perhaps because he felt he should have written. I never knew.

Elizabeth was anxious to help, but relieved that there seemed to be no need to uproot him from Michigan and his friends. Our finances were too unsettled to contemplate moving to quarters that he could fit into, and neither of us could imagine him in Manhattan.

We did persuade him to come visit for a week, and put him up at a nearby small hotel, which he found uncomfortable because of the exotic UN clientele. After much puzzling we took him to a famous old-fashioned restaurant in Brooklyn, Gage and Tollner's, but the expedition was a failure; he hated the subway, and was outraged at the prices on the menu (Elizabeth and I had thought them surprisingly reasonable compared to midtown Manhattan!).

He got along with old Aunt Grace better than with us, but she was disturbed at his detachment over Mother's death. So all four of us were glad when the visit ended.

I had laid on two visits to Minneapolis at the end of March, with a quick trip to Phoenix to check on General Electric's situation in between. I missed my good friend Grady, still dominating my memories of what had been rechristened Arizona State University. He had died unexpectedly in 1959, not long after showing up at Sutton House and spending a wonderful evening with Elizabeth and Grace and Deo. We had all loved him.

The visits to CDC were creepy. Nobody wanted to discuss my 96-page letter-report, even to criticize it. Nobody wanted to talk about Europe, or orders in the U.S. - although the 1961 Annual Report which I picked up at my Minneapolis hotel (!!) said they were beginning the long run of orders for big machines

which Surly Seymour was fathering.

I finally was introduced to Tom Kamp, who had an IBM-compatible magnetic tape drive coming into full production in the new factory. This was the 606; it looked just like the 729 drives on the 7090s and the new 7094s, but had been considerably cleaned up and made (Kamp claimed) a great deal more reliable, and needing less fiddly maintenance. Miles very reluctantly admitted that, yes, a price had been set for OEM orders.

"Overseas?" I asked. Well, yes - most of the U.S. companies were doing their own or buying from Ampex. Also I guessed that really large orders might be embarrassing; the new factory was about the size of the tape drive shipping area in Poughkeepsie!

I pressured Miles (Norris made himself unavailable). "Why don't you let me peddle this very nice gadget around to the dozen or so European computer manufacturers, this time with your name clearly associated with the product?" I said. I pointed out Control Data could sell 606s and later peripherals (they were monkeying with a check sorter, for instance, on the same clean-design basis) to someone like Zuse or Stantec, or maybe even to one of the Big Boys that was fumbling with mainframe production.

One clear signal I had picked up in Minnesota was that the idea of a CDC spare parts and maintenance center somewhere in Western Europe or Britain was much less scary than a full entry with several offices, a computer center for backup and customer practice [at least a 1604A and several 160As], and a bunch of expensive American deportees. And a service depot! I kept quiet with an effort, sensing painful arguments going on with directors and such.

Finally another fancy contract appeared at Sutton House, even more legalese-ridden than the first. It essentially said yes, talk Control Data - but for Gossakes don't close any deals!! However, it did have a price list attached. The good sign was that my list of OEMers was incorporated. The familiar bad signs were Minneapolis whining about prorating days, and on and on.

There seemed to be no Jim Miles in it, and no Tom Kamp; just lawyers and beancounters. But I looked at the rate and the number of days: \$200 a day for not more than twenty days. I groused to my handsome wife. I groused to Grace. I groused to Déodat. But I signed.

The agreement was dated 11 April [1962]. I still have my copy.

The little Simca Ranch was garaged somewhere in Geneva, hopefully full of brochures and papers from my first tour. I was still an Air France fan, but no longer keen on Orly, so I chose to fly Scandinavian, which by this time was doing DC8 nonstops to Kastrup. After a night at as I remember the Hafnia, a couple of great meals, a survey of the sex shops, and a call to Niels Bech arranging to see him at the end of the month, I caught a Swissair Caravelle for Cointrin.

I arrived in Geneva on the 17th of April, just six weeks from my hurried departure. The concierge at the Richemonde was every bit as welcoming as I had expected. Yes, on receiving my night letter he had had the "little car" as he called it, made ready for my advent. Yes [sympathetic tones] he had paid the bill for me, and the wagon would be delivered to the front door in the morning whenever I wanted it. Fabulous! True, it cost the earth, but I had desperately needed the service.

I did not call CERN or even think about the last two computing shops I had planned to visit, but set out for Monaco next day with a huge sigh of relief. (And yes, all the papers were perfectly safe: Switzerland!).

There was a lot of household chores, and of course I needed to reassure the puzzled agents that I still existed by paying two months back rent. I tried to thank the concierge, who spoke mostly non-Castilian Spanish, for his part in helping with my father's cable back in March and found him vague, but anxious to accept an American \$20 bill.

I had disloyally begun to look around Nice for a place to sell the little estate wagon, since I was planning to get another Super Car if my finances held up, and AutoEurope back in Manhattan did not take trade-ins. After a couple of weeks of this sort of personal stuff, however, I girded my loins - or at least packed another set of clean shirts - and set out again on the consulting trail.

Leaving Ranch parked at the side of the Résidence, I took a curious but cheap bus to the Côte-d'Azur airport at the foot of the Var and boarded an Alitalia Caravelle. The end of the alpine chain coming down to the sea looked wonderful out of the left first-class window, but the 45-minute flight was too short for even a snack. Linate was as disorganized as ever, but I wangled a green and black Fiat taxi in to the Continentale, where they recognized me.

I had the portiere call and confirm my arrival to Roberto's secretary, and sure enough, next morning an elegantly chauffeured Lancia sedan swept me away, to the satisfaction of the doorman, who much preferred it to my own Simca.

This was my first visit to the electronics lab at Borgolombardo. I have a record of the address, 33, via del Parlamento, but absolutely no recollection of what it looked like; strange. I was welcomed by a Martin Friedman, one of the Olivetti Canadians, who said he was the man in charge of peripheral gear, but before I could open my folder Olivetti himself appeared, and wanted to confirm in pleasant detail that I had also been working for Control Data on my previous visit. This somewhat confused the young engineer, who had not heard about it from Roberto or from his late boss Mario Tchou.

This is a good place to reflect on my curious but pleasant relationships with the third-generation Olivetti and the second-generation Ferranti. They were easy, I'd guess looking back, because I was not a salaried employee or a for-fee consultant. When Bill Norris or Tom Watson looked at me they knew I was under control. Roberto Olivetti saw me as a senior figure full of valuable insights, the extraction of which was made easier by warm treatment. And Boz Ferranti started the same way, and over a good many years came to be genuinely a friend, with yarns about his hobbies, and nice relations between our wives.

I remember years later, long after IBM had had me removed from my fancy job at the Bureau of Standards and there was no prospect of any further formal interaction, having a lengthy and friendly conversation with Tom Junior about his sailing enthusiasms and his family's participation. And later still, the Wild Duck birthday present. Fits the above.

Anyhow, on this visit we were very much at ease. Friedman took over and explained that as far as my interest in tape drives was concerned, he had 150 Ampex units on order for the coming ELEA 7003s planned for 1962 and 1963, and thought it very unlikely those could be derailed. Roberto said the new 6001

might need something much fancier, in what was then referred to in the trade as the Hypertape range (from the IBM units supposedly being delivered with STRETCH).

I was able to tell them that such drives were only under development in IBM, not in production, and that from what little - and I was frank that it was little - I had seen of Tom Kamp, he was likely to do as well or better than Poughkeepsie.

My report said, "Would in any case want to manufacture complete drive, buying only the first 50-100 (and even these without electronics but with heads). Roberto O. would like to discuss such with Kamp and Norris. Also Friedman would like to visit plant when he is in Canada in July. Roberto O. more interested in the men, less in the machine."

I added, "No indication when or if they plan to go heavily outside Italy - I asked outright and was brushed off. They are building a high-speed printer [in Ivrea?] you might want to look at."

For follow-up action I suggested "further top-level contact", and that Friedman might be invited to Minneapolis. To the best of my knowledge neither thing happened. Sad!

Roberto took me to his office for lunch, which I remember vaguely as British-style "Cut Sandwiches", presumably washed down with San Pelligreno. I had a brief session with him about Tchou's death on the autostrada, and asked to be considered as he reorganized around the loss. But I could see he wanted only a hardware man, although I gently pointed out that Tchou had done software and personnel tasks as well, which I claimed to be very good at. I had time to wander around the Galleria and the Duomo. In spite of it being a Monday [May 7], there was a major performance at La Scala, accounting for the second-class room I had been given at the hotel, which was only a block from the opera house. I watched from the da Vinci statue across the street that evening as limousine after limousine unloaded fancy fancy Milanese, and have over many decades told the story of the beautiful young couple who arrived in a two-seater Ferrari and left it standing in front of the La Scala entrance, in a swarm of limos and taxis, and walked regally into the building. The doorman and hangers-on pushed the gorgeous vehicle to the side; I assume the driver reclaimed it after the performance!!

It felt good to be at work again, and especially to be able to talk freely about my client, whom I really was quite happy to be representing. I thought Norris was great, in a rather special ex-Arlington-Hall way and liked Tom Kamp a lot more than Surly Seymour Cray. And just as the Italian start of the first tour had been exciting, so this Olivetti visit had been good. I flew away to England with great expectations.

COMPUTER LIST FOR CHAPTER 43 (*, new in this chapter)

7090
7094
1604A
160A
7003 *
6001

STRETCH

44 PARK LANE PERIPHERALS

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In Chapter 44 you will encounter
(in order of appearance):

The Savoy Hotel *my favorite London hotel for two active decades*

ICT [International Computers and Tabulators Ltd.] *merge and merge and merge and merge*

Col. J.A. Davies *put his Park Lane office at my disposal*

The CDC 606 43 Ampex *the California firm sold wide-tape drives across the world, and the tape to go on them*

"Loan us a drive" *the term "reverse engineering" was twenty years in the future*

A brilliant RCA executive *had hornswoggled natives of four countries into taking Camden gear*

Lyons & Co. *mostly sold tea, but built the very first data processing mainframe to keep track*

J.M.M. Pinkerton *built what the mysterious TRT had gotten top management to dream of*

Maurice Wilkes [19](#)

Leo III *I was amazed years later to find that seventy had been delivered worldwide*

Elliott's *in spite of a strong link to National Cash, they cared most about control applications*

EMI [Electric and Musical Industries Ltd.] *amazingly, they also had a thin-film laboratory*

Internal competition *within ICT, more severe than between Endicott and Poughkeepsie*

Stantec [Standard Telephones and Cables Ltd.] [29](#)

Zebra *finally going out of production, unmourned except by its Dutch architect*

My parents [04](#)

Basil de Ferranti *becoming a personal friend*

ATLAS *Boz and Peter Hall should have sold fifteen in the U.S.*
The Midland [hotel] *with the two best restaurants in Manchester*
Kidsgrove *home of English Electric's computers, and the "K" in their names*
KDP10 tape drives *Kidsgrove built its own; RCA design and British parts*
Time sharing *the KDF9 hardware men seemed not to know Oxford was planning on it*
AEI [formerly Met Vickers] *fatally concentrating on one huge Royal Air Force machine*
ICL [International Computers Limited] *would be born in Edinburgh at IFIP68*

The Savoy was its familiar sophisticated self, except that there were many more Americans, and especially American women, than there had been three months before. Only weatherproof business visitors brave the glooms and chills of February London, but it was now lovely May on the Embankment. Encouraged by generally nice weather all over Europe, I had let the Monte-Carlo agency put me on a morning flight, and had been pleased with a first-class First Class Alitalia breakfast. The line for Aliens at Heathrow Immigration was not too bad, my bag came off without incident, and even the ride in from the airport was easy.

I had time not only to inspect the gigantic bathroom and fantasy Edwardian plumbing of my high-up room, but to get down to the Grill early enough to not need a reservation. I had a light lunch, stared for a few minutes at the Savoy Theatre posters, and strolled up Piccadilly to the ICT building at 149 Park Lane.

There was a small embarrassment at the Reception, since I had addressed my long night letter to the wrong Colonel Davies - there turned out to be two, not related [and probably not from the same regiment!]. When I produced my reply telegram, however, the male secretary who had signed it appeared and took me upstairs to the office of the correct colonel (J.A.), who as I had been warned was not in London that day, and told me it was at my disposal. Nice!

He then produced a Mr. J.K. Draper, head of Peripheral Equipment Engineering, and a David Antrich from marketing. Antrich knew of me from the February visit, which he already understood had also been on behalf of Control Data. After some fairly penetrating drolleries about midwest caution, we settled to business. Turned out The Right Davies ("happens all the time!") was in Germany all week.

"Stuttgart?" I asked, meaning SEL. No, visiting his son's family, they said; "Wonderful weather for it", we agreed.

"Would like to discuss the drive in detail, and test one in their own shop quite soon. Draper says his development budget will not stand a purchase; said they had very first production TM2 Ampex over here (prototype went to Olivetti) and that they did a great deal to advance Ampex rep[utation?] on the Continent and in the U.K. Now feel they should examine the alternatives. Would like (1) to have two or three of you come over, see their shop (which I have not done), determine possible back-scratching areas, tell more about the 606. Then (2) if it still looks good, they would suggest a loan of one unit for perhaps 6 months. They feel your price is very high but can be earned back by sufficiently good reliability and ease of maint. and repair. Discussion about use of air guides, power supply (would have to be 50 cycle except for loan machine), track format (they don't want IBM 7-track, but ½" [physical tape] is OK). Apparently they have 10-channel format in mind. I believe interest is genuine and probably fruitful."

I counseled sending a team "second or third week in June", including a Draper type and someone who could negotiate the loan of a drive. As I saw while helping a couple of months later, the "Draper type" was a CDC engineer named Thorndyke, and he did indeed make a European swing, in connection with the Munich IFIP conference, but that was August, not June. I watched the beginnings of a relationship at that time, and Norris himself came over (by ocean liner!) in November, but I was regrettably not part of that later contact. DATAMATION reported the subsequent flurries but then lost interest. In fairness to Control

Data, I have to say they had an awful lot on their plate all through the early Sixties, and not just internationally!

Here I should make mention of the ICT provenance. In January 1959 the two office machinery outfits British Tab[ulating Machine Company] and Powers-Samas [Accounting Machines Ltd.] had merged to form International Computers and Tabulators Limited: ICT. British Tab had been the Hollerith, square-hole, punched card machine vendor and Powers-Samas, the round-hole. Each had been recalcitrant vassals of their much larger U.S. counterparts, IBM and RemRand. Now freed, they were threatened by the appearance of IBM U.K. Ltd. and Remington Rand Ltd.

By 1962 they had acquired the computing business of EMI [Electric and Musical Industries], which made them the reluctant parent of the Emidec 1101s and 2400s. But much more important, they had been trapped by RCA back in New Jersey into a strange exchange arrangement, non-exclusive, where they got RCA 501s by the dozen and RCA got a fair number of ICT card readers and such (making it possible to offer "IBM" peripherals without dealing with 590).

This was paralleled by the similar arrangements I have noted in Sweden and France, and amazingly with English Electric in Britain. Also Olivetti was involved with Bull, although nobody in Milano ever mentioned it to me, so through Bull they too had access to RCA 501 information. To this day I marvel at how some brilliant RCA executive - who knows, maybe Fred Farwell? - had hornswoggled all these foreigners, and how some other RCAer had managed later to chuck it all away.

One trouble I am having in writing this is that I see my own insider dope being played back to me without attribution in research reports from a Wall Street firm I consulted for in 1963 and 1964!!

I must mention that most remarkable ICT competitor, J. Lyons & Co., who in addition to operating a thousand tea shops up and down the British Isles was building and selling LEO IIIs against the ICT 1301s and the ICT/RCA 1500s. And doing it with less than a thousand bods, against ICT's 22 thousand!

I went to see Leo Computers Ltd. in North Acton, a London industrial suburb. I already knew Dr. J.M.M. Pinkerton, their key technical man since 1948, and thought very highly indeed of him. As a Cambridge man he knew all about Wilkes and EDSAC, although he had not worked directly for Maurice, so the LEO [Lyons Electronic Office] architecture sat well with him.

The IIIs were using Ampex drives, and it was clear that these had a big technical advantage over Potter (or Decca, a sort of English Potter). IBM was far too expensive, and apparently very hard to deal with in their new U.K. corporate form. So the Kamp 606 and its probable successors drew Pinkerton's interest.

"Showed me an Ampex being checked out for #3 Leo III, which was being built up [went to British Rubber, I think]. I was startled by genuine air of accomplishment and optimism; Leo may really stay in business Lyons gives them some help, but mostly in corporate staff support (lawyers). New expansion into second bldg. just finished - I estimate 400 employees [North Acton]."

I noted they were not offering trades "à la ICT", but warned their probable production was small. This turned out not to be true, at least in British terms: seventy IIIs were sold, eight of them overseas. I had seen evidence of a Leo IV during my visit, and Pinkerton said they would want more advanced tapes for it. Readers will meet Leo for the last time when ICT gets turned into ICL at a piping of the haggis in Edinburgh.

Another London-based visit was to Elliott's, Elliott Bros. Ltd. to be formal, which was in Borehamwood, Hertfordshire. I noted in my final report some weeks later that they did not seem serious about the DP end of the business. In the earlier trip report I was quite negative:

".... they are extremely limited by their relationship with National Cash; all marketing of their

line items which might use (or already use) mag. tape is via NCR except in the U.K. and perhaps the U.S. They plan on TM4 Ampex but do not seem to actually have one in house - they make own paper tape and card readers and are obviously keen on supplying those. Also they are heavily committed intellectually to new work in the control and military areas"

My host was one R.L. Cook, assistant manager of the development operation. He was polite, not distant - but I felt general purpose computers were not his Great Love. Pinkerton, now ...

I had been puzzled for some years by hints from English friends, notably at NPL, that the EMI enterprise, which was then and even today is usually thought of as in the entertainment end of electronics, had done interesting laboratory work and not just lashed together the usual components. Then the National Insurance scheme, which like Social Security in the U.S. had enormous tape files, announced its choice of the Emidec 2400 (1-inch tapes and an early Rank Xerox printer).

The business press carried the story of the ICT acquisition, and Stan Gill sent me a copy of the little DSIR [Department of Scientific and Industrial Research] ADP book. So it was with sharp interest that I took a green bus to Hayes, out beyond London Airport in Middlesex. I had an introduction to one W.J. Talbot, chief engineer of the computer division - not from Gill, but from Bram Loopstra of Electrologica. However, the story of my newly-announced connection to Minneapolis had preceded me; the trip report I filed that evening [May 11] back at the Savoy said:

"These guys were laying for me. The story is that they cannot afford American prices unless there is a heavy quid pro quo (although they are heavily Ampex TM4 already). So they want to sell you thin-film memories which are working in 256-word prototype right now, in 0.3 μ range I think."

I went on to suspect that they didn't really care about the CDC drive, although indeed they also had a Potter ["not the high density one"] on evaluation. They had an American outpost in West Hartford, featuring a former team member named Dick Booth, and I was startled that EMI wanted the Kamp people to contact him! And indeed, the absorption of the division into ICT seemed more important to me, since the contacts I was trying to promote on Park Lane would in theory lead toward the thin film experiment in the end.

From 1996, that seems optimistic, especially since I had seen under De Carlo and Benton how warfare raged between IBM sites! And the IBM outfits had grown up together, while the parts of ICT - and even more, of the successor ICL - had been forcibly juxtaposed.

They did not feed me lunch, or offer to help me get back into town. As was so often the case in Europe and the U.K., there did not seem to be any smooth marketing types, in blue suits or otherwise, in the engineering outfits. Ferranti was trying to be an exception, but I was already inside the door with Boz And Co., so I didn't have a balanced judgement.

I managed to struggle back in time for a call at the New Southgate offices of Stantec, Standard Telephones and Cables, in North London. This was the part of the British ITT enterprise doing digital switching computers and such, and they told me quite frankly that now that Zebra had run out they were not going to stay in DP. I yearned to tell them of my adventures with Marc deFerranti and Horrid Harold, but thought it impolitic (as perhaps hurting CDC).

Dr. G.G. Smith, chief engineer of switching development, was indeed planning to buy some sort of tape drives:

".... in fair profusion in digital switching computers and equipments. They need full-time on-line 24h/day, 7d/week, 52wk/year reliability with as little redundant equipment as possible. Some centrals will only want 1 or 2 drives, so redundancy there is very painful."

He and his people also raised the question of using British components, which would be easy for IBM U.K. but nearly impossible for some years for Control Data. I was sorry; looked like a real opportunity, but one that CDC was not ready for.

I spent part of the Saturday on pleasure in Charing Cross bookstores and some intriguing Soho extensions into fairly hard softcore. But I also had reports to send out, and a call to make back to Elizabeth in New York, who had to tell me neither Grace nor Deo were doing well. Also she had telephoned my father a couple of times and found him still unhappy with his son and daughter-in-law but planning automobile trips with a woman friend.

I was delighted for him, and was able to tell her (at considerable expense to CDC) that this friend was Frieda Johnson, the mother of the handsome girl I had dated in my junior year of high school in Royal Oak!! Frieda Senior had also been the owner of the house my parents had rented while I was in college, and had been a widow for some years. Dad had a nice Plymouth, and was anxious to see some of the U.S. Dorothy and I, and Elizabeth, had been describing to him for decades.

Monday morning early I flew up to Manchester, giving up my Savoy room reluctantly. There was a Ferranti car waiting to take me directly to the West Gorton factory, which was new to me. I had a warm welcome from Boz, Peter Hall [then General Manager of the Computer Division], and several submissive juniors. Parenthetically, I was itching to see if Peter also had a fancy executive dining room, and if he was an expert at carving - but alas! they took me out to lunch.

I already knew from the ATLAS brochures and operating manual that it was wide-tape, although Boz informed me they were putting one IBM 729 drive on Jack Howlett's machine at Harwell, along with eight FR300s. Peter told me they had a big contract with Ampex to supply TM2s for the ORIONS. I said:

... " 'over half a million pounds' but volume is greater than that, so presumably they are reachable - but only by wide tape! They also raise question of 50-cycle system - ask if you plan to change diameter of capstans to maintain 150 ips speed. Do you?" [Kamp never told me, but presumably Thorndyke brought answers in August].

I had to say that unless CDC would either consider wide tape or talk Hypertape specs neither Peter Hall nor Boz himself were anxious to meet. I was amused to find out that Norris' tough way of talking was known in Manchester (and hence, all over the British Isles), and was not admired. I did not report the feeling, nor that I had said I felt the same!

Peter had to go back to work after lunch, but Boz was hungry for computer stories (and laughed his head off at my yarn about Frieda Johnson). He said he wished I had time to be social, and that he wanted me to meet his wife, "who doesn't believe my stories about you and Tahiti and flying off the Riffelberg". I put this down to gentility, having never met even Robbie's American wife, let alone Tom Junior's. But later on, I did - different wife by then, though!

A company car took me back to town and delivered me to the fabulous Midland Hotel, where Peter's secretary had quartered me. Downtown Manchester was still pretty grim, redevelopment not yet having started, but the food at the French Restaurant made up for it. I noted there was also a carvery; this was many years before the invasion of fast foods [although there was a Wimpy's in Soho!].

I don't remember how I travelled to English Electric Kidsgrove the next morning; would expect to find a rental car in my expense accounts, and there isn't one. But through the offices of Les Fox I had a date with the chief engineer of the computer division, a Mr. Asbury. His staff gave me a brisk tour of both the KDP-10 area (the RCA machine), of which two had actually been delivered, and the indigenous KDF-9, which as Fox had warned me was not quite ready to ship. Because the latter machine was to use drives from the KDP-10, which were being manufactured in Kidsgrove to the RCA designs, the whole outfit was IBM-narrow-tape equipped, but in no need of the 606.

Moreover, since their costs were so much below Camden's, the CDC price was far too high. Nevertheless, Asbury was cordial, and said he would be glad to meet his Control Data counterparts if they "came by". I noted somewhat sadly that none of the men I met were planning to go to Munich, while a large number of Ferranti hardware and software types were going. It brought back the animadversions of the Norwegians in February.

It is worth noting that while the DSIR book mentions the [moderate] time-sharing capabilities of the KDF-9, no one at Kidsgrove seemed familiar with the idea. Oxford would have to do its own software, obviously!

I had been introduced to MetVickers, Metropolitan Vickers, the day of my first visit to Ferranti. They had now changed their name to AEI, Associated Electrical Industries, but were still offering the rather big 1010, with few takers. I had been told in February that the entire team was engaged in designing and building a probably-one-off AEI 1100 for the Royal Air Force supply operation, reminding me of the IBM 701 sent to the Naval Aviation Supply office ten years before. The application:

"... is touted over here as the world's largest file processing case (maybe it even is, although the pieces of our military stuff may be bigger than their whole package). They would jump at 150,000 char/sec drives of almost any physical characteristic, mostly because of reel capacity. The machine I saw had 15 TM-2s connected with more coming! a small department of a tremendous company; reminds me of GE Phoenix and its ERMA days!"

I respected the dedication. But I remembered the struggles when pioneer tube machines like BIZMAC and the big Raytheon were built under similar forced draft. I told the Minneapolis boys this was a cinch if they could produce a super tape or Hypertape quickly, but not to plan on furnishing 606s.

And when I ate haggis to welcome the birth of ICL [1968] I noted that of all the 1962 firms swept up in that conglomerate, only AEI had not stayed the course. That 1100 contract was a killer.

The nine days in England had gone by as in a dream. It had been downhill from ICT to AEI, but to see vibrant shops like Leo (!!!) and Ferranti's made up for the problem sites. I paid my bill at the Midland, noting that I was no longer regarded as an impoverished IBM victim, but an expense-accounted traveling salesman. I caught an Air France Caravelle and headed for Orly.

COMPUTER LIST FOR CHAPTER 44 (*, new in this chapter)

1101 [AEI]	*
2400	
501	
LEO III	*
1301	*
1500	*
EDSAC	
LEO IV	*
ZEBRA	
ATLAS	
ORION	
KDP10	
KDF9	
1010	*
1100	*
701	
BIZMAC	*

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In Chapter 45 you will encounter

(in order of appearance):

Caravelle [airplane] *oval windows and two smallish jet engines, but European*

Lotti [Paris hotel] [25](#)

The Alcazar *a night club that made the Vegas Lido show look obvious*

Phil Dreyfus 39

Machines Bull 39

Jean Rollet *a good engineer who believed the Bull marketing hype*

The Gamma 60 [38](#)

Belgian PTT *had been burdened with the third Gamma 60*

EdF [Electricité de France] 39

Reverse engineering *some of those Brits, maybe, but not Bull*

S.E.A. [Société d'Electronique et Automatismes] *not as big as Bull, but somewhat like Elliott's*

Continuous-loop control *pioneered on the SSEC in 1948, but with a wider tape!*

CFF [Chemins de Fer Français] *the huge nationalized French railroad*

Diesel standby power *against strikes by the utilities or their own people*

Klaus Wenke [38](#)

The CFF payroll *biggest in the galaxy: 360,000 checks every month*

Olivetti Bull [20](#)

French weekends *the drivers clogged the Étoile every Friday, even in May*

The Caravelle from Manchester to Paris Orly was familiar transportation; in fact, of the twelve flights I took inside Europe on this shorter mission, ten were in these oval-windowed and underpowered jets. I had only the normal vexations of a Wednesday at the airport, notably a shortage of taxis, and arrived at the Lotti in good spirits.

I had worked hard in England, and my appointment at 94, avenue Gambetta was fairly late the next morning [17 May], so I asked Josef the concierge to work on reservations for the evening, and set off for the bookstores and art galleries of the Left Bank.

I have forgotten where I ate, but well remember this was my introduction to the Alcazar. I had seen the Lido show both on the Champs-Élysées and in Vegas. but this was very different: much less a spectacle, much more sophisticated. I remember this as the night I learned how to get a Paris taxi in spite of the end-of-show mob scene: much as in Times Square, but made simpler by the size differentiation of French currency!

I had arranged with Phil Dreyfus that I would talk first to the Bull peripherals people, and ask them to call him when both parties had had enough. I asked therefore for Jean Rollet, who was chief engineer of one division. He brought several youngsters with him, who all apologized in English much better than my French for not having English, and we settled down for tape talk.

Bull was using both the RCA drives I had heard of at English Electric and indigenous ones from Compteurs. In my report I said I had tried to get "competitive information" but could only be sure that as installed on early small Gammas the French drives were low-performance.

Rollet said that over a dozen Gamma 60s had been shipped, and that the third one was running at the Belgian PTT. I doubted both statements, and knew for sure that the one supplied to EdF, the French power company [Number 2, they said], was not doing well. Dreyfus said the railroad installation [also supposedly Number 2] was a big success, probably because he had done a lot of the specialized programs himself (the term "software" was a few years in the future).

They seemed genuinely interested in the complete IBM compatibility, asking questions about hub specifications and air film thicknesses and such. I said CDC planned to furnish 50~ drives, but that samples for Bull - they were asking about trials starting in four months - would have to be 60~, 110v, and glossed over the availability of a French-speaking CDC installations engineer.

I told Rollet I was not able to talk about quantity discounts, but that his suggestion of an order for 500 units would undoubtedly stimulate offers. And I noted in my report that Bull was not pushing either honestly or as a matter of reverse engineering for Hypertape-level hardware, as I had heard in Britain.

We shook hands all round, in the European fashion, and one of the young men took me back to the reception and turned me over to Dreyfus. Phil hustled me out to a company car and off we went. He was excited; anxious to show me his baby, and to prove that it was doing real work. It would be in full spate tomorrow, working on the monster railroad monthly payroll, he said, pressing me for my schedule. We settled on early afternoon, and that this same car would pick me up at S.E.A. in Courbevoie. He told the driver to be sure to recognize me (I got the word visage!). I had hoped for a gossip session, but he passed up my suggestion of the Lotti bar and was driven away. I memorized the license plate on the Citroen!

The factory and offices of what I recorded on my visit report as SEPSEA were at 138, bd. du Verdun, and pretty dingy. This was a unit of S.E.A., Soci t  d'Electronique et Automatisme, about which I knew very little. I quote from my report:

Their products include the CAB500 (two more just installed at the Credit Lyonnaise) and new CAB3900. Each uses 1/2" tape in a drive made by Compteurs to SEA design or specification (big difference, but I had some difficulty with that one!). These run about 50 char/in and 200 in/sec and look rather fragile. Riou [R. Riou, assistant general manager of S.E.A.] showed me a continuous-loop transport, constant-running, using 1/2" tape and 8 tracks (error correcting?), with a random pileup bin holding 650 feet (!) of tape, or 65000 words. Rather nice, if you don't mind waiting up to 40 seconds for your word. They plan to use it on automation equipment (probably machine tool control??). They will digest CDC info and get in touch for further words.

That meant 48-bit words, or 36-bit if there was two channels of redundancy. I said the probability of business was 0.2, that it would be sale rather than lease, and the order would in any case only be for "a few".

Riou took me to lunch. I liked the informality and the engineering-management flavor. It reminded me of a smaller Elliott's. But when I thought about what, say, Ramo-Wooldridge was doing back in Aerospace Country ...

I had mentioned the Bull car was coming for me, and Riou considerably had me at the gate promptly at 1430. Turned out to be the same driver but a newer Citroen!

After a couple of repeats I understood we were going directly to the CFF installation. This was Chemins de Fer Franais, the enormous French national railroad system. It now operates the TGVs, terrific Trains de Grand Vitesse, and the early interest in high technology that Bull was catering to was a harbinger of that future. The Swiss, as I described in Chapter 41, ran a more efficient railroad, but the French wanted a lot more speed!

Apparently the giant power company and the giant railroad had competed for the first Gamma 60. Carteron claimed he got the Number Two [p.381] and the CFF machine was supposed to be the earliest one outside Bull itself. I suspect that the failure at EdF was what got Dreyfus to do the CFF programming - or at least manage it - which points to the railroad machine as either being Number Four, or more likely the internal Number One, refurbished. Big mystery!

The building was amazing; as big as my Evendale shop of 1954, but with diesel standby power in the

basement instead of a technical library. It was neither as large nor as modern as Wenke's confection in Ludwigshafen, but then central Paris was not as easy to manipulate as the industrial spaces of GE or BASF!

As I have reported elsewhere, there was a room with banks of line printers and a room full of paper-handling and mailing equipment, which along with a fantasy of reports and summaries and receipts produced 360,000 paychecks every month. This was almost certainly the biggest payroll operation in the galaxy, and it was set up to run come hell or high water - including strikes by the power or water utilities, or by the railroad itself.

As for tape drives, Phil showed me twenty-four Burroughs transports, under Olivetti Bull maintenance. He said the drives were slow, and that fewer and more reliable ones would be welcome, assuming they ran faster than the Burroughses. I gathered that these were rated at 20,000 characters [bytes, today] per second. The 606s were only being offered initially at 30,000 but I told Phil I expected much closer spacing than the current 200 bpi in the next few months.

He pressed me for details, and I admitted I was going on what I knew about IBM tape technology, which even three years ago when I was Wild Ducked was easily doing 600 bpi - and this was long before the Hypertape offerings to Los Alamos and Livermore. It was clear that the present 606 performance was not useful to the CFF installation, and I so reported to Minneapolis.

One curious question was about rewind speed, which seemed unimportant to me in a multi-multi-drive installation. I was able to tell him 225 ips, which also did not impress him, especially when I agreed that tape speeds were harder to improve than record spacing.

He asked if IBM would license its technology, pointing out that CDC had no track record yet in R&D. Not a chance, I told him. We [Bull] can't buy from them, he replied. How about CFF? I asked. No answer.

This was a Friday, and the weekend exodus was jamming the Étoile and getting worse by the minute. The Citroen was nice to sit in, but ... I volunteered to walk back to the Lotti, but Phil wouldn't hear of it. I knew him well enough to ask him what his weekend plans were, and he said he and his wife were staying in town, looking smugly at the confusion around us.

I have no record of that evening, nor memory either. Low life, I'd guess, and a croque-monsieur and a beer. The next morning my bill for three nights in a modest room, and continental breakfasts, and telephone, and ten francs for Josef, was less than a hundred dollars; today, six or seven hundred. Ça!

COMPUTER LIST FOR CHAPTER 45 (*, new in this chapter)

GAMMA 60
CAB500
CAB3900 *

46 I MISS KONRAD ZUSE

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In Chapter 46 you will encounter
(in order of appearance):

Heinz Gumin *I had helped him at AFIPS, and now he ran the Siemens computer outfit*
IBM Deutschland *they told their German customers very little about the U.S. competition*
DATAMATION [25](#)
The Bayerischer Hof [36](#)
Siemens at last! *they had just adopted Ampex for the 2002; did not take me through the shop*
German rail travel *to get from München to Konstanz was not easy, even helped by Thomas Cook*

The Insel [hotel] *gentle reminders of its centuries as a cloister*
Telefunken *had their own tape transport, but it looked maintenance-prone to an old operator*
TR4 deliveries *I told CDC it looked like there would be major delays*
SEL Stuttgart [29](#)
A scramble-bin tape drive *one inch wide, and a symptom of ITT's loss of interest*
The Zuse factory in Bad Hersfeld *bigger and happier than I had expected, and transistorizing!*
Konrad Zuse *alas! I was not to meet the great man for two more decades*
The Father Figure icon *From Watson Senior and Dr. Ikeda to Ken Olsen and Gene Amdahl*
An attached butchershop *no wonder I enjoyed lunch at the local inn*

I had looked forward for some years - long before the Control Data involvement - to penetrating the mysteries of Siemens. I had helped Heinz Gumin, and he had risen in the company, and in 1962 was the key management figure in the 2002 enterprise as well as in the supporting design and software efforts. He responded briefly but pleasantly to my occasional letters, but somehow I never felt anybody in the giant outfit was watching the American scene very closely.

This was at least partly due to the chasm between the universities and research institutes, which were part of the world computer user community, and the industrial powers like Siemens and Daimler Benz and BASF. The latter were world players in their own markets, from Sydney to Reykjavik, and knew a great deal about their U.S. competition, but the criss-crossing between say Dupont and Douglas was unheard of, the tremendous involvement in defense was lacking, and the migration of researchers (and computer experts) back and forth between Academe and business was, as I've said earlier, unheard of.

Moreover, because IBM Deutschland was a major player in IBM World Trade, it tended to not pass as much information from White Plains and Poughkeepsie - and nothing about SAGE or SDC or the Pentagon - to its German customers, as a minor outfit like IBM Greece needed to do. So the German user community knew about IBM successes in Germany, but not much about what was going on in Santa Monica.

In fact, Siemens customers that I had met earlier in the year seemed as puzzled by what the 2002 people were doing as DATAMATION was. IBM Deutschland funneled more information about Siemens back to Paris and White Plains and 590 than any customer of either supplier ever heard, but I had no hope of accessing that.

So I approached my first visit with strong doubts. I had arranged to meet only engineers, but I had used Gumin's office to set things up, hoping that Heinz would invite me to meet with him. Not a chance.

I flew in to Munich Sunday night [20 May] and put up at the Bayerischer Hof. The Simca was parked forlornly at the Monte-Carlo apartment; the giddy days of taking it with me on trains or of putting the Ivory Lady on an airplane were suspended. I taxied out to the huge main offices of Siemens & Halske AG on Hofmannstrasse and started in.

My date was with the chief engineer of the computer department, a vigorous blond named Lockemann, who had brought in the tape specialist, Georg Helmerich. They were cool, which I soon found out was because they had just finalized some major peripherals commitments and found a new possibility aggravating. I told the story colloquially in my report that night:

Well, I finally penetrated! This is the last major computer mfg. I have contacted, unless Facit counts as major. They were pleasant, rearranged several schedules to see me - but showed me no labs, no equipment, no follow-on plans; that's Siemens! As for the present assignment, they have just adopted the TM-2 as an alternative to IBM 727; they are staying 7-track IBM compatible. They do not want to commit personnel to further transport tests and integration redesign. Most of all, they would want CDC to establish a base in Europe, such as Ampex has in Switzerland, and parade German-speaking engineers before their very eyes, before placing

a substantial order. Of course they realize your problems in doing this; that would be their position, however, even if they were looking for a supplier. My own guess is that they will be a good deal more flexible after they begin to have TM-2 trouble. Still, they have a point - because of their admitted inexperience they have required Ampex to offer standby "exceptional" maintenance over and above that of Siemens maintenance, on future installations. That sounds like they had trouble with IBM!

I said they did not want a visit, but "will see you in August at IFIP". I estimated probability of a 606 order as 0.1, based on the possibility of poor results from the Swiss Ampex connection.

It was a very unsuccessful first contact. I lunched at the hotel.

It was just as well I had the afternoon free. I had intended all along to go to Telefunken by train, and on to other appointments, but even with the help of the BHof staff it was not simple. I had to coordinate train and ferry (across Lake Constance); the concierge would get the tickets, but expected me to know more about alternatives than I did. I always travelled with the Thomas Cook European timetable compilation, and it seemed to recommend going to Zurich and doubling back.

Anyhow, relying on the concierge got me a reservation at a wonderful hotel called the Insel, a converted cloister, so arriving, not getting there, was half the fun! And my expense account says I went on the town that night.

Everyone from Les Fox to the tape boys at Siemens agreed that Telefunken was in over its head. The TR4 was a terrific machine on paper; easily a match for the Kidsgrove KDF9. But would it deliver? And for all but the most recondite number crunching, good tapes were a necessity; the IBM experience, sweeping away the competitors to the 700s and the 7000s partly because of superior peripherals, confirmed it.

Telefunken GmbH was on Bücklestrasse in Konstanz, and seemed to be mostly an engineering lab. It was part of the Technisches Magnetophon division, one of the smaller parts of the giant company. I was met by the chief of development, W. Madee, the tape transport expert W. Grimm, and a Dr. Zscherre, all of whom were anxious to talk futures - unlike the Siemens men.

They startled me when, on a brief tour, they showed me a big area that was intended for TR4 test when production was "moved from Backnung". My report tells my reaction:

.... they are deeply involved with their own drive, with Ampex FR300 as a stop-gap. Many questions also about Potter hi-density unit. Their own machine is about as far along as the 606 - I saw five in the test area. It is ½ inch tape but 8 tracks; IBM-compatible reels and hubs; vacuum channels but magnetic clutch rather than pneumatic emphasis. My amateur opinion is that it is a pretty complex mechanical design and not nearly as nice as yours. However - - - it's theirs, huh? So nothing for a while at least. I tried hard to leave a good impression for you in case they get in trouble in a year or so.

The TR4 is not yet working except in the Backnung labs. The production (??) will be moved to Konstanz shortly - I was shown the test area. That should set 'em back another six months. Looks like your competition is IBM, Ferranti, English Electric, period!

Getting back to tapes, Grimm wants to avoid faster tapes and just go to higher densities - probably a sign of design limitations, but who doesn't have trouble?

I put the probability of business at less than 0.1 and without putting it on paper was sad for the TR4 and its proponents. I could see the same big-company problems in Siemens and Telefunken - yes, and English Electric - that had made the GE entry so clumsy.

They were nicer than Siemens: took me to lunch, and dropped me off at the Insel afterwards.

Konstanz is a southern satellite of Stuttgart, with frequent train service. The Munich concierge had gotten me tickets, much easier than getting to Konstanz in the first place, and reserved me at the Graf Zeppelin. I had not asked his help on the leg beyond, since the desk at the Stuttgart hotel was presumably also competent.

My call was of course at SEL, Standard Elektrik Lorenz - the third time I had been there. The plant was unchanged, but the brochures now said "Informatikwerk, Stuttgart". I talked to a marketing man named Weyersberg, who had heard of my second visit, and a young peripherals engineer named Polakowski.

The latter had just gotten his hands on a Stantec Zebra, which had been sent from Britain to the Hannover Fair. Since neither the parent organization or its builders in the west of England were interested in building more, SEL had managed to snaffle it easily.

As I expected, the Air France one-off system had still not been shipped. I poked carefully at the marketing people to find out whether they knew about SABRE, which of course was to run on standard equipment (if you considered Rey Johnson's disc drives to be standard!). My recollections are negative, and certainly there is nothing in my reports. I saw copies of DATAMATION in two offices, and was criticized for my "Monster Marketing" article; the Stuttgart men were not as uninterested in the American scene as those in Munich and Konstanz.

The Creed paper tape drives were still attached to the Air France system, but SEL was making its own drums and mag tape transports, apparently getting a few parts from other ITT plants. Nothing like I had proposed to Marc [deFerranti], of course.

The tapes were one-inch and they were using a scramble bin, I reported.

.... they claim it runs 35000 cps. My guess is either 35000 bits per second or at most two characters wide, or 17500 frames per second. Looks very poor - perhaps Creed mechanism and their magnetics? Quality also indicated by considerable knowledge and interest in FR400. And they use Shepard printers.

This place smells of defeat to me. The ER56 never ran well; the reservation systems are late; unlike Stantec they do not talk much about advanced switching computers. Still, if they do go that way, they will need better tapes than their own. And they are very pleasant to talk to - very knowledgeable. They are dubious about the Telefunken prospects.

After lunch I went to the main station and struggled with tickets myself, more for practice in language and customs than to avoid concierge tips. The mark was about 43 cents, and my expense account shows DM26,00, which I take to be second class to Bad Hersfeld and on to Frankfurt - a third of what it would be today.

Neither my 1998 memory nor the current Michelin helps me with the Bad Hersfeld hotel. It cost more than the Graf Zeppelin but less than the Insel, so it must have been a nice place - and I stayed two nights.

This was my very first contact with Zuse people. I had been delighted with the wood-cabinet relay machine outside Vienna, but the men I met there were optickers, not Zuse employees. So here I was in what turned out to be a substantial factory, with three or four hundred employees, and a considerable engineering component.

My host was the chief of systems development, Ing. H.F. Heins. He didn't know me from Adam, but knew a lot about IBM Deutschland, a little about IBM White Plains, and was delighted to find I had been a close friend of John Lentz, the father of the IBM small-scientific machines which were the closest thing to the Zuse Z22 tube machines and almost as early as the Zuse post-war equipment.

The first thing Heins did was to show me the prototype [or a very early] Z23, which was pretty much a

transistorized Z22 with up to 4000 words of core but no mag tapes as yet.

There were pieces of a smaller and newer transistor machine, to be called the Z31, and it was to have two FR400 tapes, which were already im haus and checked out.

The proprietor and pioneering figure who loomed everywhere in the company and in the national picture was alas! on an extended vacation, Heins said, promising to show all the brochures and Control Data material to the Great Man. It was my first real chance to meet him, and I was very disappointed (it was over twenty years before I finally did so).

This was what Siemens and Telefunken and SEL - yes, and English Electric and EMI - sorely lacked: a towering figure to give not only direction and drive, but to make the technical people and the salesmen proud. I knew the Watsons, and Ken Olsen and Bill Norris, and I thought also of the first Olivetti and the first Ferranti. And outside computing I had known Gerry Neumann and the Three Vons. Zuse, on a smaller stage perhaps, was just such a giant. I had guessed already that Gene Amdahl would be such a figure, and I had heard of Dr. Ikeda, who was building Fujitsu.

How I regret that Niels Bech, who could have powered a much larger Scandinavian enterprise, had died in the Seventies. But Konrad Zuse, tough as an oak tree, lasted into the PC era, sold his company to Siemens - which ate it up - and died only a year or so ago, full of honors. I wish I could have met him in 1962!

Well, Heins took me off to a country inn mit eigene metzgerei [attached butcher shop] and fed me a memorable lunch. We became friends, although he was reserved about company matters. For instance, having been unable to see back at the assembly area, I asked him whether the FR400s were half-inch or one-inch. "That also was decided by Dr. Zuse," he said. Yes!

Next morning early I took off for Frankfurt Airport, which had even in those days its own railroad station, and boarded a Lufthansa Convair for Amsterdam. I took a canal boat to the Apollo, and settled in with a sigh for a well-deserved weekend.

COMPUTER LIST FOR CHAPTER 46 (*, new in this chapter)

2002	
SAGE	*
TR4	
KDF9	
Zebra	
ER56	
Z22	
Z23	
Z31	*

47 AN ITALIAN FROM AMSTERDAM

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In Chapter 47 you will encounter
(in order of appearance):

Electrologica *spun off from a Dutch government research institute*

Bram Loopstra *van Wijngaarden had picked an engineer rather than a salesman*

COMPUTERS & AUTOMATION *carried the specifications of Tom Kamp's new tape drive*

The Dortmund X 1 installation [36](#)

Niels Bech [33](#)

Classic convertibles in the U.S. *I aspired to another, in Europe*

The Simca Ranch Wagon [30](#)

The Alfa Romeo 2600 *with a scarlet custom body from Touring of Milano*
Shipside *an office in Manhattan and a showroom at Schiphol, open on Saturdays*
Speed limits on the autostrade *don't be silly! In Italy?*

I had an important Control Data prospect to call on: N.V. Electrologica. But after that Friday call, there remained an exciting personal affair to be consummated. I will return to it below.

Electrologica had been spun off some years back by the Mathematisch Centrum, although my old friend van Wijngaarden was still involved in some subterranean fashion. It was established alongside a canal in central Amsterdam [Willem Fenengastraat 31]. The director was Bram Loopstra, who had visited me in Phoenix five years before and marvelled at the spurious cowboy ambiance and the poor wine list of the best restaurant in 1957 Scottsdale.

He had seen the small announcement of Tom Kamp's tape drive in COMPUTERS & AUTOMATION the year before, and remembered the specs, but was unhappy when I told him the price. Less than IBM, I pointed out.

My report of the contact said in part:

His machine [the X 1] uses Bull punched card readers and punches, and 300 lpm printer. He has his own paper tape reader, 1000 cps and stops between holes(!). Most of his (small - perhaps 30/year) production does not have mag. tape. The ones I did see were an old English design. He must be the only Continental user!

Loopstra agrees IBM compatibility is important, but mostly for larger machines. His prospects usually have no old tape, or tape coming from remote subsidiary installations. He says he simply can't afford units in the \$20,000 range - two or three would cost as much as his basic machine! This will be the story at Regnecentralen also, of course. But he does want to see the exhibit at Munich.

We discussed the engineering consultant prospects on the Continent and in the British Isles. He had already heard of my visit to the X 1 installation in Dortmund, and we were both unhappy about the demise of van der Poel's Zebra. I avoided talking much about Denmark and the Regnecentralen GIER.

It was clear that Electrologica would not buy 606s, and I so reported. In my trip-end letter later I brought up the possibility of a deal with Bech, but did not mention the Dutch equivalent; speaks to my evaluation of the two men, each of whom I liked very much - Loopstra the engineer, Bech the entrepreneur.

My expense accounts show I was taken to dinner, but I was so caught up in the affair of the new super car (which I must have described ad nauseum) that I haven't the faintest recollection of where we went or what I ate!

I had wistfully remembered the powerful and beautiful automobiles I had driven - the Roadmaster, the New Yorker, the Silver Lady (which Loopstra had admired in Arizona), the scarlet Alfa Veloce - as I pattered along the autostrada and the autobahn at a hundred kilometers an hour in the little blue Simca. I had found a purchaser for Ranch, hoping that the faithful wagon would be as appreciated by its second owner as it deserved. And I had done the New York deposit and final payment on another scarlet dream car.

This was the brand new six cylinder Alfa Romeo 2600, with a limited-edition custom convertible body by Touring, which along with Pinin-Farina and Zagato was energizing the rather stodgy Alfa sedans. The new engine was an enlarged and modernized version of the one in my Veloce; same aluminum block, same overhead cams (and alas! same crummy electrical system).

Auto Europe had been replaced by Shipside, which based near the Amsterdam airport and offered eager

American customers substantial discounts at their Schiphol showroom. Delivery had been arranged for Saturday the 26th, since the check had cleared back in Manhattan and the Dutch banks, which were of course closed, were not involved .

The body paint was the familiar Italian racing red, the interior was a curious dark gray artificial leather, and the top was black. I was entranced; could not wait to put some mileage - ah, kilometrage - on it so that I could then open it up on the roads of Northern Italy.

Parenthetically, 200 kph was easily attainable: 125 mph. And when I saw headlights blinking in the rear view mirror, I would give way to Ferraris and Maseratis doing 240!! Those were the days!

I drove the beautiful creature carefully south that afternoon and through a long Sunday, and Monday morning parked it at the Nice airport and flew off early to Stockholm.

COMPUTER LIST FOR CHAPTER 47

X 1
Zebra
GIER

48 FACIT AND SAAB THINK AGAIN

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In Chapter 48 you will encounter
(in order of appearance):

SAAB [34](#)

Niels Bech [33](#)

Bill Norris [20](#)

PLATO *a computer-aided learning system that Norris believed in, in spite of his directors*

Facit *the Swedish equivalent of National Cash*

The Carrousel tape drive *"a weird arrangement of [magnetic] tape spools circling a central reading system"*

The Grand [hotel] *the Waldorf-Astoria of Stockholm, across from the Royal Palace*

Børje Langefors [34](#)

DEIF *a company joining with SAAB, Facit and Bech to form a Scandinavian computer combine*

SCC *my coinage, for a company hoping to parallel the airline SAS*

IFIP Munich *the second international charivari; the 16th will see the millenium out, in Beijing*

Malmö *a long day or night ferry ride from gallant Copenhagen*

AB. ADDO *light on electronics and heavy on paper tape, they had lost their link to ALWAC*

The machinery of internationalism *not just passports and vaccinations, but overseas banks too*

Déodat 15

I assumed that the Swedish experience as vigorous and rather sophisticated users which I had witnessed earlier was not going to inject them into the world computer manufacturing orbit, but there remained two things that might make them attractive to both the parent Control Data and to the CDC peripherals people. One was that SAAB might keep a position in an engineering niche market in somewhat the same fashion that Elliott's looked to do in Britain, or SEL claimed it wanted to do in specialized airline systems.

Such systems needed tapes, although not as many per installation as data processing, and because the full entry was delayed in the SAAB case by reluctance to abandon the general-purpose market, there was time for CDC to develop niche tape hardware or learn to market the 606 family more broadly.

The second possibility was that Bech and his vision might pull the rest of Scandinavia along, and create a viable capability for the whole region. There too there was time for Norris and Kamp to get acquainted with the Danish wunderkind, and sell him a few drives and one or two 1604-sized computers while learning his style and even helping him broaden out. Looking back, I see now that Bech was well ahead of most of the CDC executives, dreaming of Eastern Europe and chemical industry applications in the same way that the brighter IBM World Trade boys in Paris were doing.

Norris himself was a visionary, but on the American scene. He came to pioneer in farming applications, as one unusual example, when even the Golden Boys around Tom Junior had not seen them. And of course there was PLATO, which had worldwide potential but which originated in Illinois! But putting him together with Bech in 1962 or 1963 looked difficult, and not just because he didn't do foreign travel.

My appointment on the 28th was with Facit out in Solna, and the taxi out and back cost a small fortune. I had arranged by cable to see one O. Karlquist, who had been mentioned in Gothenburg in February as the head of the Computer Department. He surprised me by bringing in his marketing man, Åke Wannenberg, rather than an engineer. He had gauged the Facit interest correctly, however, because he was upset that he and the marketing crew had just lost a major order to IBM Sweden, and was sensitive to the compatibility requirement. My standard inquiry cable always mentioned that the 606 drives were interchangeable with the IBM models.

My day report said:

.... their own "Carrousel" tape drive [a weird arrangement of small spools circling a central reading system, much less primitive than pile-up bins and with ten times faster access - but dreadfully complicated, and ugly to look at] costs \$25,000 (Wannenberg), and Sweden is a high-cost country, hence your \$20,000 doesn't really shock 'em; also they just lost an order to the Swedish IBM for - count 'em - twenty 1401's, for census and gov't statistical work [the Statskontoret]. The I/O requirement was complete IBM compatibility: cards as well as tapes. They apparently had some trouble saying they would meet such terms, and for this and other reasons lost out.

Their EDB is around 1401/7070 interface capability [I no longer remember why I used the word "interface"]. I got no hint of a follow-on machine. And no tour! As bad as Siemens. As at Telefunken I tried hard to embed you in their consciousness, expecting they will need help soon. Some question of a licensing arrangement; I said you people would have to be contacted for that - I was not authorized.

In my summary at the end of the tour I mentioned that I had picked up indications later that there would be a follow-on machine, and that it would likely be smaller. Not only did this turn out to be an understatement, but their next announcements were special-purpose machines as well, and with no software features. They were of course still discussing broader strategies, as I was to find out - but not on this Solna visit!

I was free in the late morning, and went back to the austere but wonderful Grand for lunch. It was to be very different in 1974, when IFIP had a terrific meeting centering there socially, and the freedoms of the intervening twelve years - and a tripling of Stockholm prices - made the hotel a much much more exciting place.

I regretfully paid my bill next morning and took the early train to Linköping and SAAB. This was a very different and more pleasant feeling: Børje Langefors was a friend, I had visited only three months before - and the surround was fighter planes instead of cash registers!

He introduced two policy-level people named Pedersen and Knudsen, the latter just back from the U.S. and full of gossip I had not yet read in DATAMATION. The three of them broke me all up with a major

disclosure, important for my client and for Europe. I was excited, as quoting will demonstrate:

Extremely interesting news: these people are going in with Facit and a new Danish outfit "DEF" or "DES" to form a Scandinavian computer combine modelled after the SAS airline success!! This has not yet been announced widely but is not confidential. SAAB will be the big-machine specialist with the D-21, Facit will make I/O, especially paper tape, cards, and Carrousel (instead of disc random-access). DEF will make small machines. No certainty about tape drives - D-21 has Potter 906II as you know from my earlier visit. Facit was most noncommittal yesterday and now I see why - but my estimate of later interest was certainly accurate! Pedersen says "no commitments [sic] yet beyond the Potter drives" which sounds like none to Facit, hence no Facit drive in the labs?? Wish I had known this yesterday!

SAAB has sent first D-21 to its Stockholm office for display but without fanfare. I still doubt their marketing and support understanding, at least topside. To buck IBM from a like-Autonetics base is mighty complicated. But at least they are already major users of equipment and recognize the value of IBM compatibility.

I said at the bottom of the page that I had promised to route the CDCers through SAAB Stockholm when they came over for IFIP Munich, and called on Minneapolis to start planning the trip immediately [underlined on the report sheet]. They didn't.

I made only small attempts to bring Bech, who would obviously be furnishing GIER to the new Danish enterprise (and I suspected was the new Danish enterprise), into the discussion. I was to see him in a couple of days, and I knew he would want me to spread whatever word he was generating, as well as continue to be a conduit to Norris and Control Data. Also I wanted to milk as much out of Linköping as I could while I was on the ground, rather than waste time talking about Bech and his young men.

In spite of the excitement I checked out and got back to the station in time for the express to Malmö, which is just across the strait from Copenhagen. I remember a very unusual hotel called the Tunnel, and a rather vigorous night on the town, but the details are masked by my interest in what I had begun to call in my own mind (and later in CDC correspondence and in DATAMATION) the SCC, Scandinavian Computer Combine.

Next morning I went to AB. [Aktiebolaget] ADDO, another business machines company less well known in the States than Facit but a strong competitor in those day in Europe. It was not a good visit.

My host was a very pleasant man named W. Wang-Andrésen, director of Special Products Sales. He explained that after the death of Axel Wenner-Gren the flow of "big electronics" [his expression] from the ALWAC people in the U.S. had dried up, and the company had decided to pull back to paper tape and key-driven gear.

I suggested there might be a market for conversion equipment such as paper-tape-to-mag-tape, pointing out that such machinery sold well in aerospace for instance, and was too expensive - and made by too-unknowledgeable California outfits - to be offered in Europe. It cheered him up a little, but not much.

I reported to Norris that he then told me they had just sold "Skr 2,000,000 (\$400,000) worth of paper tape stuff" to the Swedish post office, demonstrating that this was big business if not big electronics!

I added that "unless they have some computer-electronics people still on board with little to do" this idea would go nowhere. In my big report on European users I had explained that one of the dozens of differences between Europe and the U.S. was that technical men and women did not move from company to company on the Continent, as they did so freely in California. And ADDO would be hard put to discharge them. The idea was not easy for Minneapolis types.

The hall porter at the Tunnel had coached me on taking and enjoying the ferry to Copenhagen, which ran

several times a day as well as carrying sleeping cars on the wonderful night run. There were tax-free advantages, and in those days travelers from the U.S. were dazzled by Åalborg aquavit for well under two dollars. But I was flying out of Kastrup immediately, and Niels Bech was the sort of man to whom you might present a really old bottle of Armagnac from Fauchon's, but not primitive booze. So I refrained.

I had a wonderful session with him. He was anxious to talk, more because of his excitement than because of my DATAMATION window, and not at all because of Control Data. I could see that the new SCC would not get advanced peripherals from Facit, and was fairly blunt in saying so. And clearly they would not dream of getting anything from IBM, even if made in Europe.

So I was pleased for Norris and Kamp. I reported:

.... the DEIF outfit is a Copenhagen mfg. firm that will make Bech's GIER! And Bech expects to be about 1/3 of the joint R/D enterprise in this new Scandinavian combine. He says they have to have "IBM" as well as Facit and Facit Carrousel drives. Specifically, he is interested in but not committed to Ampex, and would like to play with your 606 first. He wants 3 things:

1. You should visit his people, esp. Petersen, before Munich.
2. The Munich display machine should come to him afterwards, at \$825/mo rental, for 4-5 months evaluation.
3. He would want a guarantee (letter-of-intent basis, called a "pre-order" here) of at least 4, perhaps 8-10, 50~ drives beginning in October if the evaluation is satisfactory.

He would put at least some (4?) of these on a built-up GIER that he is using for demonstration and R/D. But of course the major chance is to be the sole supplier of drives to the Scandinavian combine. Quick, men, to horse! To horse!

I pointed out that Bech would be the program chairman of the whole IFIP Munich event, and that as much discussion and technical exchange as possible should be scheduled in advance or with this in mind. I requested of Kamp himself that he send a team "here and to ICT and Bull", by mid-June (the Munich social events and registration began Sunday 26 August).

Parenthetically, my visits to Minneapolis in June didn't do much to speed up the machinery. One major problem was that the engineers and management people had never been to Europe, had no passports or vaccinations, had family problems that were encountered and managed four decades ago in IBM, and even further back in National Cash, but were brand new to Control Data.

The machinery that shipped Don Pendery smoothly from California to World Trade Paris was necessary for The Old Man's vision of World Peace - and of international sales. Control Data had a junior version in place by the mid-Seventies, but in 1962 ...

Also they needed a great deal of financial and legal help once they began. ICT was armed; Bull was armed, and could and would retreat behind the language barrier; Bech and his Danish partners were more at home in Warsaw than Norris and Kamp and Miles were in, say, Ottawa.

Yes, the Minneapolis banks had affiliates in London and in Paris and, unfortunately as it turned out later, in Frankfurt. Yes, American Express and local travel agents could help. But this was Year One for CDC.

But this was a little in the future. Here in lovely Copenhagen, with Tivoli open and Bech being his formidably hospitable self, the world of European computing looked wide open. I flew back to Nice that night delighted with my two expeditions.

Friday morning in Monte-Carlo I aired out my hardly-used studio, deplored the stale coffee beans and the lack of coffee cream, went gaily off to pay two months rent at the real estate agency - and reality intruded. Elizabeth cabled that our much-loved Déodat was in trouble, and needed me.

So where I had been planning a leisurely week writing up my tour report and finding a typist - I had been too busy to find one, in six months - I had to rush down to the travel office and buy a ticket.

And talk about the novices in Minneapolis - my own smallpox vaccination had expired! My expenses record says 23.30 francs. And I had almost nothing for my expectant wife, except what I could pick up quickly at Orly.

COMPUTER LIST FOR CHAPTER 48 (*, new in this chapter)

1604
1401

EDB *
7070
D-21
GIER

49 HOW NOT TO BE A EUROPEAN

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In Chapter 49 you will encounter

(in order of appearance):

Dick Jennison *a pioneer security analyst for European computing, and a gourmet besides*

Peggy Schulder *helped entertain me at Chambord, and helped Dick on his early trips*

Auerbach, Pollak & Richardson *published results for their clients in 1962 hardcover*

An early estimate of foreign computer sales *showed IBM with 65 percent, which seemed likely*

Jim Miles [30](#)

Ed Strickland *he moved CDC into and out of Luzern, and put me in Coventry*

1962 and 1964 CDC Annual Reports *record a successful proliferation in Western Europe*

Bill Norris [20](#)

Tom Kamp [43](#)

Peter Stevens *a key figure for their European entry, he knew nothing about CDC users*

IFIP Munich *first world gathering of the scientific computer user community since 1959 Paris*

ICT [44](#)

ETH [Eidgenossische Technische Hochschule] *in Zurich; the closest thing in Europe to MIT*

Stiefel and Rutishauser *famous Swiss pioneer computer users I had met at the Watson Lab*

Two eager IBM salesmen *a stupid CDC offer led directly to the company's expulsion*

The Luzern Chamber of Commerce *deplored any "distortion of the [Swiss] labor market"*

Frankfurt instead of Munich *even the U.S. consulate thought the location a handicap*

An Alfa Romeo adventure *I abandoned Ranch, bought a scarlet beauty, and left it in Verona*

A place for my family *I tried to move them to a lovely estate south of Salzburg, but alas! no*

An initiative modelled on STRETCH days *consider clustering some Europeans around a 6600?*

Regnesentral *the Norwegian computing center in Lysaker*

Kirsten Nygaard [35](#)

Niels Bech [32](#)

A Shell/Philips get-together *called in the Hague by Rudy Lunbeck, it considered sharing a 3600*

"Non-American management" *a sensible way to get charges down below \$1000 an hour!*

I mixed frequent trips to the vet with drafting my tape report - and getting deliciously reacquainted with Elizabeth. We worked together on ideas about how she and Grace, and our Little Boy, might move to Europe if the "business" flourished. I already had ideas of what I might do for other clients, and indeed

cemented relations during this stay in Manhattan with an interesting security analyst named Richard E. Jennison, who wanted to find out about current and near-future EDP overseas.

He was a senior figure in Auerbach [no relation!], Pollak & Richardson: not yet as I remember a partner, but head of the institutional research department. (The firm still exists, and still uses the brokerage code AUER.) He had an attractive sidekick named Peggy Schulder, and the two of them sampled my wares at delightful and ferociously expensive dinners at Chambord.

Soon Dick signed me up as an information resource. I recycled the impressions I had brought with me from the ITT adventure and had acquired in huge measure on the two CDC tours. He was not then interested in Japan or Australia, but noted that I had experiences there that might be, um, purchasable in a couple of years.

They were very straight with me; did not attempt to winkle out free advice or information as for instance Fletcher Jones had a couple of years back when Computer Sciences was a pup. I was careful not to disclose Control Data plans at that time, although later in the year I was frank about the ungainly tactics of the European advent.

I had been careful to avoid any mention of exclusivity in my two contracts with Minneapolis; whether they didn't think of requiring it - my theory, since they certainly should have restricted my future disclosure of their plans, and did not do so - or simply thought of the information as ephemeral, I never knew. At any rate, I summarized my user-tour experiences and most of the things I had seen on my tour of manufacturers with a clear conscience.

This was made easy by their use of tape recordings rather than requiring hundreds of pages of manuscript. The observations I had made in the Hundred-Page Letter were so mingled with material about CDC prospects that I couldn't give Dick a copy, but I drew on them heavily as I recalled SEL and Regnecentralen, and of course IBM Europe.

The two put out an excellent 35-page hardcover report for their clients, "Outlook for Foreign Electronic Data Processing", dated November 10, 1962. They had made visits themselves by then, and I found new information for my own databank in my copy, but a great deal was based on my observations.

What they had been able to do, because they were security analysts rather than consultants, was to ask IBM and other organizations - probably back in New York - for figures on sales that I would not have dared to request. These figures they incorporated in small tables which were an important part of the early pages of their document.

For instance they gave estimated value for 1962 foreign computer sales by company:

IBM	\$ 650 million
Univac (Sperry Rand)	65
Machines Bull	60
ICT	55
Ferranti	33
Elliott	28
NCR	23
Siemens & Halske	22
Olivetti	20
English Electric	18
Others	26
 TOTAL	 \$1000 million

My feelings when I first saw these tabulations were mixed; on the one hand, they were using what the salesmen and analyst-feeders were tossing them; on the other hand, the numbers looked pretty good - and it was the only game in town! It was also noteworthy that IBM in those days tried not to give dollar

figures except in the annual report, and even there aggregated and massaged wherever they could. A whole industry grew up around the construction of such estimates; numbers of machines sold were compiled from the trade press and press releases, customers helped produce typical cost figures. But that was in the future; men like Jennison and Calhoun (who had written the earlier document SRI had originated) were pioneers of their kind.

I made two trips to Minneapolis in June: the 11th and the 28th. They were excruciating. I saw hardly anything of Norris, and not much of Kamp, who seemed not to have digested my day reports or even to have read the overall one.

Miles introduced me to the new player in the game, uncaringly destroying my hopes of a full-time Control Data job. This was Edward E. Strickland, at the time treasurer of the corporation. He had come to CDC when Norris acquired Cedar Engineering locally as part of a wild expansion which included an exchange of stock in Scientific Computers, Inc. and a joint venture with Holley Carbureter which did not prosper.

Norris was busy finalizing the 1962 Annual Report, which also referred to an affiliation in Australia and the creation of a wholly-owned subsidiary in Canada. Dated August 13 [1962] it referred in one sentence to the European decision which had been taken in July; "Another wholly-owned subsidiary of Control Data has been established in Western Europe and marketing activities will commence in early fall." I had asked him point-blank to use me in all these efforts, and he had turned me down on the first two and disclosed Strickland's existence with reference to the last.

I was paid promptly for my two tours, the last invoice having been submitted on June 16th. The totals were \$10,800 in fees and \$3,953 in expense. But when I tried to get Strickland to involve me in the next stage, which in my presentations was to make a big appearance at IFIP Munich, I found that he and Miles were absorbed in starting a European operation, and did not want to wait and talk to Bech and others first. And on the second visit they told me they had hired a marketing manager, one Peter Stevens, then based near Frankfurt, who had a background in business data processing sales but none at all in scientific and technical matters.

Never figured out to this day how these things were done. I was their consultant. I was the only person in the whole cabal that had any first-hand knowledge of Australia or of Western Europe, and I had a lot of knowledge of Canada and an entree at Toronto, where they were going to base. I was a major figure in the worldwide user community, and in the American one before that. And I genuinely wished them well.

There were of course other players. All five vice presidents knew me: Frank Mullaney, Bill Keye, Hank Forrest, and of course Miles and Cray. And there was the First National Bank of Minneapolis, and Peat Marwick Mitchell, and a big local law firm, who didn't.

It was a small board of directors, with four insiders and three money guys. That shouldn't have been a problem. The biography of Norris by Jim Worthy is hearsay about these times, and mostly repeats Norris' anecdotes. There were stories in DATAMATION and the Wall Street Journal, but they are inconclusive: tend to focus on the Sperry Rand suit, which had been settled in January.

On the second trip I found out that Strickland and Miles were planning to talk to a London bank and make a decision about a Swiss location in July. Neither of them wanted me around, but I succeeded in forcing my way in by a tactic which both men seemed to value: I cut my fee!

I wanted to influence them, and I wanted to steer them around IFIP and introduce them to Bech and others. And I did help, in the end, but not with the short-term matters. In a letter to their general counsel (of Oppenheimer, Hodgson, Brown, Baer and Wolff) I gave an informal review of the deal:

Strickland and I accordingly worked out the following extension of the relationship, which was then rehearsed with Norris (and later with Miles) in lieu of reduction to writing: for the months July through September I was to assist Strickland and Miles in Europe; while they

were doing legal/financial things my daily fee was to be reduced from the usual \$200 to \$100; the minimum fee for the period was to be \$6000; expenses were to be as before (see written agreements). None of this is in dispute, I believe. It was understood that a major part of my task was to be attendance at the international Munich computer meeting and show in early September (this part at full fee). I was to assist in recruiting, introduce them to customers I had previously solicited [without having disclosed the CDC sponsorship, that is], and so on.

I flew to Amsterdam July 9/10 on my last propeller crossing, a KLM DC7-C. Strickland and Miles had settled at the American Hotel in Leidseplein, a very poor choice; I seem to remember Peter Stevens showed up, but was staying somewhere better. I would have put them at the Europe, and my obvious disapproval and their own observations (neither knew anything at all then about European travel) at least got them to switch reservations to top hotels later.

I had wanted them to meet the Shell people on behalf of Surly Seymour, or Loopstra of Electrologica for Tom Kamp, but they spent Monday the 9th at some bank or other, and apparently were told not to come to the Netherlands; in fact, even in 1964 when they had begun a major expansion in Europe, they put only a minor office in Amsterdam. By the time I arrived they were packing up for London, where they had a date in the City with the Toronto & Dominion Bank - not exactly a major factor in Threadneedle Street, but apparently an affiliate of First National. I switched my air travel to join theirs, flying backward [my log says for the first time] on a BE Vanguard. The bank sprang for a very nice luncheon near the Royal Exchange, and I liked the people, but had wistful thoughts about the coming affair at ICT.

I had barely had time to set up a meeting at ICT, but they produced several engineering executives, and Strickland and I were able to extend my rather vague offers of test 606 tape drives, and discuss financial terms. He was unhappy back at the hotel that there had been no money man present; I, that we had not drawn Colonel Davies.

We flew back next morning to Schiphol, on a less-interesting Viscount, and this time had been put up at the Victoria, which wasn't much of an improvement over the American. Stevens had not tried to switch them to his hotel, but spent a long evening with us talking about the Swiss visit. He was not keen on either the Netherlands or Switzerland; wanted them to base in or near Frankfurt.

I kept trying to recall to them that their customers were scientists and engineers, who would like Amsterdam or Geneva, and in Germany would dislike Frankfurt and much prefer Munich. They all three thought I was strange, and it was during the contrasting of the two German cities that I realized neither Strickland nor Stevens had any feeling for technical computing (Miles of course had AEC and university prospects, and had old ERA installations in mind also).

We flew the next morning to Zurich, and settled at the Carlton Elite, which was at the same part of the hotel spectrum as the Dutch hotels, but much better in absolute measure. It is in the heart of downtown, and we did local travel by train, being only two blocks from the main station. But next time the entourage came to Switzerland they went to the Dolder; they were learning!

They met with two young salesmen, currently working at the local IBM office on a bid for a major machine at the ETH [Eidgenössische Technische Hochschule], the MIT-type polytechnic, which was home to Eduard Stiefel and Heinz Rutishauser and would have been my third call in Switzerland in March if Mother's death had not intervened. They were senior figures in the world academic computer community, Stiefel heavily on the numerical analysis side, Rutishauser more into programming. I had met them several times, first at the Watson Lab, and had had Rutishauser in Phoenix when he was on his way to UCLA.

But in this chapter they are in background, although central to the proposal effort. The institution and its computer experts were ripe: they had had Zuse relays, and built some vacuum tube equipment themselves: ERMETH, an offshoot of BESK. Now they needed a 7094, and IBM was preparing to offer a substantial discount. Miles set out to seduce the two youngsters, who were obviously ripe for the

plucking. I was horrified.

After they left I expostulated. "Jim, you just can't do this sort of thing. This isn't California, or Pratt & Whitney. These guys ought to give IBM six months notice, and never be allowed anywhere near any account they have knowledge of through IBM for literally years.

"I realize you can't prosper without hiring some experienced men, and with the languages and the sales experience, but get 'em from Univac or Burroughs; IBM will fry you. And this is the worst country in Europe to distort the Establishment's pay scales. IBM already pays those two forty percent more than scale, and you are dangling a huge increase on top of that.

"Listen, it isn't just the competition that will complain. The customers themselves, the ETHs and the CERNs and the railroad, are going to be outraged if you act like a bunch of American pirates. They don't like that game, and IBM avoids most of it by hiring only nationals - and gains ground against outfits that bring in American managers." You could see the midwestern faces shut down. Stevens, who certainly could verify my story, kept his eyes lowered. I destroyed myself in half an hour.

In the long run it didn't matter. In less than two years the CDC machines began arriving. There were offices in thirteen countries. IBM grew handily, but from a big base; CDC sprang up overnight. It wasn't just anti-IBM sentiment, and it certainly wasn't any smoothing out of Control Data crassness. The facts were that the 1604A was good, the 3600 was very good (although never the success it should have been), and the 6600 was a genuine super. The computers sold themselves, at least in a scientific environment. Seymour Cray really was terrific, surly or no.

Next day we went off to Luzern, where we were met by a young financial man from the Geneva branch of Peat Marwick. He had arranged to introduce us to the head of the Chamber of Commerce, which in most Swiss cantons is governmental rather than non-profit private. He was small, white-haired, with very good English. I was startled to have Ed tell him immediately that Control Data had decided on the advice of its accounting firm and its bank, to establish its European headquarters in Luzern.

When I quietly expressed my amazement to Jim that evening he frowned and said they would have to clear it with Norris. But that hardly registered at the time; I had been shaken by another matter.

The Chamber director was not too surprised; there had clearly been exchanges with Peat Marwick. He set out to welcome us, saying that his office stood ready to help not only in business matters but in personal ones, mentioning schools (there was no international school, nor much expatriate presence). Then he made a few cautionary remarks, notably saying forthrightly that any "distortion of the labor market, and particularly of salaries" [I remember the phrase vividly] would be unwelcome.

We said various polite things; the whole interview lasted well under an hour. As we broke up the director, who understood that I was living in Europe, put his arm in mine and said how pleased he was to have a computer firm come to his city. "My nephew works for IBM in Zurich, and is always telling me how wonderful the machines are."

Oh!!!

Stevens opened a small office and had letterheads printed. I suppose he did bank accounts and such. He hired the two IBMers. They never moved down from Zurich. He never moved down from Frankfurt. The office was closed quietly before the end of 1962; a small sales office was opened in Zurich, and a new headquarters location was announced in DATAMATION: Frankfurt! And even that - the idea of a European head office - had vanished by the time the rather nice 1964 Annual Report came out.

But that was in the future. The next stop for the four of us (the Peat Marwick man having dropped out) was Germany, where I was to observe negotiations for a sales office. I quote from the 1963 summary letter to Counsel:

We were to talk to the embassy in Bonn, then to various consulates and chambers-of-commerce types, before reaching a decision. Instead, they (M&S) were hell-bent for Frankfurt a/M, even though the consulate there said bluntly it was the worst place in the country for them unless they had to come. I pushed very vigorously indeed - even though I was in virtual Coventry - for a Munich location, in view of the number of technical customers there and the far greater ease of recruiting German personnel (technical and office) in that very pleasant area.

The troop went back to Zurich, where this time we all put up luxuriously at the Dolder Grand. I made my last arguments, Stevens disappeared, and Miles flew back to headquarters.

I again said I wanted to go around with Stevens when he could put on his CDC hat, and also kept pushing for a better appearance at IFIP in September, and for the dispatch of tape drive experts before that, but could see that I wasn't registering. I resolved to write Kamp directly and turned back to Monte-Carlo on the 19th, with a heavy heart.

I considered writing also to Norris, asking that they be sure Stevens attended the meetings in Munich, where there would be literally hundreds of his potential customers milling around, but in the end I did not do so. Instead I laid out a written plan for Miles of how I would spend "his" \$200 days before and during IFIP, and adjuring him to make sure Stevens attended - and that he came himself, of course. I knew there was no hope of Norris!

I had a personal mishap during the next days, which even now I connect to my finally saying goodbye to the Simca. I turned my faithful Ranch over to the Forum Garage in Nice on 28 July for 3700 francs [\$704], almost exactly half what I had paid eight months before.

In the next week I drove my scarlet 2600 down to Milan, exulting in how it powered up and down the fifty lacets [hairpin turns] of the col de Tenda. I have faint memories of marvelling at the disarray in the banking side of American Express, which made Nice look good and even AmEx Paris, bearable. It was something to do with the 3700 francs, but I no longer remember what.

I then drove gaily up into Austria, staying one night in Bregenz and two in Salzburg. I was delighted to find a country inn south of the latter, in Hellbrunn, the Maria-Theresien-Schlössl, which would offer a handsome suite for Elizabeth and Grace, welcome Deo - there were house pets as well as a trout stream - and do so very inexpensively on condition that we pack away our belongings and turn the apartment back during the summer weeks of the Festival. The gracious female owner charged ten times our rate for those weeks! Michelin tells me it is still in business: "14 rooms", and they now have television!

Parenthetically, it never happened. I was optimistic about my European venture, although the CDC chapter was not prospering, and Elizabeth was eager to come, but the Cuban crisis, my father's death soon thereafter, and probably most of all the worry-induced decline in Aunt Grace's vigor made it impossible. And when Elizabeth finally visited the Schlössl she found it charming but did not like Salzburg. Ça!!

But about the mishap: I drove back toward the Riviera over the Brenner, and came down into Verona late at night with the intention of pushing on into the morning on the deserted roads and autostrade. I was shouldered off the road by a giant camion and left dazed in a ditch as the beast thundered away. My lovely new Alfa was badly hurt but not destroyed; it needed a great deal of what the Brits then called "panel beating" - poor poor Ivory Lady - and a new front bumper and grill, but the wonderful engine and the tender convertible top were undamaged.

I was picked up by some other truckers and taken in to the city. I called ACI, the AAA of Italy, and they sent out a wrecker; I had only a small suitcase with me and had pulled it out of the trunk as my rescuers watched. I put up at the best hotel, the Due Torri, calculating from my experiences before and since coming to Monte-Carlo that I desperately needed a good concierge. This was a Sunday night, besides: 5/6

August.

Monday was beastly. I had to taxi to the big Alfa Romeo dealership, where ACI had deposited my wounded beauty. Then there was a severe language problem; Verona is not a major tourist center, and the local Alfa owners included few or no English. It was difficult enough that in the end most of the negotiating was done by telephone, with the Due Torri portiere as interpreter.

There were two major items. First, my low-deductible collision insurance was with the Danish subsidiary of a big German firm, and had been written and paid for in Amsterdam. Second, the 2600 had this custom body by Touring, and parts like the bumper and grill and left-side door handle would take months to obtain - and no substitution was possible.

Ohhh!

The sad event did not hurt my Control Data work much, since I could fly to customer sites and of course to IFIP. But it cramped - in fact, destroyed - my Monte-Carlo adventure. I thought seriously of buying back little Ranch!

The details are no longer of interest. Europe is a different place today, and a problem like that would be easier for an expat (and much easier for a tourist) to handle. Suffice it to say that as I travelled up and down Europe by plane and train and taxi, I had a dozen superb concierges telephone Verona to measure progress on the repairs.

And in the end it all came out pretty well, but with elephantine slowness. I had to pay a huge bill in lire - over a thousand dollars - and wait several months for reimbursement. The net cost of the 2600 had been \$3850 (that is, not counting the \$704 from the Simca), and the repairs ultimately cost me only a \$250 deductible and some incidentals. If I could have been in Verona to hand out encouraging 10,000-lire notes things would have gone much faster!

These memories overlay my CDC adventures of the next weeks, the weeks before IFIP Munich. My air logs show I stayed on the road for the rest of August, and returned to Monaco after the big conference only to fly off again to the British Computer Society meeting in Cardiff. I will reserve that story, and turn to my third, short, and rather unhappy Control Data tour.

One of the intersections of Control Data and my past experiences was the 6600/STRETCH metaphor. Just as C-E-I-R could not envisage its own STRETCH - nor could RAND, for that matter - so Shell was not ready for its own big 6600. It had the problems, it had great people and lots of vision. But where Generous Electric had reached out for early 701s and Univacs, and the Livermore types had begged later for huge expensive machines (citing Grosch's Law, *mirabile dictu!*), no European enterprise I could help would plunk down six or seven million hard American dollars for one of Seymour's monsters. One or two nuclear labs, perhaps; a STRETCH was at work in England.

But these shops tended to interact with eager Dunwells and reluctant Crays directly. I was convinced there was room for many more 6600s than that. The customers were straitlaced and CDC was unimaginative. What next? Cooperation!

I put down a short list of the more eager. It ran to Atomenergi in Norway, Shell in the Netherlands, what I called the SCC in Scandinavia, maybe EdF later on. And certainly BASF when Wenke had digested the first German 7094.

Unlike the proposal I worked out on Sunset Boulevard, I envisaged two or three or four European outfits, not competitors like the tin airplane boys I had tried to cluster for Robinson's benefit. I hoped for Amsterdam as a location, remembering good things not only about Shell but about the Dutch infrastructure and the Dutch experience. I wrote out an outline of what I proposed and sent it off to Minneapolis. No response.

I cabled the gist to six locations and got four invitations to come and talk about it. There was just time for a round before IFIP overwhelmed us. I sent Miles an itinerary and urged him to come over in time to check out my progress. No response.

I did Oslo on the 9th and 10th, going first to the Lillestrøm location. I had not only Jan Garwick but his boss Tor Håvie, director of the Atomenergi computer center. My call report, which went to the U.S., estimated 0.3 probability of a sale and said "3600 if discounted, or 1604A":

It turns out these people have already requested a tender from you some weeks ago. They share a DEUCE now and want to step up to a 7094-class machine or better. Other contenders are English Electric KDF9 (leading), 1107, and (if it exists?) Telefunken TR4. ATLAS (and 6600) too expensive. They can get about N Kr 10,000,000 = \$1,400,000 from their supporting agency, the ministry covering scientific and industrial research institutes (like Regnesentral).

I went on at length about a proposal, emphasizing timing and completeness, and concluded by reporting that "local Rem Rand" was "dangling up to 50 % discount on 1107", and how I had implied "you were giving comparable allowances to Am. universities", which was still in the future. The tone of the whole report is minatory, and seen from 1998, ill-advised.

Next day I spent at Lysaker, closer in to the center. The activities of Regnesentral were divided between scientific and administrative directors, the latter being a Mr. Ørjansen. I took Kristen Nygaard to dinner at Blom's that night and afterwards wrote:

... Nygaard has over 30 O.R. people, expects to double again next year. Needs a 1604- or 7090-class machine (double precision nice but not used too often; he calls 3600 double-precision too long - - 84, that is).

I go on to funding sources and amounts, reprising the previous story from Atomenergi.

He has had big trip (his first) to America under Rem Rand auspices ... and as direct result is very sold indeed on 1107 ... Needs or at least wants DP/symbol-processing capabilities, hence 6-bit byte operations very attractive. IBM poor second here, EE KDF9 largely because Garwick insists is running third. ORION possible?

There are some scribbles about 1604 "DP/OR/symbol manip appl" and the usual adjurations to get moving. Not one word in either report even hints at a cooperative 6600, and I don't remember if Garwick or Nygaard were supportive. What they wanted, and what the administrators wanted even more, was a written and timely proposal for one or two standard machines.

I went on to Copenhagen Friday morning.

This time I stayed at the Royal, which is the SAS hotel in the very center of things. I liked it for its cool modernity, its handsome shops, its 20th floor view restaurant, and its legions of SAS stewardesses in and out of uniform. I ate alone that night at 7 Small Homes, looking forward to a session on Saturday with Bech.

Niels was encouraging. The new combine was already looking at a big machine, he said; at least a 7094 or a KDF-9. Or a 1604, he laughed. He thought the Norwegians would be a pain in a cooperative because of their military preoccupation, but he sympathized with my interest. He too thought everything hinged on a lead partner, and that it might well be Shell Laboratories.

Rather to my surprise, he was not forthcoming about the Combine, and I gathered that he and the Danish commercial outfit were having problems. I was a big fan of SAAB, mostly not because of their D-21 but because of their CEO. Bech agreed but said it was hard to get past their fighter plane mind set. He rolled

his eyes when I said that military jet engine contracts had been the life blood of my Evendale fantasia. Not in Sweden, he said rather grimly.

The weather was gorgeous, and the tourist season was at its height. The shops in Strøget all closed Saturday noon anyhow, Europe being Europe, leaving the Americans gazing sadly at the window displays of silver and porcelain and handsome furniture. I laughed to one couple that it was worse in Paris, where the whole town had gone to the mountains and the beaches for a month. They couldn't believe me.

Sunday I took a KLM Electra to Amsterdam - one of the last I ever rode. The jets were overwhelming the older planes, and before their long design lives had barely started. I had thought the DC7-C that flew me to Bora Bora was pretty wonderful, but when I looked out at Peary Land from a long-distance Air France 707 later in that same trip I knew it was doomed.

Free this time from the inexperience of the CDC travel office, I put up at the Apollo. I had an encouraging telephone conversation with Rudy Lunbeck, who said he was setting up a joint Shell-Philips conference in the Hague next day, that I was reserved at the Des Indes "with the Shell discount" that night, the 14th, and that he and his group were going down right away to make sure things were ready. It was the high point of the third task, and I sent a finely-scribbled call report off to Ed Strickland, who had supposedly settled in at the Dolder Grand to get Luzern in train before going off to Munich.

Shell/Philips joint
meeting at Parkhotel, the Hague

prob 0.2 Large 3600 installation
Chairman: Dr. R.J. Lunbeck, Shell Amsterdam

This idea stems from other Shell visits (see report). I proposed a non-profit Dutch corporation managed by committee representing 3-4 shareholders, one year commitment. Corp. would lease and operate installation, sell time to shareholders at cost, pay CDC full rental. But CDC would also be shareholder, with special unique right to resell its 1/3-1/4 share to others, at cost-plus-sales-commission rate. Extra-shift time available first to non-CDC shareholders at cost, then available to CDC for resale; full extra-shift rental paid to CDC; operational economies shared by all partners. Preferably shareholders non-competitors, hence BP and Texaco not approached. Other possibilities SHAPE, State Mines, etc. Philips ultimately will want own-built machine but this is attractive stop-gap. The CDC share is at worst a disguised discount, at best cost-free. Conceivably deal could be such that unused time available Lucerne outfit for training and installation free-time. I emphasized that this was a new idea for CDC and did not have full support of all corporate staff; that this would depend on details. The group rejected a 6600 pitch as too much, too late, and too uncertain; [they] estimated it would take six months to prepare and present proposal to sufficient possible shareholders. Group also insisted shop could not be run by CDC - - must be completely independent with CDC having only 1/3-1/4 vote in management. Especially concerned with scheduling and possibility of remote operation. Location not a problem. Cost estimated at \$1000/hr by me; group felt it could get figure down considerably by non-American management!!

DISCUSS INTERNALLY BEFORE IFIP

It was a friendly group, and there were broad smiles when the remark about non-American management was made. I laughed and said I was interested, and was now domiciled in Monte-Carlo. Sounds great even now.

There was no reply from Strickland, either from Zurich or from Minneapolis. I sent off a handwritten note to Norris, and Miles replied on his behalf, and incidentally gave the arrival times for the Control Data men coming to Munich: juniors early, to set up the exhibit; seniors later. No one of the three evinced the

slightest interest in the Shell/Philips idea.

COMPUTER LIST FOR CHAPTER 49 (*, new in this chapter)

ERMETH *
BESK
7094
1604A
3600
6600
STRETCH
701

UNIVAC I *
KDF9
1107
TR4
ATLAS
1604
7090
ORION
D-21

50 MUNICH CARDIFF AND EINDHOVEN

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In Chapter 50 you will encounter

(in order of appearance):

IFIP62 [International Federation of Information Processing] *DATAMATION sent its new editor Munich "... if Munich is the Paris of Germany, it is not the Paris of Paris!"*

Pan Am Flight 2 *Hong Kong to Los Angeles to New York to London to Munich, and on and on Hal Bergstein he had brought his wife and a camera, and there was a small Thompson booth*

An article about international organizations *I timed it to appear at IFIP62 but it fell flat*

The CDC 606 tape drive [43](#)

A big IBM Deutschland booth *dominated Halle 7 of the Conference Centre and showed a 1401*

Ed Strickland 46 and Jim Miles [30](#)

Niels Bech [32](#)

DATAMATION pictures *the August issue showed many of the figures from these chapters*

A survey of Japan (and India?) *Miles and Grosch were ready, but not the CDC board*

BCS [The British Computer Society] *used to Oxbridge and London, they opted for Cardiff*

Sandy Douglas [26](#)

Dublin *I visited Trinity, but only as a tourist*

The Cuban missile crisis *a fragile family in a Manhattan high-rise: I bought a gun!*

Peter Stevens [49](#)

Bill Norris [20](#)

An ocean liner *I called Bill while he was aboard, but he said to clear everything with Strickland*

Dollars for francs *I changed my travellers' checks into currency not under fire*

Miami *... and then it all blew over!!*

Philips *wanted to enter the field, and was not concerned over the GE debacle*

Professor Unk *just retired from being the bridge between research and the Philips board*

Lopes Cardozo *Unk's successor, he thought my warnings mistaken*

Eindhoven *I would gladly have traded dinner at the Cocagne for healthy doubts about IBM*

IFIP62 was covered moderately well in DATAMATION. It was not as joyful as its Paris progenitor; a smaller

percentage of the American contingent brought their spouses, and if Munich is the Paris of Germany, it is not the Paris of Paris! And the stresses of the U.S. military presence bothered the Europeans and the British, although the Californians hardly noticed.

After eight months on the concierge circuit I was an experienced hand at good reservations. Passing up the hotels recommended by the organizers, I put down at the Bayerischer Hof again, arriving from London on the famous Pan Am 2 --yes, the same one which had introduced me to the Kai Tak landing pattern almost 27 months before. It was full of computer people, groggy from the long transatlantic haul and from the indignities of Heathrow, where I had boarded.

This was Saturday 25 August. There was an elegant late breakfast in the front cabin, and afterwards I toured steerage and found a dozen friends. Hal Bergstein and his wife Jane had come straight through from Los Angeles, and were in poor shape; Hal had just taken over the editor's chair at DATAMATION, and was planning an informal article, with pictures. It appeared in the October issue, and the best of the poor photos shows the DATAMATION booth!

Most of the East Coast contingent were happy with themselves, and one or two sophisticates had come a day or two earlier and stopped off in London to recover their bearings. Ike Auerbach, who was the founding IFIP president, had come still earlier and was already in Munich.

Only a few of the North Americans had seen the article I had contributed to the August issue, "An Intonation On Internationalism". It called for a very different governance of IFIP than had been put in place; the Americans (and the Brits) didn't care, and the Europeans, who cared quite a lot, saw the piece only if they picked up a copy at the Thompson booth. It reads poorly today; stuffy and prissy alternately. Many of the ideas were good in spite of that, but none were adopted then, and it took three decades for my recommendation of biennial rather than triennial meetings to be accepted.

I mentioned in Chapter 40 that I had done a short column in an early issue of the magazine, complaining about the one-country-one-vote council pattern. What I now suggested was the formation of regional federations, which would meet every other year and be primarily technical, and the IFIP overbody which would meet in the interstices and be primarily ceremonial. I argued that the regions would be more evenly balanced in size and financial ability than the individual countries, and mentioned the immediate need for a European region:

It all sounds most complicated and artificial, doesn't it? But look at a few of the immediate benefits:

1. An urgently needed international exchange for European data-processing communities.
2. A channel upward for the NMAA and for user groups in the United States.
3. More frequent but less expensive international assemblies, closer to home.
4. An overlay of the scientific union type of organization, without major dislocation of the current arrangement.

And in the long run, the regional federation would provide:

5. An organization capable of handling hundreds of thousands of individual members from fifty or sixty countries.
6. And doing so with far less disparity of representation than the current one-country-one-vote method.

The Control Data contingent was in trouble. The part I cared mostly for was the provision of a tape drive expert, and that had gone ahead: an engineer named Thorndyke. But the CDC exhibit was built around the 606 that I had been talking about up and down the continent, and it was seriously damaged in shipment - and need I say there were power supply problems too! Meanwhile the huge IBM stand went together

smoothly, ran off fifty-cycle Bavarian electricity, and drew customers and prospects like flies. Moreover, the 1401 they featured had been made in Sindelfingen!

There were by now over 150 1401s installed in Germany alone, and 300 more on order; both figures had doubled since January. One of the booth salesmen (the gorgeous booth birds of AFIPS conferences were sadly lacking) told me in German that IBM had five thousand employees at the factory, and 1700 customer engineers at work. Stevens would need to hustle!

I noted however that in spite of the 7090 and 7094 installations and orders, there was no mention of big machines in the sales talk-talk, and not much literature. I reported this to Strickland and Miles, who arrived on the Monday and seemed preoccupied.

Bech and his team were also having shipping problems, and the Regnecentralen stand was in turmoil. I tried to get Thorndyke and Miles in touch, and succeeded on Wednesday, when the pressure of program changes on Bech slackened.

The social side was a great deal more fun. The Pilotys took some of us to a sumptuous lunch, and introduced me to iced eau de vie de poire as an aperitif. I no longer remember the main course, but ...

Halle 7 of the Congress Centre was underwhelmed by the exhibition, which while substantial for Europe was a tenth the size of the Spring Joint Computer Conference that had been held in San Francisco four months earlier. There were fewer exhibitors, of course, and the stands were rather small - although IBM Deutschland was impressive. And attendance was disappointing; the crowd was an academic one, and wanted to talk ALGOL rather than price-and-delivery, and the technical sessions were being held at the TH rather than at the Centre.

Of the companies I visited on the tape drive tour Bull, Electrológica, Facit, Ferranti, ICT, Olivetti, SEPSEA, SEL, SAAB, Telefunken, Zuse, and of course Siemens had exhibits; of the competitive drive makers Ampex, Compteurs, and Potter were showing.

I hand-lettered a blank CDC badge, saying "Consultant", and hung out at the stand most of the time, thereby missing some important but grindingly dull [I was told] papers at the TH.

I still have the small [110 by 165 mm!] papers list put out by North Holland; the English version runs 96 pages. Few items have stood the test of time and change, and I value it more for the names of the authors and their 1962 affiliations. But here are a few samples:

- J.M. Bennett, University of Sydney *A Breakpoint Technique for Network Problems*
- W.C. Carter, IBM Poughkeepsie *Mathematical Analysis of Merge-Sorting Techniques*
- L.D. Earnest, Mitre Corporation *Machine Recognition of Cursive Writing*
- P. Ercoli and L. Mercurio, INAC Rome *Threshold Logic with One or More Than One Threshold*
- E.A. Feigenbaum, UC Berkeley and H.A. Simon, Carnegie Tech *Generalization of an Elementary Perceiving and Memorizing Machine*
- C.C. Gotlieb, University of Toronto *The Construction of Class-Teacher Time-Tables*
- E. Goto, MIT [!] and H. Takahasi, Tokyo University *Some Theorems Useful in Threshold Logic for Enumerating Boolean Functions*
- H. Gumin and F.K. Kroos, Siemens & Halske *A Very Small Electronic Digital Computer with Stored Program Control*
- H.D. Huskey and W.M. Keese, UC Berkeley *An Algorithm for the Translation of ALGOL*
- M. Nadler, Machines Bull *Analog-Digital Character Recognition System*
- A.G. Oettinger and S. Kuno, Harvard *Multiple-Path Syntactic Analyzer*
- A. Opler et al, Computer Usage Corp. and R. Goldfinger et al, IBM WHQ *Automatic Translation of Programs*

H. Remus, IBM Böblingen *Simulation of a Learning Machine for Playing GO*
H. Rutishauser, ETH Zürich *On a Modification of the Quotient-Difference Algorithm*
A. Svoboda, RIMM Prague *An Algorithm for Division*
S. Takahashi et al, Electrotechnical Lab Tokyo *System Design of the ETL Mk-6 Computer*

There are many more names in the 10 August List of Participants, some of them no-shows: my admired Klaus Wenke, for example. There are 1300 or so, foreshadowing a smaller turn-out than the 4000 predicted in the Spring (Bergstein says 2800, which sounds about right).

There was a fair number of Eastern Europeans; there had been only a few in Paris in 1959 - men like Dorodycin and Turski. This time there was representation from Belgrade and Ljubljana and so on.

Looking at the names as I write, I regret the friends like Ed Berkeley and John Carr and Stan Gill who have died, and take pleasure in those like Gene Amdahl and Heinz Zemanek who still flourish. I thought of recording the attendees who are mentioned in chapters before and after this one, but there were too many - and such long arrays are dull to look at.

I took Hal and Jane to Zur Kanne, and Langefors introduced me to Ewige Lampe. On the TH side, van der Poel offered me the chairmanship of a Tuesday session, which was flattering. Looking at the August DATAMATION coverage today I see pictures of Bech, Billing, Garwick, Langefors, van der Poel, van Wijngaarden and Wilkes (and others not mentioned in these pages). It was a good deal more intimate than a Joint in the States!

On the last day we were together I told Strickland and Miles that I intended to go to the British Computer Society meeting as a way of utilizing the four or five days of my current agreement with them, which expired at the end of September. "Better than just sitting in Monaco and letting it run out," I said. "Fox of Oxford and Douglas of C-E-I-R will be there, having passed up this show, and both of them are potential 1604 or 3600 customers." Since Stevens was tied up with his pre-CDC affairs, and was nervous about using me in view of Strickland's obvious contempt, I thought it unlikely I could do anything else for them in September, and worth the travel expenses.

Miles and Thorndyke told me Norris himself was coming over to see ICT at the end of October, and that pleased me. But when I asked if I could help they shrugged me off. I made a mental note to call Bill in Minneapolis when he was getting ready to come, and closed down that part of the discussion.

Miles then suggested I might do a market investigation in Japan, something like the first European tour, and I jumped at it, especially as he mentioned inquiries from India also - probably Tata, although I no longer remember. Parenthetically, it got up to the board of directors, who said Control Data had enough on its plate already and turned the idea down. Anyhow, I took this as a sign that the fifty visits had been useful, even if Strickland wasn't speaking to me!

Thorndyke took off on his 606 visits, Strickland went down to Zurich, and Miles flew back to Minnesota taking Stevens with him. And I took Swissair Convairs back to Nice.

Before I left Munich I sat down at a travel agency and worked over the ABC, looking as usual for new adventures and cheap fares. Having in mind the British holiday-making flights, I looked at Cardiff and Bristol connections to the south of France and Spain, and sure enough there was a charter-type airline (Derby) I had never heard of, operating a DC-4 into and out of Palma de Mallorca.

The agency was dubious, but said they would send a teletype, and sold me a through ticket relying on the mileage rule that governed in those infinitely simpler times. I did Nice/Barcelona/ Palma on KLM. Heavens knows what the whole routing was: Amsterdam-Lisbon, maybe, or even Casablanca!

Actually the fare was double what it should have been, because the Palma/Bristol leg was at package-tour rates, and by paying a small, ahem, fee in Palma I got most of it back in pesetas.

It was my first touchdown in Spain, and certainly not a typical one. I had all day to look around, as the DC-4 didn't take off with its full load of fully loaded Brits until after midnight. My log says 4h30m, but it was mid-morning before I swaggered off in Cardiff.

My recollection of that particular BCS meeting is hazy - nothing like the sharp memories of Cambridge three years before. I have found no souvenirs in my files, and the BCS publications were pretty much confined to papers lists and such. It was the very first national computer meeting ever held outside the London/Cambridge/Oxford ambiance, and I believe the first centering on a hotel.

I do remember spending most of my time with Sandy Douglas, who knew something about Wales and a great deal about what had happened in C-E-I-R. I now had the time to tell him of some of the strange doings in Control Data; he was amused at the story about the Luzern faux pas and agreed that even if CDC landed the Polytechnic order their name would be mud in German-speaking Switzerland for a long time.

The meeting was only for three days, and on the Thursday [6 September] I boarded my first Air Lingus flight and took off for Dublin. My previous Irish touchdowns had always been in Shannon: this gave me the chance to visit Trinity - as a tourist, since I had no hopes of helping CDC take business there away from IBM or ICT. The Book of Kells was on exhibit, and the beauty of the older buildings was impressive, but the days of technical excitement were decades in the future.

Two nights at Irish hotel prices ran under eight pounds, so I was not exactly breaking the bank! I flew from Dublin direct to Idlewild, still via Air Lingus, and was delighted to find Elizabeth at the exit from Customs. I had to tell her it had been a painful voyage with Norris And Company.

This was a difficult time in the U.S. The Cold War was heating up. I worried about what Elizabeth and Grace and Deo would do if Russian missiles from the reported Cuban emplacements began to hit Manhattan and Washington. This chapter is about Norris and Strickland, not Khrushchev and Castro, but it bears mentioning that I bought a .357 S&W Magnum and gave "the girls" instructions about filling the bathtubs or at least not flushing the toilet tanks.

They were on a high floor, and during elevator strikes I had found carrying a fifteen-pound ancient poodle down and especially up all those stairs quite daunting; Aunt Grace, well over eighty, looked almost impossible. I deeply regretted that she, and Elizabeth and Deo, were not in the little apartment outside Salzburg.

At the very height of the crisis Stevens called me to meet with him in Frankfurt. In the painfully long letter to the Control Data lawyers next spring I wrote:

He asked me to stop off and see him on the 26th to discuss what further I might do with him for CDC, and we reviewed at that time my reports on visits to prospects. He planned then to use me in those countries where CDC would not immediately wish to set up a sales organization, and especially in France and Italy. He further told me that Strickland had set up a meeting with ICT London involving Norris himself, for the end of October. We agreed I might be able to help there, since I was the original contact there (second, 606, mission). I tried that night to call Norris, and finally reached him on his ocean liner (!). He was pleasant if somewhat surprised, but said I must clear the matter with Strickland. I called the latter at his home in Minneapolis; he first said he had "objected to" some of the charges on my last invoice [15 October]; he then went on to agree that I should come to London, at least (there were of course other visits scheduled), at my usual fee and expenses. I called Stevens the next morning and reported this, jubilantly. He then informed me Strickland had just called him and had said inter alia that he had cancelled out the idea - and in a few hours I got a curt and ugly cable confirming the fact.

I flew back to Monte-Carlo in a daze, stopping off in Zurich to cash my two New York letters of credit for

9,012 less-vulnerable Swiss francs and 1243 French ones. I spent the next day paying my bills with the latter in the Principality and getting ready for a long and possibly terminal absence. My world looked about to come apart.

I took a PanAm flight to Miami via Lisbon to assess the crisis close up (it was in its last, crucial, day), bought more ammunition for the Magnum, and arrived back in New York utterly drained. Next day it was all over.

I turned some of my fail-safe European money back into Sutton House currency and settled back to a long series of invoices and complaints and finally, interactions with CDC counsel. It was clear that the relationship was shattered. Indeed, it was many years before Norris and I got together again, and we had both mellowed considerably before that happened. Notably, harsh "Bull" Norris, as I called him in anger, had seen the light - on the Road To Damascus, I claimed - and was by then engaged with social issues and PLATO, the biggest experiment in computer-assisted instruction.

I had been watching the devious interest of the gigantic Philips organization in designing and building and selling computers. I could see with unquestioning clarity that they were about to repeat the General Electric experience. I was sure that even if they would not believe me, or were internally committed to a dubious course of action, they should hear my experiences in GE and my opinions of Watson Junior's IBM. The question was, how to penetrate?

I had two routes. One was through their internal user community; it was very expert, very productive, very aware of the American experience - and very keen. Precisely like the situation in Generous Electric just before the beginnings of the Phoenix imbroglio!

I had tapped into that fairly forcefully with the meeting Rudy Lunbeck had set up. The CDC involvement was now impossible, but the concept of a C-E-I-R-type cooperative remained alive.

But there was a second route. Through the Mathematisch Centrum and Aad van Wijngaarten I had introductions to the research side of Philips, which with the exception of the Bell Labs did the best industrial research in the world, slightly better than GE and a fair way ahead of IBM, which was however moving up very fast under the leadership of the Piore/Williams/Watson Junior team.

This led me to a Professor Unk, who had recently retired as the liaison between the Philips board and the research laboratories. He was impressive but approachable, and the fact that I had been a high-level insider in the IBM development and research enterprises was not lost on him, although like the senior figures in Murray Hill he did not fully approve of the computing explosion.

We met once in New York, where he was involved as a "consultant" to North American Philips. I found myself unwelcome there, not because of the computer connection (which they valued more than the parent company), but because I had come in from the top instead of as a grateful suppliant from below. Didn't matter a bit to Unk, who was terrific.

After we met a second time, in Europe but not at his Isys consultancy, which I never visited, he passed me on to his successor, a vigorous man in his fifties with five or six languages. His name was Lopes Cardozo, and he put me up at a new hotel in Eindhoven which catered almost entirely to Philips and its visitors. It was called the Cocagne, a lovely and unusual name.

I was sure this was my only chance, so I put caution aside and said bluntly that "even Philips" would have a tough tough time against IBM, and even in northern Europe. He was not incensed, but not happy with me either. "We are known around the world for our research, our engineering, our manufacturing, the variety and reliability of our products. And as you say we are large and expert users of IBM and competitive equipment ..."

Perhaps incautiously I broke in to remind him that all these good things, which I agreed were important,

were true of my old employer General Electric also. "What GE lacked, and did not realize it lacked, and still lacks six years after its entry into the computer business, is the special and world-renowned marketing skills IBM has developed under the Watsons", I said.

He brushed it aside. "All Philips needs is to develop those sales skills (he never referred to the product planning, the sales intelligence, the customer engineering [maintenance] components)," he said. We never got anywhere near the question of whether I could help either in developing the skills or in figuring how to distribute them; he was after all primarily a research-oriented executive. I suggested mildly that the North American subsidiary was concerned about IBM - which was an exaggeration: the American executives I had met were, the Dutch were not. We parted after a lovely dinner, and I found out next morning he was paying the hotel bill. Nice!

After all these years I still have the official letter he sent me. It was definite:

... I have come to the conclusion that we will not follow up your proposal.

Neither will it be of interest to have unsolicited [sic] consultation for the first two years in the area we discussed.

I have advised Messrs. Unk and Vernes [top Dutch executive at NAPHilips] accordingly so that we do not spend our time in vain.

With kind regards,

Yours sincerely,

N.V. PHILIPS' GLOEILAMPENFABRIEKEN,

M. Lopes Cardozo

Three strikes and out!

The story of the tentative entry of the great company into the computer business in the mid-Sixties, and its ignominious departure, is still well known in Europe, and was exploited by IBM World Trade much more strongly than Galactic Headquarters had dared to exploit the GE and RCA failures. DATAMATION covered it fitfully in years when I was no longer a contributing editor, and I had no personal experience with it. But after my stay at the Cocagne I knew exactly what would happen.

COMPUTER LIST FOR CHAPTER 50 (*, new in this chapter)

1401
MK-6 *

CUMULATIVE LIST OF MACHINES

1010
1100 [all machines mentioned are included, even IBM ones]
1101 [AEI] [collating order of the list: blank, number, letter]
1101 [ERA]
1107 Chapters 31 through 50
1108
1301
1401
1500
1604
1604A
160A
1620

2002
2400

300
301
3600

501
502

6001
601
610
650
6600

7003
701
704
705III
705
7070
7074
7080
709
7090
7094

803

9002
9003

ALWAC IIIIE
ASC
ATLAS

B5000
BESK
BIZMAC

CAB3900
CAB500
COLOSSUS
CPC

D-2
D-21
DASK
DEUCE

EDB
EDSAC
ER56
ERMA
ERMETH
ET

G1
G2
G3
GAMMA3
GAMMA60
GIER

KA21
KDF9

KDP10
LEO III
LEO IV
MARK 1*
MERCURY
MK-6
ORION
P101
PEGASUS
PERM
Pilot Model ACE
RAMAC
RC4000
S2000
SAGE
SARA
SEAC
SIRIUS
SS90
STRETCH
SWAC
TR4
UNIVAC I
WEGEMATIC
X 1
Z11
Z22
Z23
Z31
ZEBRA

51 A TIME OF TROUBLES

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In Chapter 51 you will encounter

(in order of appearance):

Aunt Grace [19](#)

Déodat [15](#)

Father's death *he had smoked since boyhood - and now, cancer*

Frieda Johnson *she had hoped for a long drive with him, and was left with only the Plymouth*

RemRand Europe *they were opening a headquarters in Lausanne, and focussing on computers*

A settlement with CDC *the lawyers finished what had started so well and ended so sadly*

The Bec Rouge [restaurant] *my longest and best Michelin-level haven*

The end of the first overseas venture *it was time to turn homeward and help Elizabeth*

The summer of 1963 *time hung heavily as we waited and remembered*

Farewell to Manhattan *Death drove us away from Elizabeth's favorite city*

Scandinavian again *to London via Prestwick, and then Air France to Nice*

Another estate wagon *this time a black rented Opel, but with a companion*

The period at the end of the Control Data relationship was a painful one. I was sure the fumbling incursions from Minneapolis would mature into a rewarding presence in a dozen countries, and that the contacts I had made on both swings would be helpful - starting with the ones at CERN and with Bech at Regnecentralen. But I was to have no further part in that exciting expansion.

I had been unable to get past Vin Learson and share in the IBM space successes. Now I was unable to get past Ed Strickland and share in the CDC European advent.

And I was having trouble focussing on computers and even on my own future in the trade. My family affairs were painful, painful - and drew me back across the Atlantic. When I had descended on Sutton House for Christmas I found Aunt Grace desperately ill, with a nurse helping Elizabeth in what was clearly a last illness. She was 83; her body was giving up; only her desire not to leave her beloved niece and her much-loved Déodat kept her alive.

I was aware that "the little boy", as we all three called him, was also ready to go. He had been blind for two years, but still pleased with his daily walks and his professional grooming; he had enjoyed Manhattan more than Grace! But now his coat was thinning, his gait was slowing, his kidneys were giving up the ten-year battle with hardpad. We had a good vet, and close by, so that on bad days I could carry him over for shots or dental work. Elizabeth and I had agreed long ago that when life became a burden to the wonderful little guy we would do him the final favor, but for the moment we wanted him to go on for Grace's sake.

And right after Christmas day Dad's best friends out in the Detroit area called to say that he was in serious trouble. When he had been with us in New York he had been having difficulty swallowing; I had told him it was a natural reaction to Mother's unexpected death, and that he would feel better when he got home and relaxed. But Elizabeth and I both thought it was more than emotional, and debated whether to urge him to see a Manhattan doctor.

Now it was clearly cancer of the throat, and he was about to be hospitalized. I rushed out on the 28th, telling him I had business at Burroughs and Chrysler "in a few days" (which indeed I managed to put together, telling Ray Macdonald the Burroughs president about my European adventures as a presumed explorer of B5000 possibilities).

His dear friend Frieda Johnson was terribly upset, telling him and me and the other people who cared that they had planned a long cross-country drive together in the Spring. It was obvious he found my presence irritating and my cautious remarks about Grace's illness depressing. I went away.

I came back on the 9th of January and saw him into hospital on the 12th. He began a beastly regimen of nitrogen mustard, which indeed controlled the growth of the now-obvious tumor but was rackingly painful. I stayed with him, tried to distract him with homely stuff - no European and very few British stories. Grace and Deo were battling on, back in Sutton House.

On February 2nd the doctor began to explore the family situation. I was the only child, I said, and Mother had died the year before. There were no other relatives. He had made no will, and I was responsible for his medical bills. Quietly I was asked what to do: continue the treatment under increasingly heavy sedation? I did not bother Elizabeth, or ask Frieda what she wanted. Stop the mustard, I said.

The hospital called at five in the morning of the 13th. I sat quietly by his bedside and listened to the labored breathing. The nurses left us alone. And while I sat there, he died. He was 75.

He was still handsome. He had smoked heavily for sixty years.

Dorothy and I had called on George Dondero when he represented the Royal Oak area of Michigan in Congress while we were amateurishly lobbying for the Federation of Atomic Scientists back in 1946, relying on the fact that Frieda Johnson was his housekeeper. Now 17 years later I asked him to take the small estate through probate, have the little house Dad had finished with his own hands a decade back sold, the title to the small Plymouth sedan transferred - the closing down of a quiet life. Bert Grosch, as he had always been called, was a good husband, a good father, and a very expert cabinetmaker.

He was buried next to Mother on the 15th. I asked his many friends to help Frieda empty the little house on Ten Mile Road, reserving for myself only my mother's family souvenirs and the seven violins he had made. Just now, 35 years later, I used letters I wrote them from places like Bad Hersfeld to reawaken memories.

When the title had cleared I signed the Plymouth over to Frieda, suggesting that she go on that long trip she had planned with my father. Take a friend, I said, and remember how much Dad would have enjoyed being with you.

Back in Manhattan things were getting worse. I had appointments to keep in the Netherlands, notably the meeting at the Cocagne on February 27th. After that disappointment I went back to Monaco and tried to straighten out my suspended affairs, but letters from Elizabeth made it hard to concentrate. It didn't help that I was missing her March 6 birthday.

My attempts to generate new major consultancies were not going well. I was corresponding with Burroughs and Remington Rand about helping their European businesses. The latter possibility led me to drive up to Lausanne in my now-repaired scarlet Alfa convertible to see the temporary management which had opened a UNIVAC-oriented office in Jordils, a building on the upper edge of the lake port Ouchy. Clearly there could be small assignments, at about the level of the stuff I had worked up for Dick Jennison, but the bank account back in Manhattan needed more than that.

Parenthetically, while these minor efforts were under way, I was coming close to settling with Control Data. The Minneapolis lawyers had their problems with Strickland, who was often in Switzerland or Germany when they needed to talk to him. In the end, more in exasperation than from conviction, they got CDC to send me a check for \$2298 and I wrote off the rest. It arrived at Sutton House on May 20th, nineteen months after my first cable from Jim Miles.

It was costing a good deal to live at the Résidence Auteuil and eat at the wonderful Bec Rouge. I had been to the Monaco Grand Prix [March 26] and seen Rainier and Princess Grace. I had driven down to Milan for the Congress on Man and Technology in the Space Age, wearing my tattered Rocket Society presidency and having a great lunch with Arthur Clarke. It was time to shut up shop and go help Elizabeth.

I sold the gorgeous Alfa 2600 in Nice. I got my apartment deposit back. I had one last dinner at the Bec Rouge. I packed my papers and the coffee mill and the linens I had acquired so gaily that first January [1962], and found a warehouse. And on May 2nd I set out on the last trip of my first, my solo, European venture, by serious Swissair instead of frivolous Air France.

I had filled six pages of my air log: over 90 flights. I had bought and driven and sold two cars, eaten in magnificent restaurants, stayed in wonderful hotels. More important, I now had a mental data base of how technical computing was going in Europe that only the unique pairing of actual residence and ongoing U.S. connections could afford. And I had new friends.

But financially I had barely broken even. All my Control Data fees totalled under \$20,000. I was no closer to a firm relationship than when I arrived in Monte-Carlo. And Dad and Mother were dead, and Grace and Deo were dying.

Elizabeth and I talked quietly about New York. She had had little pleasure from it while I was gone, and we both guessed the apartment, which she loved so much, would be dreadful after Grace left it. I wanted to

go back to Europe, although we both could see it was risky business. Elizabeth had delighted in my stories, and fitted herself mentally into the new frame. She agreed the Salzburg gambit that I had regretfully shut down was worth exploring again.

I walked our blind little boy through the hot summer and early fall, using a stiff short leash intended for a big dog to steer him around the apartment-house stanchions and the fire plugs. He revived a little with my attentions, and Elizabeth and I occasionally could slip away to our favorite Chinese restaurant. And with me to Grace-sit she was able to shop or enjoy Fifth Avenue, which she had not been able to do after the nurse of the previous Spring had left.

I went to local ACM meetings, tried to write about my travels for DATAMATION, revived a few IBM and GE friendships that I had let slide. But mostly, I waited.

Grace died peacefully in the last days of winter. She had been more than a mother to my dear wife, and had shared almost every day with her for more than forty years; it was a crushing separation. We got the little blue Chevrolet sedan out of the Sutton House garage, bundled up feeble old Deo against the stresses of a long and bitter drive, and put the simple coffin into the ground in Napoleon, Ohio - the Yeager family plot. Deo stood at attention on his short lead as the last phrases were read, the last goodbyes said. Already he missed her.

But not for long. Depressed by our depression, weakened by every walk down on First Avenue, he sank rapidly. In early March we fulfilled our last duty to him: held him as the vet gave the last injection, bundled him in his familiar blanket, and went in a big Manhattan cab out to the crematory. It was by a considerable margin the worst day of my life.

I no longer remember how the lease arrangements at Douglas Elliman were handled. At a guess I think we may have made a month-to-month extension instead of a sixth calendar-year lease, since Grace's death was obviously imminent. I remember vividly, however, personally wrapping and packing and reinforcing the grandfather clock before the regular movers came, so that Elizabeth could bear to see it go into storage - and the fountains of tears when as they emptied the apartment we saw the band of black marks around the baseboards where our blind poodle had rubbed his hardpad-damaged nose as he found his way about.

We were destroyed. Yes, the new life beckoned. Yes, I had turned the prized Ohio Chevrolet in and promised my wife a beautiful new Porsche which we would pick up at the factory in May. But there was little laughter; we were free to eat out every night now, and cruise the elegancies of midtown, but we didn't.

On April 1st, a bitter joke, we took an excessive number of suitcases and two mink stoles off to Idlewild. It speaks to my frame of mind that there is a year-long gap in my air logs; since my passport says Prestwick I would guess we flew SAS, but not in the honeymoon exuberance of 1957. I don't remember a train journey, so I suppose we transhipped to Heathrow. I do remember the Savoy!

London aroused Elizabeth from the worst of her sadnesses. I was busy checking plans; as part of the purchase of the Porsche there was to be a rental station wagon ready for us at the Côte d'Azur airport, and we had packed so as to forward most of the baggage on ahead. It would be a fatal mistake today, and was courting disaster even in 1964. I cabled to Monaco to have my trunk and boxes disinterred and ready for pickup. I fiddled with the London Porsche people, who were stuffy about the suggestion of possible problems.

I think we did not try to see any of my British friends, who in fact had not yet learned of our arrival, or of our bereavements. I would normally have wanted to trot out Boz Ferranti for my beautiful wife, but these were not the days. We did not go to the theater, which speaks volumes about Elizabeth's depression. Bookstores, Fortnums, and a lot of walking: we were decompressing in spite of ourselves.

On the 10th we arrived at the Nice airport. Yes, a scruffy German courier had a car for us; yes, it was as ordered; yes, for sure, there were lots of papers. And when we drove around to air freight, *mirabile dictu*, there was our unaccompanied baggage!! In the best spirits we had been in in two months, we sailed off to Monte-Carlo, the Hôtel de Paris (one night) and my Bec Rouge.

Elizabeth looked gorgeous in Grace's platinum mink stole, and delightfully high heels. Roger the Bec Rouge owner was suitably impressed, and so were several other customers. I showed my reviving bride the corner table I had occupied dozens of times, which Roger had held for me the night before the Grand Prix while a horde of eager race buffs lined up outside.

Next morning we recovered my belongings, which added to what we had brought from New York pretty well filled the Opel mid-sized wagon. It would never have fitted in Ranch! And we set out for Salzburg.

52 IBM STUNS THE USERS

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In Chapter 52 you will encounter
(in order of appearance):

Elizabeth [19](#)

A disappointment in Salzburg *even the Hellbrunn countryside did not suit my distraught wife*

Gordon Smith *a fantastic salesman, he was the key figure for RemRand computers in Europe*

de la Paix [hotel] *we were to stay six weeks, and then frequent its cafe for our stay in Lausanne*

Ouchy *the port of Lausanne on what non-Genevans called Lake Lemán*

Jordils *a combined office and apartment which housed Sperry Rand International headquarters*

Pier Abetti *a much-admired engineer friend whom I had met in General Electric Pittsfield*

John Jackson *titular head of Sperry operations in EMEA [Europe, the Middle East, and Africa]*

An integrated 705 system *what Pier and Stan Williams had built for GE's Power Transformer*

The famous IBM 360 announcement *turned the world computer user community upside down*

A thousand pages *Gordon had collected most of the technical announcement publications*

Hans Flesch *still a good friend, he was Gordon's answer to IBM's Future Demands department*

Don Dowd *then and for decades to come, Gordon's aide-de-camp and most valued associate*

Spreading word about the 360 *DATAMATION and lesser media, and my mail, revealed turmoil*

"Betting the company" *instant IBM folklore, universally believed even today - and false*

New hardware and rumored software *based on funny ceramic wafers made in a new factory*

NPL *a language to replace FORTRAN and COBOL - if it ever settled down to being PL/1*

Super- and Hypertapes [43](#)

Bob Forest *the greatest of the DATAMATION editors, he wanted my assessment of the 360*

Elizabeth did not want to try driving, although even back in 1964 her New York license would have been sufficient to operate a rental car anywhere in Western Europe. I had been carrying an international license since November 1961, and in fact had renewed it during the dreary wait in Sutton House, but I don't believe she ever bothered to get one. I had thought to distract her from our slowly lightening depression, but in fact the scenery of northern Italy and the freshness of the adventure did very well.

We went along via Menton and the coast route and up over the same pass where I had raced her train on our honeymoon, and probably stayed at my usual Continentale in Milan. It is a mark of the troubles of the last chapter that where the pleasures of 1957 - the hotels, the wonderful restaurants, the trip to Capri - are still fresh in my mind today, I recall almost nothing of April 1964.

I must have shown her where the big Alfa was wrecked below the Brenner, and the Hospiz of my first St. Silvester. She had read my letters and seen my slides and listened, with Grace and Deo, to hours of my

stories. But neither my memory nor my records confirm it. Certainly we took our time: I had no engagements; we had no address - mail would be forwarded from the Sutton House mail room when we achieved one. Everything that was not warehoused in upper Manhattan was right there in the black station wagon. I must have cabled ahead to the Schössl - or did we stay in town at the Goldener Hirsch? Blanked out!

But I remember my disappointment at Elizabeth's reaction. She thought Salzburg "medieval", disliked the narrow streets and the overhanging upper stories, and did not find the lovely open views down toward Hellbrunn enough compensation. And she did not like the language; the harshness of Hamburg might have been a little more acceptable, but the local Austrian version bothered her dramatics-tuned ear.

I saw regretfully that my investigations of how to live cheaply and unobtrusively in that area, my questions about taxes and telephones and dog tags and the fremdenpolizei that I had asked when I planned to bring the whole family over, had been wasted. I had worn out my welcome in Monaco, and to live as Elizabeth would want in that golden clime did not look economically feasible. I thought about Vienna, which to a New York City lover like my sophisticated wife ought to have looked pretty good, but for reasons lost to me now we discarded the idea: language, perhaps.

We talked as we turned west again about London. It had been ruled out earlier by the ridiculous animal quarantine, just as it was to be ruled out in the early Eighties when I returned to Europe yet again. But we no longer had a poodle [sob!!]. Elizabeth loved the city, loved the theater, loved and had taught the language. And of course my connections were manifold, and fresh, and probably could be developed rapidly. I could see operating out of Ferranti's City offices, or trying to get in on the other side of the probable ICT/CDC relationship. On Park Lane!

But I also remembered that the RemRand activity in Lausanne was in its formative stage, and that my good friend Gordon Smith had been reported in a recent DATAMATION to be headed in that direction. So I suggested to my seatmate that we go all the way to the Romande [French Switzerland] instead of turning north toward Basel, and she thought it a fine idea.

I had been put up at the Beau Rivage on my 1963 visit: a magnificent but extremely expensive venue. The locum tenens, Luther Harr, had picked up the tab, and since Jordils was just three blocks up the hill probably had a substantial account going. We were paying our own way this time, and after brooding over Swiss guidebooks [Michelin was decades from putting out a Red Guide] I chose the Hôtel de la Paix in the heart of town, which was fairly cheap and adjacent to underground parking. We intended to stay only a day or two, and were worried about our belongings packed densely in the wagon - even in Switzerland.

I had not telephoned from Austria, but when we crossed into der Schweiz I called ahead and found that Gordon had indeed arrived from the U.S. and was in full bloom, was out of town that day but could see me when he returned. So after we settled into our not-too-luxurious quarters I arranged a date next morning. It was early Spring, and Lausanne and the lake - Lake Lemán, since we were beyond the reach of the Genevans - was getting ready. Crocuses would have been finished, tulips at their height.

I was amused to find that the ultra-short funicular that descended from the heart of Lausanne through the busy mainline rail station to the Evian ferry wharf on the lake had a stop named Jordils. I found the building bustling with RemRand activity (there were apartments above, which I never entered). This was partly due to the increase in staff and partly to the ongoing installation of a service bureau/demonstration site on the ground floor - a minor SS card-oriented system.

The first surprise when I climbed to the first [U.S. "second"] floor reception area was that I was greeted by my old friend Pier Abetti of GE Pittsfield days. Pier it soon turned out had been hired away by the Univackers to second Gordon, who in turn was theoretically next-in-European-command to John Jackson. John was also an ex-IBMer, and like Gordon and most other Golden Boys (tall, handsome, great salesmen, and close to Tom Watson Junior) had only English; Pier not only was a genuinely distinguished engineering

computer user but could sputter as intelligibly in French and Italian as in English, and had a good fund of German, and could fake Spanish.

It was a wonderful conjunction, and should have really put a thumb in the eye of World Trade Europe. It did not, in the end, partly because of the enormous IBM initiative worldwide which was firing up, partly because the guys back in Blue Bell were third-raters, and partly because in spite of his electrical engineering and computer user skills Pier was very very far from a Golden-Boy smoothie. I was too, of course, but in an orthogonal direction - and Gordon already knew and liked me.

About Pittsfield: back in my Evendale apogee one of my other-GE-division clients was Power Transformer, which in western Massachusetts a little remote from the unions designed and built huge custom transformers almost as big as the turbines and generators Hans Kraft spent his career improving; boxcar size, and bigger.

Their key computer pioneers were Pier, whom I had immediately realized was the son of the great solar astronomer Giorgio Abetti of the Arcetri observatory near Florence, and his sidekick Stan Williams. Pier had come to GE because of his research interest in lightning damage or threats of damage to transformers and switchgear; he ran an expensive laboratory which reminded me of all the Evendale component test stands and flame tunnels. But by the time he became a customer of my 701 and 704s he had embarked on a remarkably ambitious and still little-known experiment in what later came to be called integrated systems, rivalling and more immediately successful than Allen Keller's steam power plant expert systems.

He and Stan soon got a 705, a choice strange to me even today but probably dictated by conservative Pittsfield [finance?] management. On it they built a software system which put together some - in fact, most - of the design philosophy of the department, fully automated the onerous drafting process, put out manufacturing shop orders, and even sent out invoices and printed shipping notices!

Turned out that as in the tin airplane business you spent more time on paperwork (engineering design, manufacturing schedules, and financial tracking) than in cutting metal. This really pioneering achievement, more encompassing as it neared completion at the end of the Fifties than the larger efforts at Lockheed and Convair, was never described in the management or electrical literature, and is referred to only scantily in the minor computer journals, even DATAMATION except in my side remarks there.

This was because GE division and group management wanted to retain a competitive edge for the department, and it worked, for a year or two. But the lack of professional recognition drove a terrific man, almost of Steinmetz or Langmuir stature, out of the company: a bad deal. I was reminded later of the way BASF lost out when they mismanaged Klaus Wenke.

Digging up the story would be a fine computer- or EE-history project.

Back to Ouchy: Pier whisked me in to see Gordon, babbling his story at top speed the while. After a warm embrace and a recap of my previous short visit, Gordon fixed me with a penetrating stare. "Do you know about the 360 announcement, Herb?" he asked. Only what I see in the Herald Tribune, I replied.

Yes, it was that week. IBM, the Grim Gray Giant of my DATAMATION stories, had kicked the software stool out from under every 700/7000 user worldwide, and left them to dangle. It is an amazing story, somewhat misunderstood by the historians even today. I protested in my popular review of the Watson Junior autobiography years later, but it has had little effect so far:

Tom and his henchmen were afraid of General Electric in 1956, of RCA in 1965, of the Washington antitrust pygmies, of European rivals. The long story about the "necessity" to develop, announce, sell, manufacture, install and service the 360 is engrossing - and completely misleading.

Certainly Tom Junior and Vin Learson and Dick Watson all believed they were being overtaken

by the competition, and had to make an enormous investment - "bet the company", goggle-eyed journalists wrote - to stay in front. And, as we all know, they made that investment.

But I was consulting for Univac Europe at the time, and could see only too clearly that neither Univac nor any other of the Seven Dwarfs, nor all seven collectively, could pick up any major share of the IBM customer base if the 360 fell on its face. They didn't have the sales forces, the manufacturing capacities, or the service organizations. If the competition increased its share of the world market by fifty percent - an unimaginable accomplishment - IBM's share would have dropped from 70 to 55 percent!

Gordon had already installed a handsome desk in the rather puny Jordils office. He spun around to the matching credenza and heaved over to me a foot-thick stack of red folders: at least twenty, some of them an inch thick. "This is what I've been able to get so far," he growled.

Typically, he had had salesmen fan out over the whole of Europe and secure photocopies of the IBM technical announcement material. He hadn't waited, as Harr or Jackson would have done, for the U.S. marketing people to collect a set and send it in the equivalent of a diplomatic pouch - not Gordon!! I fumbled at the top folder, my eyes bugging out: 168 pages entitled "Principles of Operation [S360-01]", labeled A22-6821-0, the first edition! Beneath it was an introductory folder of only 44 pages, "System Summary" labeled C28-6510-0, apparently the twentieth item in the series.

Gordon's team had snaffled 27 items and a price list, out of what later analysis showed to have been something like 36. They also had copied one-page "configurators" for five of the six announced systems, and for I/O and communications gear. I expressed my amazement and approval.

"Herb, what am I going to do with this stack?" he snarled. "It will be months before the gang in Philadelphia sends competitive analyses out, let alone to us over here. And I have announcements coming up ..." The 1108, I asked, making him all the more unhappy, since it was supposed to be a deep secret - as the 360 had truly been.

Soon we were at grips. I knew almost nothing of his direction and the terms of his vice-presidency; he knew only what the trade gossip had carried about my Control Data adventures, and nothing of the family agonies. But we were both madly anxious to find out what IBM intended. And, as I said happily to Elizabeth back at the hotel, "he has money!"

We agreed I would plow through the thousand pages of technical stuff, come up not only with serious comparisons with existing and unannounced UNIVAC models but with pointed sales arguments for the continent-wide sales force, and offer advice to him personally.

Sperry Rand International Corporation would pick up six weeks of living expenses at the de la Paix level, including the portion due to Elizabeth, but no travel or car expenses (I had sort of hoped to cover my trip to pick up the Porsche in Sindelfingen, which would come toward the end of the period). And a healthy fee, without the kind of wrangling Strickland and even Norris felt compelled to do. On a handshake basis: I trusted Big Gordon implicitly.

I settled in to the very challenging job with a will. Elizabeth had the use of the Opel, which we had unloaded into the hotel except for my trunk of heavy books and papers. With it she cruised the area, already convinced we should stay in Lausanne.

She was befriended by Pier's New Englander wife Betty - yes, Betty Abetti - whose poetry writing and bilingualism she much admired. They lived further out along the lake with their kids and hobbies [but no pets, as I remember; we thought it strange]. We had pasta feasts there, and took the family in turn to lakeside restaurants which tended at the lower price levels to feature tiny fillets of lake perch with competitive home-made tartar sauces. And carafes of white wine.

Now I come to a sticking point: how much to write about the announcement material? I gave above the labels of two key pieces of the thirty, and this would be sufficient to follow if any historian cares to do so.

I still have the raw handwritten work sheets from which I did my summary, and could extract scores of pages that would bore readers silly. I found not only hen-scratch calculation (no TI hand calculators for another ten years, and not one Marchant or Friden in the whole building!) but detailed comparisons of hypothetical machines with parallel 1107 equipment - that is, assortments of 360 componentry I myself might have ordered for one of my GE shops, or for C-E-I-R. And in comparisons of both speed and money, much to Gordon's relief [and my 1999 amusement] the 1107s didn't come off too badly.

But the major RemRand systems couldn't be squeezed down to a 360/30 or even a 360/40, nor could a really big set-up compare with the IBM claims for a 360/70. The heralded breadth of the announced spectrum was impressive.

Instead of flogging two long-lost competitive horses, I give verbatim [including solecisms I regret today] the notes for my talk for senior Lausanne staff, from Jackson and Smith and Abetti down to visitors from the Swiss and German sales staff. (I will describe the people involved later.)

Too much compatibility

Too great a puzzle for unsoph. customers

Cost/power curve non-Groschian, hence less reason to go upward

Main memory actually no larger than before

Byte business a clever disguise for wasteful uses of storage (except tape)

Tapes now incompatible with evvy'body! On purpose?

Data cell almost certain to give horrible troubles. A madman's answer to CRAM!

1401 [emulation] package very limited

upper end not most powerful machine ever built. STRETCH, HARVEST, 6600, probably ATLAS & TITAN

lower end expensive (\$3800/mo min plus 15%?) compared to \$2600 for 1050

Horrible list of word sizes (16)

Clearly either [sic; meant "neither"] a 32-bit or 64-bit machine (large end)

Many of these "features" developed elsewhere earlier

- Multiprogramming (Bull, Honeywell)

- Nine-channel tape (Univac)

- Data strips (NCR)

- Solid logic (North American & other military suppliers)

- Fixed memory locations (Univac and others)

- Multisystem (CDC)

- Vocal response (Informatics)

- Read backward (Univac)

- Fast paper tape (Electrologica)

Greater reliability not possible (ie 100% with transistors, or close enough)

More compactness unnecessary (I/O gear dominates now), and besides where is it; machine photographs don't show

Universality costly - even in microprogrammed machine the facility costs something (if not why charge extra for 1401 package use)

Also no customer will escalate from bottom to top in life of machine family (3-6 years)

Could maintain same code, but in that case why not do so this time [sic; but this was nonsense: 7000 code was fantastically diverse]

Specialized binary registers sound like superlative index registers - but there are only 16, and they are used for much besides. Should be many more, at big end.

For powerful upper-end machines, limit of six channels appears somewhat low (well below power of ten 6600 peripheral processors, for instance)

Many traces of "engineer" decisions 8/32/64 a case in point 6/48 probably preferable to users

Fantastic list of speeds for I/O gear (only two of eight major data rates agree - disks @156K)

Lack of multiplexor channel on 60-62-70 machines implies use of a "buffer" 30 if large numbers of slow devices are to work into a 70

Note extremely messy use of 1442 reader-punch which deals with lower six bits of a byte. There is some question whether a full twelve-hole image can actually be used any more in the old 700-7000 series sense

2030 options actually increase bareboat price toward \$4000/mo dec arith 25, console 135, timer 50, storage protection 150, floating point 50, direct control 100 in about that order (Basic machine 3680)

Vaunted 1401/1440/1460 package considerably extra - from \$300 - \$1000/mo

The huge core is wonderful, but will run 40% of the cost of an installation. Costs a thousand times as much as cell storage, two hundred times hypertape, two hundred times disk, eighty times disk pack, five times 2301 drum (per byte)

Taking the square root of the average access time, the maximum capacity and the cost incl control (shared), the large memories are:

2361 2.4 times as good as 2362 main core

1302 disk 3.5 times as good

2321 cell 9.6 times as good at the upper end

The people who were to select sales arguments from this farrago were Gordon himself, a market research chap named Kent Ellsworth who later left computing and became a tennis pro (!!), and the local equivalent of the IBM World Trade Future Demands Department (reputedly a dozen strong in Paris alone), one Hans Fleisch. Jackson couldn't or at least wouldn't, and Abetti was too wrapped up in the technical details in the thousand pages, and especially in the material on the operating system, disclosed in stupefying and already obsolete detail in 30 pages on control programs, 86 pages of Assembler, 95 pages of COBOL, and on and on and on. (FORTRAN was an embarrassment, and was called Special Support.)

I tried to discourage him, since my DATAMATION reading and ACM correspondents all spoke of NPL, New

Programming Language [later of course PL/1], which IBM Galactic Headquarters had decreed was to replace both FORTRAN and COBOL if they got around to putting it down on paper where Share and others could wrangle about it.

Hansel thought the whole thing was unbelievable. He had language skills like Abetti, a good EE degree, and unlike Pier sharp business sense. He and Gordon were the only two people I could reach who understood how IBM was dealing from strength.

There were other actors on this turbulent although rather small-scale scene. The most impressive one, whom I met for the first time but valued as a friend for many years, was Don Dowd, a very suave PR type who was Gordon's aide-de-camp. He was youngish, handsome, beautifully dressed, very wired-in socially. Two examples: Gordon's wife was a very high flier, and thought poorly of us techies. Elizabeth and I were permitted to enter the elaborate mansion on occasion, but were obviously "Gordon's business people". Don, on the other hand, had impressive family and PR connections, and was reported by Hansel and Kent to be able to manipulate Her Elegance with ease - more so than Gordon himself, they agreed.

And shortly after I blew into Jordils, Don staged a gorgeous party at the Beau Rivage for a small team of senior RemRand executives from the States, with John Jackson as host and the U.S. ambassador William True Davis (who obviously knew as little about computers, or Sperry Rand International, as the other senior American ambassadors around Europe). Charmed Madame Smith and the ladies, including Elizabeth, though!

This latter event was primarily to open the new headquarters. I still have the fancy but technically barren brochure Don turned out - not as easy to do in Lausanne as in Geneva. It has a handsome picture of Jordils on the cover, a better portrait of Gordon than of his boss, and a literally unbelievable list of "Offices of Remington Rand and UNIVAC Divisions in Europe, the Middle East and Africa" on the back cover. And the silk cord down the spine is in the Lausanne colors!

I've lost the luncheon menu, which was much more important.

In the next chapter I'll tell about how the list of nineteen African countries turned me on, but at the time my recent Control Data tours, which interested Gordon and Hans and Don enormously, led me to look at the list of European sites. I noted only two in England, which reflected the withdrawal of the round-hole boys into a domestic affiliation, and none in Denmark or Luxembourg. I valued it for future business, assuming I survived the 360 load!

I began to get replies to letters (there would be ten times as many today, in a flood of e-mail exchanges, and there would be Web postings). One good story was that Lee Amaya, who had taken over most of the direction of the Lockheed IBM 7000s, had been engaged with his Applied Science rep in exploring the successor to the 7094II. On the day of the big 360 announcement, news of which ran through the aerospace community like a California forest fire, Lee called his man and asked, "What does this do to the 7095?"

There was a painful silence. "What 7095?", said Cuthbert's guy!!

The obvious thing, even before the next DATAMATION came off the presses, was that the whole industry investment in assembly programs and number crunching, the specialized communications methodology that was coded in raw machine language, and a great deal of the FORTRAN code, was spurlos versenkt, sunk without a trace. Pure higher level programs using the latest IBM versions of COBOL and FORTRAN, and especially COBOL on the 1401 and 1410, could be emulated (with great pain, and to run very slowly, I predicted in Lausanne). But the tin airplane boys, and Stan Williams back in Pittsfield, and my crews back in Evendale and Lynn, had patched, and patched the patches - "spaghetti code", we call it now.

I had written several articles for DMN denigrating what I called Magic Languages, saying that they did not make real working programs truly transportable, and that new machines offered the chance to rethink the

flow charts and the underlying necessities, and to do a more sophisticated job of coding the next time around. I pointed out that the Los Alamos had done this as their famous nuclear codes had moved from wired panels on 601s and 604s and CPCs to stored programs on 700s and 7000s, and then on to incompatible STRETCH, and soon to CDC 6600s. Each time, I said, the increased understanding and more sophisticated specifications of the problem, and the improved techniques of writing the software, did more for productivity than the increase in raw speed [not true for the 1952 jump from CPC to 701, as I well knew from my 701 days - but I admitted that]. So in theory I was in favor of what Galactic Headquarters was doing.

It amused me to think that Tom Junior was probably playing his Wild Duck's theories back to resistant customers. Gordon knew I felt that way, but reminded me that I was a discredited prophet among the FORTRANners and the ALGOLIacs. True, I admitted ruefully.

So the first theme I played for UNIVAC was that no one installation anywhere in the world needed compatibility across more than at most two interfaces: that a satellite design (like Surly Seymour's great 6600 concept) was one way of linking feeder machines like the Census ones in the German case to the big central gizmo in Dortmund. Today the jargon is "client/server".

Passing to software, I said that in order to do scientific and business and communications programs in one single language meant that it would be less efficient than specialized packages, harder to teach and maintain, and be so big you would need the new IBM 2361 core to hold it. My handwritten notes say, "You can't stretch a rainbow from a mud hut to the king's palace without going pretty high in the stratosphere!"

All but the most sheep-like customers were outraged, and the more angry ones rushed out to UNIVAC and CDC and Burroughs, saying that if they were going to be forced to start over from scratch they might as well stick a thumb in Tom Watson's eye. But in the end not many defections really happened, or stood the test of decades. Enough did that Bill Norris could expand into Europe, and from his original nuclear and crypto applications into aerospace.

Readers should remember that this was still a rather small community, full time operators or managers of what today are called mainframes: UNIVACs I and II, with IIIs beginning, 1107s and soon 1108s, and a rather small number of mid-range installations; IBM 700s and 7000s, and a lot of 650s; Burroughs and Control Data and the beginnings of the GE 600 family. And in Europe, Bull Gammas and a few Siemens 2000s, and in England LEOs and the range of Ferranti machines.

I'd guess there were a thousand big shops (70 per cent IBM worldwide) and maybe ten thousand 650-like installations. There were endless estimates, recorded mostly in DATAMATION; my experiences in CDC and in Jordils confirmed that there was no customer database among the Seven Dwarfs.

I have always assumed IBM had an almost perfect one for North America, and very complete lists for the World Trade arena - certainly they had accurate ones of their own installations, and these were seventy percent of the totality! But these were never available outside, even as totals (and especially not as percentages, because of the anti-trust problem). I wonder if today's very different company might let their archivists exhume the 1964 data?

The circulation of DATAMATION in April 1964 when the first notice of the 360 explosion appeared was 47,132. By year-end it was up to 54,150! But I will return to that in a minute.

Those guessed-at figures mean nearly eight thousand IBM shops were turned upside down, and over three thousand non-IBM shops were, as Cuthbert Hurd undoubtedly put it, "given the opportunity of adopting a new direction in hardware and software". It was the dawning of a new era: for IBM, for its hapless competitors, and for the agonized old-user community across the world.

About that booming magazine: it was of course still coming to the mail room at Sutton House, where it and my ACM publications (but not things like TIME, which were of course on Swiss newsstands) would be

forwarded when I asked for them. But the single measly copy that came to Jordils was two weeks behind its U.S. date, and the April issue had not put in an appearance when Gordon and I struck hands. So he and Hans and I were working from the Herald Tribune and the airmail copies of the Wall Street Journal, and of course the gigantic pile of photocopies.

The DMN rewrite man gave a three-page summary of the IBM announcement starting on p.51 of the April issue [the Library of Congress copy is timestamped the 21st]. When the Jordils copy arrived, somewhat ahead of my Sutton House forwarding, it filled in the few lacunae in what I had: for instance, I learned the performance of the promised IBM hypertapes Tom Kamp had been fretting over for two years. I later found it buried in material I already had, in the details about the nine-channel (!!) 2400-series mag tapes. Anyhow, they were now called 7340s, and ran at 340,000 alphameric or 680,000 numeric characters a second, ten times the speed of the CDC 606s. Whether any had been delivered (with the STRETCHes) I never knew, although gossip before Elizabeth and I left New York claimed that HARVEST, the special 7030 at NSA, had a bank of them.

The May issue had several squibs on the late-news inserts about California reaction to the Big Boom, and pictures of the funny ceramic wafers which were the precursor of the later LSI chips; IBM had had to build a complete super-automated facility in Fishkill [near Poughkeepsie] to make them in enormous numbers. And there were comments on the success of IBM secrecy.

Then in the June issue Bob Forest wrote a first assessment, and user comment - every prospective user was a DMN reader - began to flood in. I would have loved to contribute, being full of the stuff and having the unique European perspective, but although Gordon never asked me not to, I felt I had to let others lead. Forest was mildly upset with me.

53 A SWISS INTERLUDE

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In Chapter 53 you will encounter

(in order of appearance):

Belmont-sur-Lausanne *now dominated by the autoroute, it was rustic and welcoming in 1964*

Villa Loup *very different from Sutton House, and not just the lake and the mountains*

The Opel station wagon 51 An ivory 356SC convertible *waiting for me at the factory in Sindelfingen*

A love affair with Porsche *it was the first of four for me, but the only one ever for Elizabeth*

Gordon Smith [52](#)

Don Dowd [52](#)

The German UNIVAC operation *well run by Otto Stitz, it even published a user magazine*

The 1108 *a considerable success, and an answer to the IBM 7094 II (but not to the 360s!)*

Scandinavia's multiple 1107s *and Gordon backed SIMULA to help sell one in Oslo*

Kristen Nygaard [35](#)

A flurry of UNIVAC IIIs in Africa *alas! even Gordon couldn't sell the idea in Philadelphia*

Bad news from headquarters *a small troop of know-nothings got ready to undermine Gordon*

The Zermatterhof [26](#)

The Cresta [St. Moritz Tobogganing Club] *they had to lift me off the sled, but I loved it*

The Steffani [hotel] *but the after-run luncheons were at the Sunny Bar of the Kulm*

Ex-pats at the de la Paix bar *a remarkable crew, mostly young and all, sexy*

A phone call from Santa Barbara *bread cast on the waters in Phoenix floated ashore in Belmont*

My air logs *deadened by four deaths, I started them up again to fly off to a new adventure*

During the first weeks of May, while I was completely engrossed in the 360 and its documentation,

Elizabeth had been doing an apartment search. There was much less machinery to help her than in, say, Monte-Carlo, but what there was she used. And Betty Abetti helped her with the newspaper ads, although my reviving wife was already moving into French.

She located a furnished place on the road leading down from the tiny village of Belmont-sur-Lausanne to the locals-only rail stop called Conversion, west of town. The whole area has been transformed by the main autoroute today, but that was only in planning stages in 1964.

It was the main floor of Villa Loup, and the Loups - a teacher and ex-teacher pair, with two teenager daughters - had moved into the upper stories. It had a fine balcony on two sides, with vestigial furniture. Down below M. Loup had a big vegetable garden and a few flowers, and the stretch of land dropped away so that a lovely view of the lake opened out over the trees at the bottom of the property. On the west a somewhat tree-hampered view pointed toward the Rhone valley and especially the distant mountains.

There was a big living room with funny furniture, opening on to the lake balcony, a small bedroom with a "marriage" bed [between double and queen] on the east side, a very European bathroom with junior-Savoy piping and what I told Elizabeth was an "inspection" WC: a flat interior surface that had to be scoured off by the flood from the overhead tank. She was more amused than put off, and indeed it was not much more exotic than what we had at the de la Paix.

The little kitchen had a fair stove but a tiny fridge, about three feet high and set on the floor; you knelt down to look inside. Later I built a stand out of precut lumber which served as a wine cellar, and levered the little monster up on top, but it was always inconvenient.

And Mme. Loup did our laundry, giving it a good flap in the lake breezes down under our north porch. She also undertook to file the proper papers with the commune to start the residence permit request through the labyrinthine cantonal and federal processes. Nice!

There was a "garage" in the sous-sol, which Madame said we could use for storage, since it was too short for the Opel (the Loups rode mopeds). In fact the Porsche was so compact we were able to use it nicely, and close the door with two (!) inches to spare.

There was no TV, and only a very very Swiss radio in overweening cabinetry. There was an extension of the Loup telephone in the interior hall, which we used infrequently; I made long distance calls from Jordils or the downtown post office (as in Monte-Carlo).

Elizabeth gave the Loups a deposit and two month's rent as soon as we decided on the place, but we stayed at the de la Paix almost until the end of my six weeks for Gordon, just in case the canton made trouble about our advent. We did unload the suitcase stack from our suite and my trunk from the Opel into the Loup storage space, which made the hotel room a great deal more comfortable. And I sallied forth to Germany with the wagon having done yeoman duty, knowing that the new car would not have to serve for trunk transport!

For reasons I have forgotten Elizabeth did not come to Germany with me. I drove to Stuttgart in one long hard day, which would not have been easy with her along, put up at the Graf Zeppelin but in a very cheap room, and reported at the factory reception area late next morning. All was im ordnung; the Opel was whisked away, the insurance papers were ready for signature, the oval tax-free plates were already affixed - and everybody spoke American. It was a several-a-day affair for Porsche, but a revelation to me, having stumbled painfully through very clumsy processes in France [faithful little Simca] and the Netherlands [big Alfa 2600].

What I drove very proudly away in was an ivory 356SC convertible with a black top and glorious black leather interior. This was the last year that model was made; there were 1965 356s made while the 911s were starting delivery, but no more convertibles and I think no more SC engines.

Elizabeth loved it from the day she touched the wheel, in a way she had never felt about the Arizona 190SL or my scarlet Alfa Veloce in Manhattan. She drove it in Switzerland and back in the United States, refused offer after offer for it as it became a classic worth four or five times what I paid in the Sixties [\$4300 or thereabouts!], and finally totalled it in its 24th year. And agonized!

My initial contract with my friend and client wound down, much to the relief of his Swiss finance man, who hated my expense vouchers (tiny compared to those of Jackson, Smith and Dowd - but he hated those too, and dared not object). Gordon gave me supplementary tasks, including an amusing chore reviewing the publications of the various national companies; the German DIE LOCHKARTE had a long and honorable history. He took me with him to his sales meetings and got me to pontificate about IBM and review the opportunities for the 1107 and the forthcoming 1108 at the places I had seen in my 1962 Control Data visits.

Parenthetically, that 1108 had indeed been announced in late July [1964]. I still have the few press releases that filtered through to Gordon and Hans, which were passed on to me. It was indeed five times as fast as the late-model 1107s, but I had already used a sub rosa figure of 5.3x in my 360 comparisons, so revisions were unnecessary. I smile today to realize I did not see an actual 1108 until I took over the Bureau of Standards one three years later; I had known the announcement but not the actuality!

I was delighted with the country and with Elizabeth's happiness, and pressed Gordon for permanent employment à la Abetti and Flesch. He put me off, although we were becoming closer and closer personally. He tried to compensate by inviting me on almost all his forays into his favorite Lausanne restaurant, the Grappe d'Or, often including my lovely wife, who had designs on the big handsome guy.

I discussed it with Hans and his wife, with whom we spent many evenings. "The poor guy is being chewed up back in Philadelphia," said our knowing friend. "Jackson has his own problems, and wants to go back to the States, so he isn't helping at all."

I knew Gordon was enjoying Lausanne, and that in his Golden Boy way had made friends with for instance the movie star William Holden, who lived with a wife almost as hoity-toity as Gordon's in the same neighborhood. And Don was wiring him in to the business community, which Gordon did well in in spite of never picking up more than a few words of French.

I've told the story in print and in Scandinavian speeches about how Gordon tackled the problem of low sales in the national companies. Germany, which was run by a really good man named Otto Stitz, he left alone, but Denmark/Sweden/Norway he fretted over. Where Jackson or other UNIVACKers would have set up elaborate sales meetings (and spent a small fortune importing people from the U.S.), Gordon threw a few 1107 brochures in a suitcase and went out on the road himself. He planted big - outrageously big - machines up and down the region, from sardine towns in the far reaches of Norway to a major shop in Stockholm (running up a record bill at the Operakällaren in the process).

Some places he used insider information from me or from his own salesmen (and from IBM local people whom he charmed silly). Some places he used enormous discounts. In Oslo he let me point him at Nygaard, whom he signed up to do an improved version of SIMULA for the 1108, and landed an 1107 order at the same time. What a salesman!

One adventure which didn't come off, and which is nowhere in the literature, came late in the shared venture. I remembered the crazy list of nineteen African capitals on the back of the Jordils brochure, and suggested to my excitable client that he could probably seed UNIVAC IIIs in every capital that had reliable electricity. I would make a tour like the CDC affair, I said, visiting a whole string of countries from Algeria to Zambia, starting with one or two where I had contacts [Kenya and Morocco, through ACM] and infiltrating the rest, relying heavily on the concierge network and a lot of very big tips.

I would report prospects, hoping for six or seven out of say fifteen contacts. Then Gordon, whose vice-

presidency covered Africa and the Middle East, could visit those places, with or without me, and peddle his wares. I did not expect most of his sales would be sound ones, but that was true of his 1107 sites in Scandinavia also. I suggested the spring of 1965, having run a project on African weather with help from Michelin maps and the sluggish State and Commerce departments back in Washington.

Wasn't as crazy as it sounds. I had found out from the Jackson/Smith secretary, who was a slim English girl with amazing French and a nice figure, that these were often not just typewriter or electric razor sales offices, but were concerned with flight instruments and military gadgets from the Sperry side of the house. Neither Gordon nor I would have to go in stark naked, as I had had to explore in CDC anonymity almost three years back.

Gordon broached the idea on a winter trip back to headquarters, and they came down on him like a ton of bricks, indeed objecting to several of his 1107 discounts (and probably to SIMULA) as well. He told me this regretfully - he was as adventurous as I, and as anxious to explore Addis-Ababa. And he broke down and admitted, to my chagrin but leaving me with a warm feeling toward the man, that he did not think he could help me much in the coming year, and was likely to be removed himself fairly soon.

And while Flesch and Ellsworth watched in horror (Abetti seemed oblivious), a small incursion into Jordils of conservative types from the parent corporation and from unsympathetic national companies in Gordon's own bailiwick began.

My own situation did not seem too oppressive. Our expenses were so low compared to Sutton House plus Résidence Auteuil, and the RemRand fees so generous compared to the CDC stinginess - and those gala dinners at the Beau Rivage so frequent - that we were in fair shape financially. I was exploring contacts I had made in 1962, saying that the 360 work for Sperry Rand International was winding down. ICT looked possible, although I would have preferred to work with Boz Ferranti.

Meanwhile we were exploring Switzerland in our wonderful new car, which drew admiration even in St. Moritz. Also I would go off on two- or three-day climbing trips, usually not very challenging and usually without (expensive) guides. Elizabeth would not ride a moped, but the Flesch Mercedes and Gordon's chauffeured Citroen were useable in my absence.

Skiing was wonderful. Elizabeth loved the elegances of the Zermatterhof and the gorgeous blue-and-white hotel sleigh with which they collected us from the train, and we put up at the Crystal in St. Moritz (a mistake, but the best garage for the Porsche was across the street).

And the big new thing in my life started up. I had read for years, in fawncy British media and in a hundred mountain books, about the famous Cresta run in St. Moritz. Started in 1885, and drawing on first English and then rich-Swiss members, it is a unique sport. Truly amateur, and unlike bobsledding not available in other resorts, the mile-long descent is in a blue-ice trough made from December snows each year, and starts up in the holidays, drawing minor nobility and European industrialists (and a few crazed Americans). You get up to eighty miles an hour at the bottom of the Cresta Leap, with your face a few inches off the ice, as you belly-down and toe-steer against photoelectric timing.

And in the winter of 1964/65 there was not the press of aspirants I became familiar with later. Notably, there were few Americans, and of those most could not come every year and were not too anxious to join. I paid the Supplementary List [non-member] fees and took my first rides, under casual tutelage and with a borrowed sled, and steel-toed boots to brake with, and a BIG crash helmet.

What mostly counted was nerve. Many SL riders never used up their five rides; the first one or two are unbelievably scary. I was as slow as a first-timer can be - well, not really; the Duke of Kent is reported to have braked to a standstill in the run - and took 75 seconds [in later years I ran in the high forties]. But I had been too frightened to breath, and had to be lifted off the sled and pounded back to aeration at the finish. Magnificent!

I applied for membership, with a scion of the Cartier family and an executive of the CEGB as sponsors. Today there is a three-year wait, and most Americans never make it: I was accepted in 1965 almost as soon as we got back to Belmont.

Made me - indeed, Elizabeth too - feel like a real European. It gave us status in toney St. Moritz, where Cresta riders were far more special (and less frequent) than skiers. We learned to stay at the Steffani (the Olivettis and the Siemenses stayed at the Palace, and the rich English like Chips Cartier at the Kulm). You rode in the morning when the run was hard, and lunched al fresco at the Sunny Bar of the Kulm. And as I had related to the guide Cipollo in Courmayeur and to my ski instructor Elias Julen in Zermatt, so I got to know the Cresta clubhouse men and the Kulm bartenders.

I belonged for twenty years, and managed to ride in the Seniors Cup race at the Centenary in 1985 (thirteenth in a huge field of oldsters), but then saw I could never afford another trip to St. Moritz. Felt almost like resigning from the Astronomical Society after 35 years, which I had done in the Seventies!

As 1965 spun on its axis, the Sperry Rand connection grew less rewarding. Ellsworth left, Abetti seemed never to be around, Flesch fought with his vigorous wife Huguette. Without a travel record I can only vaguely remember attempts to sign up other clients. It was a time of change; with Grace and Deo gone, we could never go back to the remarkable New York marriage.

Neither of us was yet inclined to wander, although we had begun to interact with an older-student crowd at the de la Paix bar with attractive opportunities for each of us. We met strange ex-pats: the Crane family, centered on an heir to the Chicago plumbing fortune who had lost his patrimony in the South Seas [yes!], a cartoonist for ROAD AND TRACK named Stan Mott who found my wife's lovely figure irresistible, a local wench who owned a charming Italian greyhound given her by her, ah, patron which Elizabeth and I loved to dog-sit.

One early-spring evening the hall telephone rang. From nine time zones away, a quiet voice began a long and very strange - and exciting - story. I had cast more bread on the waters than I knew, and a slice of life I had never dreamed would ever float back, had done so. I was asked to come to California for an interview, expenses guaranteed - and amazingly, it was Generous Electric!!

So I started the air log up again. And the first entries are a Swissair Caravelle Geneva-Copenhagen, a Scandinavian transpolar DC8 (still via Sondre Stromfjord) to Los Angeles, and a Pacific Fairchild F5 to Santa Barbara, all on March 24, 1965: 6400 miles.

It was 22 months since I had abandoned my first overseas venture by flying back to Manhattan from Nice. Although I did not yet know it, on April 4th I would finish my second, and start a new New Life in Sixties California.

54 AN EARTHLY PARADISE

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In Chapter 54 you will encounter
(in order of appearance):

Santa Barbara *"An earthly paradise", with 1968 yet to come*

John Fisher *coping with a juicy contract and Freddie Thompson's departure*

TEMPO [Technical Military Planning Operation] *GE's for-profit version of RAND*

Tom Paine *as hungry as Robbie, he later headed NASA and Northrop*

Fred Thompson 22 Computational linguistics *Fred was off in left field in a brand new ball game*

RADC [Rome Air Development Center] *Air Force op in upstate New York tied to intelligence*

DEACON [Direct English Access and CONTROL] *what I was asked to direct*

A dedicated GE computer *times ten thousand today, it would still be inadequate*
TTY [teletype equipment] *dumb as I/O gear, but it let me work remotely, in 1965*
A tiny ship-movement database *"How many red ships are in Boston harbor?"*
The next millenium [3001] *we ought to be able to chat with our computers, but not soon!*
Chris Longyear et al *a small but clever bunch, part linguists and part systems people*
Mandy Grems and Madeline Henderson *I hoped to involve more female experts*
A white Mustang convertible *and a tiny temporary house in Montecito*
"Send CARE packages!" *Elizabeth was not coming back to the horrid U.S.A.*
Joyce [Joyce Misbeek Grosch] *still Joyce Winn, she was to become my third wife*
Wyman and Walter Winn *two handsome young sons of Joyce's first marriage*
The XKE [Jaguar convertible] *"head-turningest car I ever owned" facilitated courtship*
Racing at Willow Springs *I bought and crashed a lavender Porsche Speedster*
A Las Vegas divorce *terribly painful at the time, and almost certainly a mistake*
Back into the mainstream *in the future, a powerful government job and the ACM presidency*

That was Santa Barbara in 1965. The climate was wonderful - and still is, free of the Los Angeles smog and freeway traffic. It was and is a major retirement community for the rich, fancier than La Jolla and less flashy than Rat Pack Palm Springs. And this was years before Ronnie Reagan's place up in the hills behind the town was talked about.

Generous Electric put me up at the Santa Barbara Inn, not nearly as expensive as the Santa Barbara Biltmore, which was probably full, but with a great deal more action. In fact, my host apologized for the scenes spilling out from the crowded bar as we stood at the desk, not yet realizing how much I looked forward to participating.

This was John C. Fisher, a long-term and very loyal GE employee who when he was dumped years later by the no-longer-generous company became Chief Scientist of the Air Force. He reported in a clumsy and non-Smidly-like organization to Tom Paine, general manager of the local enterprise with which I was interviewing.

This had recently been renamed Technical Military Planning Operation, TEMPO for short, and was regarded by its proponents and denizens as a department of the original military electronics division once headed by George Haller. The civilian counterpart division, no longer headed by my nemesis Harold Strickland, still existed under a new name and contained the curious mix of departments into which the Phoenix Computer Department had transmigrated (I will come back to those struggling outfits in the next chapter). Its detractors - and both TEMPO and Paine had many, inside and outside GE - preferred to look on it as a carbuncular super-section, somewhat like Barney Oldfield's microwave lab had been regarded in 1956, citing the term Operation as evidence.

I was to pick up gossip later (TEMPO was rife with it, unlike the LaPierre/Parker/Neumann jet engine businesses) that the establishment had been invented to shelter a number of high-level techies that had topped out the supposedly parallel ladder of advancement in the Cordiner/Borch company, for whom no senior staff job [Vice Prez of Engineering, say] was available. The one I knew was Dick Raymond, who had been Paine's predecessor and had wiggled back into a staff position in the East.

Raymond and others had conceived of a for-profit version of RAND, sheltered and made more attractive by the giant General Electric. Indeed, RAND had been spun off from Douglas in the late Forties, and most casual observers thought Douglas now much regretted not having kept it. Just as Cochran's department back in Evendale had had an overgrown engineering aspect, so TEMPO had a swollen marketing function, since the business of finding [or generating] and bidding on Pentagon and NASA business, and extending it into continuing contracts, was more important than the analysis and synthesis to be provided.

There are hundreds of such organizations today, and dozens of government departments and hundreds of

civilian customers. The emphasis on generating rather than executing business has not changed.

Fisher took me in to meet Paine, in whom I instantly saw another Robbie (albeit with a military rather than an economic background). Then he introduced me to the Thompson DEACON team and we got down to business.

In Chapter 22 I described how I had brought Fred Thompson and his crew into GE, supported their model-building and other TEMPO-like work for Fort Huachuca, and left them to Oldfield's tender mercies when I went back to IBM. Fred had changed - well, expanded - his interests, found his way out of the civilian and into the military part of the GE organization, and during that transition had become an important figure in computational linguistics.

He had a new bunch of disciples, considerable financial support from the Rome Air Development Center [that's Rome in upstate New York], and was operating his DEACON Project in TEMPO. He found Paine and the TEMPO tempo undistinguished, had clashed with the marketing people and John Fisher about how to handle the RADC support, and ended up by resigning contemptuously.

This sat poorly with the Air Force, which regarded Fred highly and could not conceive of supporting the work without him. The whole project was in his bulging cranium. The computing and linguistic people on his crew thought the world of him. For a while things staggered on; Paine was conciliatory. But Fred had put out feelers during the interregnum, and in the late winter was offered a tenured professorship at Cal Tech.

There was nothing Fisher or Paine could do to keep him. And when they suggested replacements, they found most of the possibilities in a then rather narrow discipline were either non-citizens, unwilling to come to industry (even in lovely Santa Barbara), or unacceptable to Fred and his gang. Time was running out, and RADC was unhappy.

Fisher, who was a rather nice if somewhat wimpish guy and sympathetic with the academic atmosphere, asked Fred to suggest someone who would be acceptable to RADC, not make the higher brows on the small DEACON team twitch, and could work in General Electric. Fred said he knew just the man!!

They ran me down via the ACM staff. Neither Fred nor John were members, but Fred had stayed in touch with Mike Seven, who had landed a nice academic job in Pomona, and Mike was wired in via a student chapter; it was easy. TEMPO still had a switchboard, and lots of staff with languages. Presto!! Villa Loup.

DEACON stood for Direct English Access and CONTROL, Fisher had explained, and was a mixture of natural-language research and an implementation of Fred's Piaget-influenced ideas about learning and about semantics. There was a small series of internal reports, which I found very hard to understand, since they were written in a private jargon, leavened with paragraphs about linguistics and systems programming. A year later the team put out a major publication in an AFIPS Proceedings, and this has survived in the citations world of Academe. "Nothing beside remained ...", as Shelley said.

I was introduced to the small group, who had been warned by Fred of my astronomical origin and my engineering career. The computing side of the house, which ran a dedicated GE625 with a non-GE disk stack cloned from the IBM RAMAC, and used fairly primitive Teletype gear for most I/O, found it acceptable; the language experts were startled.. System loads were card decks, but the linguistic entries were hunt-and-peck TTY.

This meant that later on, when I was demonstrating our capabilities at RADC and in the Pentagon, I could sashay up to any standard teletype and sign in in the Balboa Building on the main drag of Santa Barbara. Crude by 1998 networking standards, but sophisticated in 1965.

I'll come back to the people later. I have to explain a little first about the "Two vast and trunkless legs of stone ...": what remains of the DEACON effort. The intention to use natural language - fairly unrestricted

English - was foredoomed, and I was dubious from the beginning. Hundreds of very clever and mostly well-intentioned researchers have struggled on four continents, from the first years of the Sixties to today, and are only slightly closer to the goal. I have written many times that yes, we will some day talk to our computer as Arthur Clarke's heroes talked to HAL. But it may take centuries.

Understand that this is not voice input; DEACON was content with keystrokes. I have had a dictation program for six months in 1997/98, and am startled and fascinated by its rather considerable capabilities and its obvious promise. The Santa Barbara attempt was to parse simple English sentences input by teletype and understand the structure, permitting hundreds of simple variations in order and tense and gender and on and on. The group had done well with tense and number but had not yet tackled negation!

The second leg was the semantic one: what is the meaning of the phrase/sentence/paragraph after you have its structure deciphered? And here I think Fred was on solid ground, and as we look at the PC operating systems and the database constructs of today we see the embodiment of his idea: that each person or team using an inquiry system (or whatever) has his or their private set of meanings for words or strings of words, and by extension even of numerical data.

DEACON, I came to tell audiences, was to be an electronic backpack storing the world and the world-view of the person owning it. Today we have laptops that offer that sort of personalization for two or three thousand dollars; in the mid-Sixties a team of CIA analysts would need a major chunk of a million-dollar mainframe.

The dictionaries and linkages were stored in ring structures much like the lists in LISP, which was a slow tool and required a lot of disk space. My demo sentence at RADC was, "How many red ships are in Boston harbor?" The structure analysis handled "how many" and which harbor, the semantic lists chose between red equals hull color and red equals communist flag.

Incidentally, when I did everything right and the TTY and its line and the 625 back in TEMPO were all happy, DEACON would reply, "if red equals hull color 4/ if red equals communist 2". What Paine and Fisher wanted me to disguise was how much special parsing and how many linguistic "rules" had been tinkered up to generate that rather glum reply.

It wasn't crooked: the team, and Fred while he was in charge, would never never have put in a prescribed answer or otherwise faked a response. If we changed the ship-movement database the answers changed from 4 and 2 to new numbers, quite honestly. If we did "airport" or "Chicago" or "planes" (and put those words in the rather sparse vocabulary), the parsing still worked. If we did "Chicago harbor" but left the rest of the demo query unchanged, DEACON would coolly inform us Chicago was not a harbor (of course it really is, for Great Lakes shipping).

What Fred and his team, and their intellectual counterparts in Academe, had glossed over - although you can be sure Paine saw it clearly - was how specialized the market would be even for a highly perfected DEACON. In the Sixties or the Seventies it could only be applied to terrifically valuable inquiries: those of a POTUS, or a Tom Watson (both of whom would be too impatient to use it). A team of intelligence analysts, say, at NSA or deep in the bowels of the Pentagon, might be doing work so important they could afford it; hence, RADC. But you had to strain a little!

DEACON would never forget a fact, no matter how old or obscure. It would never overlook a connection it was capable of making. It was available every minute of the year, even during Bowl games. Speeds a thousand times greater, data memory a thousand times larger, were possible, with no limit in sight. But I had guessed, even during Thompson's hypnotic presentations, that even quite modest success would be superhumanly difficult.

Parenthetically, there are projects today that hope to input enough of, um, the universal context to mimic common sense. They have enormously increased speed, incredible storage capacity - and hundreds of

times as many workers as DEACON had. I wish them well. Perhaps when the next millenium approaches ...

Well! Back to TEMPO! I had a group of a dozen people, all bright, all hard-working. There was internal Operation politics, notably about competing computer capabilities servicing the other local projects (and doing payroll!), but it hardly affected the group.

The key analysts were Chris Longyear, a great vaguely-Oxbridge type, Jim Craig, Susan Berezner, and Russ Abbott; the key systems man was a John Gwynn, who had written most of the ring processor software. There were support types. And there was a character, Homer Carney, who leavened the serious lump but had a great deal of hard-knocks computer experience.

I hadn't enough budget to expand in the old Groschian fashion, but I captured a great woman named Mandalay Grems, who had done most of BACAIC for Randy Porter at Boeing back in the 701/704/SHARE days, and a couple of youngsters. And toward the end of my stay I managed a link to Madeline Henderson, who as Madeline Berry had been a member of the Perry/Berry/Kent information retrieval team at MIT and then Western Reserve, which team because of Jim Perry's chemistry origins had been the "customer" for Pete Luhn's IBM search engine a decade earlier.

I will return to the project further on. But now I must get into personal mode, as I accommodated to glorious Santa Barbara. It had been years - and it seemed like decades - since I had been immersed in the California Culture, so different from Europe in general and Calvinist French Switzerland in particular. Santa Barbara was not as crazy as Sunset Tower West just beyond Hollywood had been, but the sexy action at the motels and restaurants in my new town was still pretty enticing. And these were the Roaring Sixties, with the climax year 1968 coming up fast.

I did the usual car rental (a white Mustang convertible) leasing it by the month as a poor substitute for my wonderful 356SC. I moved out of the Inn into a cute tiny one-bedroom house on the fringes of Montecito, which was the pride and joy of an older woman who had family affairs to attend to back East; reminded me of the way Dorothy and I had rented the house of the BU professor on sabbatical back at WHIRLWIND.

The big question mark was Elizabeth. She had made it clear as I packed for TEMPO that she had no intention of moving back to the horrid U.S.A. and certainly not to paradigmatic California. I sympathized; much much preferred Europe myself. But I had failed to stake out a connection with Ferranti or Siemens, and the happy linkage to Gordon was personal and not to Sperry Rand. That had dwindled as he and Dowd prepared to return to muggly Blue Bell, and I saw no financial or intellectual extension possible. So TEMPO looked terrific - but not to my lovely but intransigent spouse.

"Send CARE packages!" was her approximate valedictory. And she intended to enjoy the Porsche; her letters were dismissive of "that other" convertible.

I cast out grappling irons: the Sport Car Club of America, to which I still belonged (big in Montecito), swingers' organizations, my old connections from beef-bones-at-the-Cock-and-Bull days. Jack Strong with his infinite supply of interesting women was only a hundred miles away.

Soon I was enmeshed with a handsome woman from TEMPO, who as travel executive secretary was handling my trips to upstate New York and to a myriad computer conferences (notably the next IFIP conference, which was to displace the 1965 Spring Joint in Manhattan and which was a chance for me to recontact my dozens of valued European friends I had cavalierly abandoned). She was divorced; had two attractive blond sons with whose upbringing she was struggling. She saw the TEMPO intellectuals and power types as she ferried them to far climes like Yemen and Schenectady, and wanted her youngsters to have such opportunities.

Her name was Joyce Winn, and the boys were Wyman Winn [12] and Wally Winn [8]. Her maiden name had been Labots-Misbeek, of Dutch provenance. Walt Senior lived across town, contributed to support of his sons, and took them huntin' and fishin' - which was not going to get them into Stanford! She was

twelve years younger than I, vivacious (sportif, my Lausanne friends would have said). She was supporting the boys and a small house "on the mesa", and a simple and not too new Ford Falcon. It wasn't easy.

She had few dates in spite of her attractions, mostly because her "young men" deterred serious types, and she was wary of one-night-stands. I was at least a continuing romance, although she was aware (from me directly, and from the TEMPO girly network) that I had a wife back in Switzerland.

To facilitate what was transmuting into a courtship, I signed up for a fantastic sport car - in many ways the handsomest and head-turningest car I ever owned. I bought it in Los Angeles: a Jaguar XKE roadster, metallic dark gray [ah, grey!] with a black top and crimson leather interior. Ooooooh!

It was the last year to have the "smooth" headlights, and the first year to have an improved transmission [ah, gearbox!] and seat design. Magnificent; the boys were crazy about it, and Joyce said it was the sexiest thing she had ever ridden in - let alone driven! And it wasn't just looks; with sticky road-racing tires it cornered in the winding roads up above Santa Barbara even better than my two Alfas ever had.

It also created a stir at the regional Porsche Owners Club meeting, which I attended as the certified owner of, ahem, "my Swiss 356SC".

Limited maintenance was available at the Buick dealer in SB. I would leave the Jag to have the minor repairs such cars always seem to need, walk three blocks to the Balboa Building where my group worked, and pick it up in the evening for the short drive to Montecito.

Joyce and the boys were friends with several men and couples into racing, mostly at Willow Springs near Lancaster, and I was drawn into that circle. The Jag, the Porsche, my long list of great cars paraded faithfully by Wally and Wyman, and my membership in the SCCA all helped. Soon I bought a 1958 Porsche Speedster with a roller crank racing engine, stripped down and roll-barred for the track., and had it trailered to the Lancaster pits for practice.

Sad story! I missed the ninth turn at Willow on my very first excursion, rolled half a dozen times out in the sagebrush, and totalled the little monster. I still carry a photo of the crumpled car, signallizing what ambition out of proportion to ability can do. I was not too old, and Hollywood types like Paul Newman drive well at more advanced ages. I was fairly reflexive on the Cresta. But at Willow Springs, no!! There were race-driver training courses, but they were too remote or already full; I went out and tigered, and crashed.

I mentioned in connection with GE management philosophy [Chapter 16] that Paine had had me shipped back from the Lancaster hospital in an exceedingly comfortable ambulance. Clustered at the Santa Barbara bedside were not only the Winn family and my DEACON gang, but Fisher - fearful for that RADC funding. He notified Elizabeth, telling her it was just broken ribs and a few teeth, but she nevertheless hopped on Swissair and joined the throng. Problem was, living alone in my little house and with a low bedstead, I couldn't roll out of bed without help - and Santa Barbara, full of retirees, was for the moment out of motorized invalid beds! So I was in hospital for a couple of weeks.

Today's HMOs would have rebelled, but 1965 GE medical coverage did not flinch.

Elizabeth took one look at lively young Joyce and saw she and I had a problem. She struggled on in Switzerland for some months, failing in repeated attempts to get private-school teaching jobs in spite of her obvious talent and increasingly fluent French. In the end, as my reluctance to finance her continuing residence became apparent, she flew to Las Vegas (which she hated, hated) and filed for divorce. I split our holdings, giving her the Porsche, paid not only for the stay in Vegas and the legal shenanigans but to have her belongings in Belmont and New York City shipped to Phoenix, and tried with much guilt to settle her back into the U.S.

I agreed to a terminating (five-year) alimony arrangement, which was supposed to get her back into the

self-supporting mode from which I had plucked her nine years before. But with no Aunt Grace to steer her, and the social distractions of her earlier Scottsdale connections, it didn't work very well. She joined the third-rate faculty at Judson School, whose property had adjoined ours on Mummy Mountain, and did quite well with the rich Hollywood kids who were sequestered there, but it never really came to much. Her public-school credentials from Ohio were out of date, and Phoenix was oversupplied with people who wanted to move there from the rain/snow/mud-bedeviled East.

Guilt, indeed. I wanted to marry my new love, and found her young sons a plus rather than a minus. I thought Santa Barbara was terrific, and Joyce was a real born-in-town link to many of its attractions. She intended to keep on working (although not at GE if we married, she said), so the drain of the divorce on my finances would be mitigated. But I shouldn't have done it.

Problem was that Déodat and Grace had been the glue that held the Elizabeth marriage together, in spite of the divisive forces of my travels and my extrusion from IBM. When we decamped to Europe it eased the pain of their absence, but the union between the survivors was weakened. If I could have eased into Sperry Rand and truly settled in Lausanne, or if ICT had hired me in London, or Ferranti in Manchester, that union would have knit again.

I was right to jump at the TEMPO job, which drew me back into the mainstream, into the important years at the Bureau of Standards, and made the later ACM presidency possible. Nevertheless, much as I loved and still love Joyce, the divorce was a Bad Thing. In today's evolved world, I could move in with my new love, raise her handsome boys, and send Elizabeth her CARE packages; that was not possible in 1965 Santa Barbara or with 1965 Joyce - nor with 1999 Joyce, probably!

It is notable that two really destructive decisions in my, um, unusual life have followed new love affairs. There are proverbs: I will not quote them.

55 DEACON LEADS TO D.C.

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In Chapter 55 you will encounter

(in order of appearance):

Lt. Col. Florence Casey *the liaison to DEACON from RADC*

Dr. Ruth Davis *a hard case, working for DDRE in the Pentagon*

DDRE *the highest directorate of research and engineering in the Mysterious Military*

DEACON funding *I got the next \$850 thousand, but Paine worried I might bobble 1968*

Bull and Olivetti *"some maddened amateur" had let GE buy two difficult Europeans*

Surfing the organization manual *thousands of certified managers, but little computer knowhow*

John Fisher [54](#)

Lou Rader [22](#)

Charlottesville *GE had to pay big to retrieve Lou, and this location was part of the price*

Phoenix veterans *the Oldfields and the Lashers had vanished, and the rest were in the cellar*

Phoenix newcomers *who on Earth was Erwin Koeritz??*

New bosses upstairs *notably Hersh Cross, "part of the problem"*

IFIP 1965 *I was too dazed to contrast Europeans and Joint boys, but I enjoyed Manhattan*

DATAMATION [25](#)

Divorce and a new marriage *Joyce and I should have flown to Honolulu, not Copenhagen*

Fisher and Grosch visit the crime *back at 570 Lex, too late; the whole shebang was up for sale*

Olivetti *they were turning out 115s but we were not to see an installation*

ASEA *the only GE625 in Sweden, and with a good crew, but a long way out of Stockholm*

Bull *Brainard Fancher, a hopeless American surrounded by dozens of hostile Frenchpersons*

Awkwardnesses at TEMPO *Paine mistrusted me, and Rader didn't care*

A search committee *the Bureau of Standards had a horrid vacancy, but I jumped at it*

While the painful personal struggles kept me on tenterhooks, DEACON was evolving. Gwynn made considerable progress not only in massaging the ring processor, but in describing it in TEMPO reports for our sponsors back East. Longyear was beginning to wire me in to the computational linguistics community, whose special skills were still beyond me but whose jargon I had begun to acquire. Craig and the youngsters were adding grammar rules at a fair rate. And on the managerial front, I was beginning to settle in.

This, in two senses. Out in the world, I was learning to work with grant money, an unfamiliar venue, and with the key people who supervised its expenditure, At RADC this was a Col. Florence Casey (leaf, as I remember; not eagle); she came out to see us and mutter at our slow progress.

On occasion I would go back east, sometimes to visit RADC but also to racket around the DDRE precinct of the Pentagon, which was a couple of levels up in the food chain. There I dealt mostly with a vigorous and less pleasant type named Dr. Ruth Davis, who claimed unlike Casey to understand what Thompson had promised to do. I resisted gently, since her view - in my view - would take decades to accomplish, and most of her rather large budget.

One of my genuine skills, honed in the jet engine years, was walk-through. I could pretty well sense what was going well and what was foundering, as I talked to my youngsters and their clients. Out in the shop, not in my office - and I couldn't do it very well with strangers.

As I got to know and respect the DEACON bunch I began to regain this ability. It told me that we were only at the beginning of the beginning of the task: notably, it had me note that whenever a new "rule" was implemented (several a day, but not dozens or hundreds), many and sometimes very many of the previously-working rules had to be, ah, upgraded. "That's the way language works", said Chris, and I agreed. But as Casey pointed out, it looked like many thousands of rules would be needed to parse even a small subset of English.

I shared my misgivings with the crew, gently, and with Fisher. That latter was undoubtedly a mistake, as he in turn warned Paine that I thought the project was in trouble. I had succeeded in getting the next stage of funding, \$850,000, through the RADC and DDRE channels - child's play compared to bucking General Medaris! But if 1966/67 was safe, what about 1967/68?

While this descent into realism progressed, I was also wriggling in post-Smidly General Electric politics. Not the TEMPO stuff, which was minor: who should control other computing activities such as LP work and simulations, where I was viewed warily by the guys in charge, but the Big Screen problems screaming for solution over in the computer parts of the Industrial and Information Group. Paine offered them internal consulting services, partly because TEMPO had genuine capabilities, especially now I was aboard, but also to get his Operation further up the organizational ladder in the giant company.

Here he nibbled from below at the staff outfits (much diminished in force after Smidly's retirement), which were supposed to do similar assessments company-wide, and mostly gratis (which Paine could not do), but which so far had done little to reduce the what-next-after-ERMA pangs of the computer departments.

Some maddened amateur had allowed GE to buy Machines Bull in Paris and the Borgolombardo efforts of Olivetti. I could have really really helped in the matter: could have told them how utterly impossible assimilating the two cultures into Generous Electric would be. Schenectady and 570 Lexington hadn't been able to cope with Phoenix, let alone Avenue Gambetta!

But not only did these fatheads not know I had ever existed, or how successful Evendale had been, but

they hadn't known enough to draw on the knowledge of men like Bob Johnson, who had carried ERMA to its amazing conclusion. Bob didn't know much about Europe, but he knew a great deal about computers in general, and the rigidities of the professional-managers-can-manage-anything GE philosophy. In fact, I soon discovered he had escaped from the morass and gone over to begin a major career in Burroughs.

I hope some day we will find out how those decisions were reached. We are finally hearing how things went in secretive Watsonian IBM, and about the weird birthpains of the GE Computer Department. The book on the Bull and Olivetti purchases is still sealed. In blood!

Fisher had done a competent job on my early GE adventures, even talking to my old boss Dave Cochran, by then ensconced in Washington. He had ignored the evil reports from Phoenix, which were diminished by the departures of Oldfield and Lasher some years back, and by the disappearance into the organizational cellar of all the other partisans. He had only heard of the reorganizations and international adventures of the successor managers third-hand, and through the ridiculous optimism of the GE Annual Report. We had mumbled over our copies of the proprietary [looseleaf !] organization manual and tried to see whom I could talk to - or more precisely, whom Paine might sell my consulting services to. There were literally a hundred organizational possibilities, but the slots were occupied by strange names except at the very top. I suggested to Fisher he start there and work down.

This is a good place to list the culprits, victims, and in overwhelming majority ignoramuses, of the 1965/66 GE information technology kingdom. The 300,000-person company (yes, Marion Kellogg was still listed!) was still divided into staff areas and five groups, plus a sixth international group which would give me fits in a few months. All these were headed by two-star vice presidents, and under them were major divisions usually headed by one-star VPs like my hero Gerhard Neumann. Most of the domestic and highly interwoven computer departments were under an Information Systems Division, quite properly named, undoubtedly at the insistence of its new and exceedingly knowledgeable boss Lou Rader.

Yes, Lou! Some hint of what it must have taken to persuade him to come back to GE was to be found in his location: division headquarters was in Charlottesville! An important deputy, Jerry Coe, was at 570, and ran a three-person shop called Data Processing and Communications [communications with Lou, one presumes!].

The telephone guys were in Lynchburg. Specialty Controls, Lou's old department, was still in Waynesboro. There was a process control outfit, recently centered in Phoenix. They had left the semiconductor manufacturing in Syracuse, but put it under ISD. And somebody had scooped up the old Instrument Department, still in West Lynn. These were all characterized by having "real" manufacturing sections - that is, a product. In that vein there was a Specialty Equipment set-up in Phoenix which I assumed was still doing ERMA or ERMA parts.

Then we found a gaggle of special operations, banned by the old Smiddy philosophy. Jerry Coe's was one, and there was a coordinating group under Lou Wengert at the same deputy level in Phoenix, and one in Syracuse under Len Maier, who was also building a real-product outfit in Oklahoma City.

There was a planning group for the division in Charlottesville under Bob Curry, whom I knew slightly and whom I think Rader brought from Univac, and an Information Systems Marketing Operation under a poor type named Vern Cooper, in Phoenix, which competed with Curry. This Phoenix office was where the sales force reported, rather than in the product department - shades of IBM!

There was a listing for an internal automation operation in Schenectady, which also sounded like a Rader insistence, and amazingly, Jordan Baruch, a Genuine User, running his Medinet (with a software section) which some crazed soul had bought that very year for Generous Electric but left in Boston.

There were the usual legal eagles, and a retirement spot for Ed Parker, who had helped me back in the 701 days in Evendale, and had been a major bridge to Baker.

They had set up a Field Engineering Operation working out of Phoenix, which made sense, and there was what would some years later be called GEISCO: centers in Huntsville (sob!) and Cleveland and Chicago but headquartered out of Bethesda, as it is today. I see now, although I don't remember noticing it with Fisher, that there was a center at Dartmouth, where GE was having one of its painfully few successes.

Now, about the key activity: they had created a Computer Equipment Department - the main one, signalled by a patent section - out on Black Canyon in Phoenix, and Fisher said I should see it: a real GE plant with all the bells and whistles, churning out 600-series mainframes.

The manager was a completely new name to me, for all my DATAMATION note-taking. I went to the TEMPO library, which was at section level, elegantly labeled Technical Information Operation, and to my delight found it headed by one of my Evendalers, Klaus Liebhold. Not only was he still a friend, but he and his family still had my lovely milk-chocolate-brown poodle Carole, whom I had given them in Ohio after Dorothy's death!!

The dear creature was a little gray around the muzzle, and of course didn't remember me at all - but it was wonderful to see her, and realize how happy the intervening decade must have been for her.

Klaus tried to get back issues of the organization manual and position announcements, but there seemed to be no way in 1965 [how different a Web search would be today!] to find out where this mysterious character had appeared from. His name was Erwin Koeritz, and he disappeared a couple of years later just as unobtrusively as he had emerged. He didn't belong to any of the pertinent professional societies.

This seemed to be the pattern in the lower reaches also. I was amazed to discover there was no engineering section, although one of the poor simps who had lived in the college building in 1957 had survived and was running a peripheral equipment operation responsible for hardware integration; the stuff was bought or made outside. His old boss Ken Geiser had disappeared but was still in Phoenix, his great wife having so embedded herself in the community that Ken would not leave. Good for him, I thought.

The one man I could relate to was John Weil, who was a Real Figure in the professional and user-community circles I had inhabited for so many years. He had been at GE San Jose, somewhat as a successor to Dick Stark (who had decamped to Academe). This was the sort of engineer/scientist the departments, division and group needed so very badly (and seemed to have so few of). My guess is that Rader had drawn him in. He had a means-anything title: Manager, Systems and Processor Operation.

There was absolutely no other trace of software. Bob Bemer had not yet arrived on the scene. Great stuff was rumored to be coming out of Dartmouth, but I heard this first via gossip at the New York IFIP meeting; Fisher didn't know, and if Gwynn had heard it was probably through UCSB, the fancy campus of the University of California five miles west of us.

One problem with the higher organizational status of all these activities was that it drew wannabees in a way that the feeble Phoenix show had not done in ERMA times. Few of them had ever shared the computer excitement - Weil was an exception - but they all had studied management! And enough of the Smiddy philosophy survived in Fred Borch's GE to let these unknowledgeable types clamber up the ladder.

LaPierre had retired. Jack Parker ran our group, and Gerry Neumann a huge division under him. And TEMPO was part of a Washington-oriented division run by a Berkeley Davis, whom I knew nothing about. Rader reported up through a different group, unfortunately - to a guy named Hersh Cross, who in today's parlance would be called "part of the problem"!

While Fisher was noodling around through these multifarious channels and reaching up towards Cross, I tried to work directly on Rader, with whom I still had some standing. One problem was geographical; he stayed huddled in lovely Charlottesville, and I was not as free as I had been in Evendale to just saunter in on him!

A curious note is that absolutely none of these outfits sent representatives to the triennial IFIP conference at the New York Hilton. Rader himself would have been a welcome keynoter, for instance, to balance out Snow White IBM and the other six of the Seven Dwarfs. He had been featured at a banker bash earlier in the year, which reflected ERMA rather than MAC and such.

I don't propose to tell much about that IFIP meeting, which was given advance space in the May issue of DATAMATION, and reported fairly well in July. It had displaced the regular Spring Joint, and had a label which soon disappeared: IFIP Congress 1965 INTERDATA. I had barely arrived in Santa Barbara, and in fact I seem to remember telling Fisher on the interview trip that attendance would be an important part of the relocation deal.

I flew United into Kennedy [JFK; no longer IDL!] on 18 May, and out of Newark on the 26th. Although neither the Joints nor IFIP65 strained the New York hotel scene in the way that the giant Seventies NCCs were to do, I took the precaution of putting up at the Gotham, wistfully remembering the long stay when I came to De Carlo at the beginning of 1958.

There were three or four thousand Americans and eight hundred foreigners, and a major chasm between interest in the exhibits and stupid stuff about ALGOL60. But the attractions of Manhattan for me lay elsewhere. I had been gone less than two years, but it was and is a cityscape that changes and changes.

I was approached by Paul Armer, glad to see me back from overseas, to be backup speaker at a great ACM/DCA bash being arranged in Los Angeles to feature Ershov, the Novosibirsk king of Soviet software, who had arrived imbedded in a glum cluster that had run into travel restrictions at both ends. "If he shows you can sit next to him," said Paul, "and if they won't let him out of New York, you can tell us about Europe." In the end he came, and was dreadful. But the sight of a real live Soviet computer professional made up for it.

The report in DMN is good about the very first stirrings of ARPA, and reports early sessions on standards and on patents. I was too dazed by my unexpected transformation to remember much about any of the stuff, but clearly the lump of we-must-put-in-this-paper-from-Nigeria IFIPerries was leavened by Joint concerns. It is fair to say that the visitors thought it was a great meeting, and that the Americans remembered Paris!

Many of my old European friends and 1962 acquaintances were amazed that I was living in the U.S. again - in fact, many of them had thought I was still soloing in Monte-Carlo, not having heard of my adventures with Gordon and the 360. They all seemed to think it was quite natural, not realizing I would have preferred the U.K. or the continent. Those who knew her were concerned about Elizabeth, stranded [as they thought] in French Switzerland.

I cannot remember whether SHARE founders other than Armer showed up; most of them were decidedly not internationalists, and indeed guys like Jack Strong hated to even come to Manhattan. But as I said above, I was dazed by my new, ahem, opportunities.

Well! Jumping back to DEACON and to autumn in Santa Barbara, I had begun demonstrating what the team had produced not only at RADC and at the Pentagon, but internally in GE. This was to introduce the activity to the steadily growing community of users in the giant company, a community which was being held back by Rader's gentle admonitions at the divisional level from ordering 360s. I found it hard to recommend the 600 series, partly because I still had major reservations about Phoenix but also because I had great difficulty in finding out much about it. Shades of Burroughs!

On the personal front, Elizabeth had finished her horrid confinement in Nevada and the divorce action was imminent. I had had to leave the charming little house in Montecito when the owner reclaimed it, and was a resident of a very dull motel. But I spent almost all my private time with Joyce and her boys, and planned to move in with them after marriage and honeymoon. In preparation, lovely sister poodles named Minnie

and Suzie and a kitten Wyman and Wallie had rescued had already begun to swell the ranks, and a Siamese was under consideration.

Joyce and I were married at Christmas. The boys were pleased. I moved my last possessions into the mesa house, loaded Joyce onto a Scandinavian transpolar (she resisted first-class, thinking of "our" alimony payments), and again went honeymooning. We did New Year's Eve in Copenhagen.

We spent five pleasant days in London, flew down to Zurich, rented a car (the Porsche had been shipped to Elizabeth), and enjoyed wintry St. Moritz and the Cresta crowd. Judging Joyce's preferences, and concern about comparisons with Elizabeth, I put us up at the Crystal rather than the Steffani.

I wanted to show my lovely new wife all the things I enjoyed, hoping perhaps to live with her in Europe some day. It was a mistake. Honeymoons are for brides, not grooms. We should have gone to Hawaii.

When I married Nancy years later, and honeymooned in the Far East, I made very very sure she wanted to do it. In fact, we even talked about Hawaii as a first stop!

Joyce and I flew back to Kennedy on Swissair, which she liked, and connected to TWA for Los Angeles. We were met at LAX - the boys were ecstatic - and driven up to Santa Barbara to begin an exciting marriage.

I pass over the next months of struggle with both DEACON and TEMPO. The group did well, notably by getting a big bundle of material ready for presentation at and publication through an AFIPS conference. I got Fred Thompson to start off the session, partly because it was his due and the youngsters approved, but also because I was more than a little dubious about fielding questions from the linguistics people in the audience if I did it!

Fisher's inquiries at the group and divisional levels began to bear fruit (I should mention that I got nowhere with Rader, my proposals probably being blocked by Bob Curry). John had found considerable concern over the European operations, which were being fumbled over by the second or third Professional Manager shipped over by 570 Lex and the International group. It wasn't just cash flow, or orders: Cross quite rightly had the feeling he wasn't getting the Full Monty.

It ended up by Paine authorizing the two of us to make a major tour of the Bull and Italian venues, and report to Hersh Cross quietly on what we found. I should begin by saying the whole thing was a fiasco, and was cut short as the machinations to sell the whole crazy GE shebang, from Phoenix to Borgolombardo, to inept Honeywell, began to climax.

But the big shots carefully didn't tell us, and I had not noticed the very faint whispers in the trade that the goings-on were going on. We packed our suitcases and went.

This was 19 October 1966. Joyce's successor as travel provider did not do too well by us, and we were somewhat crumpled as we emerged from Alitalia at Malpensa, to be met by a big crew of ex-Olivettians pretending to be GEers. The key figure was one Ottarino Beltrami, whom I had never met; Roberto Olivetti, whom I had hoped to see again, and who was on the board of directors of Olivetti-General Electric s.P.a. along with Rader and financial guys, stayed away.

Beltrami was backed up by Sacerdoti, whom I did know from IFIP connections. Both were nice to Fisher but cautious with me - word had been passed! None of the Canadians I remembered from 1962 showed up. We got a tour of the Milan facilities (which I literally don't remember), a long and unconvincing market-futures exposition, but nothing much about finances. That annoyed Fisher, who had boned up on the official figures back at the ranch, but relieved me; I wouldn't have believed even the decimal place. I wanted to go up to Ivrea and see some production and read some shipping tags; out of the question, said Beltrami. "We have the whole story for you here in Milano!"

But wow! did I ever enjoy the meals. They laid it on. John was somewhat repelled, being a simple eater

back in the Oo Ess. I told John what we ought to do was to sneak back and interview a few GE-115 customers, which I knew Vacca and Ercoli could turn up for me. Take too long, he said, wincing (he knew I meant I didn't believe the yarns that had been spun). I figured I could do it by telephone and regular mail after we got back to SB, but that of course never happened. How much we would have benefited from today's e-mail!

The big crimes were up north, anyhow. Bull was hurting, and there was a GE guy to beat on at 94 avenue Gambetta: a disaster named Brainard Fancher. I didn't want to do Paris right away and John was coming around to my "talk to customers" routine, so we got ourselves rerouted to one of the national companies under Bull-GE, and went out to a major 625 installation at ASEA in Sweden. This was at Västerås, northwest of Stockholm. Forecasting a later merger, I called ASEA "the Brown-Boveri of Sweden" - there were undoubtedly links to GE, but neither John nor the various GE information sources confirmed it.

Here I was in my element, and relieved to have Fisher see me perform. I talked about time-sharing, and DEACON, and the European scene, and had a great time. The ASEA people were keen on the 625 and unhappy with IBM Stockholm. I pricked up my ears when I heard some disparagement of the GE crowd at [Swedish] headquarters, where we were due the next day.

John and I reluctantly were chauffeured off to the big city. We had been told to join the company celebration - it was not the weekend, but I no longer remember if there was a holiday or some special Bull-GE date - at a moored party boat in Stockholm harbor. Decanted, we struggled with our suitcases up the gangplank into a mass of handsome male and female Swedes whooping it up. Dozens of 'em!

We asked for the GE party and were told "we have the whole boat!!" John was flabbergasted. I was more accustomed to European style, and told him there were not only wives and husbands, but customers and their wives, and prospects, and probably the general manager's mother and father. Didn't help; he couldn't get past the fact that the one 625 and a handful of small Gammas [55s] were all the office had going.. It was the low point of the whole trip for him.

Paris did not restore him. Fancher was huddled in a dumb office surrounded by a hundred hostile Frenchpersons, and had not prepared any kind of show for us - mostly wanted to talk about GE "back home", and Phoenix. Oh, how I would have enjoyed his wonderful job - and how he hated it!

When we got back to California Fisher did the report, saying I had to catch up on my DEACON responsibilities. I don't have a copy any more, but remember how circumspect he was about the individuals. My view, as will have become obvious to readers much earlier, is that it is people who count: a Neumann, a Watson, a Robinson, a Fancher, an Oldfield. The beancounters ignored 'em, and Fisher was content-conscious: project descriptions and Gantt charts and technical audits. But he did not disguise his misgivings, and the beancounters were not much persuaded either. My animadversions were not needed.

The document disappeared into 570 and Charlottesville. I tried to get up a solo trip in February, more like my 1962 CDC tour, and using Rader as an excuse rather than Cross, but had hardly set foot on European soil than Paine called me back. The transfer to Honeywell was about to start, and he was afraid to get stuck with the cost of a survey if the sponsor evaporated. Ugly scene.

I did not fit well at TEMPO. Part of it was that Paine was a C-E-I-R type: promise anything. Partly it was that I was so mouthy about how GE was again throwing away a terrific opportunity to scare IBM spitless and maybe inch Sperry Univac out of the Number Two slot. And this was inevitably reflected in tensions in my new marriage. Being pro-European in a very American paradise was contributing.

Paine was afraid I would do something unfortunate with DEACON. He and Fisher were sort of hinting I ought to talk to Rader (who as far as I could see wanted no Grosches around as he struggled in the selloff maelstrom).

Then, in a version of the skies opening when I was drafted out of Forrester's WHIRLWIND to set up

Evendale, an old friend/enemy emerged from the jungle. Cuthbert Hurd had left IBM, where he had done so wonderfully in starting and running Applied Science but had later been crippled by the STRETCH disappointments (which gave the beancounters leverage over the computernicks). He was now chairman of a great software/applications house called Computer Usage Corporation. And because of his extraordinary contacts in every corner of U.S. computerdom, he had been appointed head of the search committee to find a director for the foundering Center for Computer Sciences and Technology, established at the new National Bureau of Standards site in Gaithersburg.

He and his adjuncts had scoured every computing barrel in the country. Nobody wanted the job, which was a killer six ways from Sunday. My friends inside said it was impossible. The first director had been savaged by the NBS establishment, the next was scheduled to be eaten up by the industry. And Congress was angry at the delays and obfuscations. Woooooo! I jumped at it.

56 A VERY DIFFERENT WASHINGTON

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In Chapter 56 you will encounter

(in order of appearance):

Cuthbert Hurd [12](#)

Allen Astin *Director of NBS, creator of its new site, "a towering presence in Conservative Science"*

NBS [National Bureau of Standards] [01](#)

Congressman John Rooney *a horrid yahoo who held the purse strings*

A 75-foot flagpole *focus of Rooney's hatred of the Gaithersburg campus*

The battery additive scandal *a warning to intellectuals that money usually ranked higher*

Jack Brooks *always an ex-Marine, he fathered PL89-306 to improve federal use of computers*

The Government Activities Subcommittee *a tool of considerable edge and considerable vigor*

BoB [Bureau of the Budget] *assigned policy by the Brooks Law, but given little technical range*

GSA [General Services Administration] *assigned procurement and shared use, with a vigorous leader*

Commerce *included not only NBS but the Census and Weather Bureau computers - and much else*

Ernie Baynard *copied his boss' vigor but "a little knowledge is a Dangerous Thing"*

CCST [Center for Computer Sciences and Technology] *despised by the Feds and feared by the industry*

"The Old Bureau" *saw no place for CCST in a National Physical Laboratory*

IAT [Institute of Applied Technology] *the Center first occupied a mezzanine in its rambling edifice*

John Eberhard *a sturdy architect; not really one of the boys, but he had not eaten up Old Bureau heroes*

PL-313 *created for Wernher when the Army needed him, it slipped me in as a top supergrade*

Herb Hollomon *out of GE Schenectady, he knew a little about my mainframe adventures in AGT*

The Math Tables Project *imported from Manhattan and the WPA, it was a hive of human "computers"*

Howard Gammon *before Brooks' intervention, there had been a Clewlow Committee*

Kitty Bailey *a power behind the vacant throne*

Ethel Marden *a pioneer SEAC programmer, a CCST division chief, and a very good friend*

Margaret Fox *for more than a decade, Sam Alexander's right hand "man"*

Norm Ream *IBM costume and accounting background, each anathema to the major NBS institutes*

Joe Cunningham *he had run Air Force shops, and much later was to run ACM HQ*

Ed Dwyer *the predecessor bill to PL89-306 intended that GSA lead federal computing centers*

Hearing Day *my first taste of a very major Washington activity [19 July 1967]*

The Bethesda police *"hey, look at Whiskers in that top-down Jag - and California plates!"*

Joe Wegstein *my belated advent saved him (and Astin) from embarrassment*

Ogden Reid *amazingly, the New York congressman had heard of Alfred Korzybski*

Joyce and the boys [54](#)

Elizabeth [19](#)

Cross-country *a wonderful chance to see the country east of Golden California*

A navy blue Ford wagon *and in a chariot much roomier than the old Falcon*
Carderock Springs *the Eberhards, and now the Grosches, had artier housing than center-hall*
Snow before Thanksgiving *a spectacular convergence of moving van and pets and boys and wife*
A beige 911 Porsche *a tweaked motor and Recaro seats, and with air conditioning stuck on*
Four crates of pets *Joyce bundled them onto United in SB and I bundled them off at Dulles*
Both hot and cold air *an unorthodox solution to hundred percent humidity*
Persecution on the Interstate *ticket after ticket, until I switched to a Mustang*

All this, from Cuthbert's initial phone call through a hurried reconnaissance to Gaithersburg [10-11 May 1967] to my enthusiastic acceptance ("drafted again!") took only a week. Joyce thought I was crazy, the boys said they wouldn't leave Santa Barbara, and my putative boss Allen Astin was warning me he needed me at hearings Jack Brooks was setting up only days ahead. Even for me, it was a wild wild scene.

About the key figures: Hurd, readers know from earlier chapters, and he dropped out of the picture the day I was sworn in. Allen, or "Dr. Astin" as even his oldest associates called him, had been director of the Bureau for decades. He had planned and carried out the gigantic relocation of NBS from Connecticut and Van Ness in the center of the District, to an impressive campus Outside The Beltway - indeed, half way to Frederick - in then-rural Maryland. He had struggled with the costs, worried about staff problems (no public transportation for the support people, much-diminished contact with the D.C. scientific establishment for the senior and ambitious-junior staff members), thought very carefully about moving the metrology operations and their historical standards, considered the effect on remote Bureau operations in Boulder, Colorado. He had done it beautifully, and in spite of everything his superiors in Commerce and an Irish yahoo in Congress who apparently hated science and scientists and Allen's handsome 75-foot flagpole in the center of the Gaithersburg site, could and did put in his way. Genuinely a great figure; not a Watson, not a Gerry Neumann, but a towering presence in Conservative Science.

He had endured one horrid Washington torment called The Battery Additive Scandal. An innocuous and very minor NBS report had noted in passing that a doping liquid which was supposed to extend the life and effectiveness of conventional lead-acid storage batteries was worthless, and the manufacturer had descended wrathfully on his tame congressmen and the stupid at the top of Commerce, and had the initially mystified Astin yanked out of his directorship instanter.

The science community, and not just the conservatives, rose to a man [ah, person] in his defense, and he was reinstated. But it shook the Bureau to its foundations, and painfully reminded its neighbors in Washington, and technical people all over the country and the world, that there was Science and there was Money And Power, and they sometimes, indeed often, clashed.

Jack Brooks was on the Power side, but not a yahoo, not a stupid. He represented Beaumont, Texas (east of Houston, north of Galveston) in the House. He was a tough ex-Marine, and in his position as head of the Government Activities Subcommittee of the Committee On Government Operations had become dubious about the efficiency of computer use across the Federal spectrum, from old-established Census Univacs to the networks beginning to spread across the nation. He should have been even more dubious about the wilder computer shores of the Pentagon; I don't know to this day whether he more or less exempted them as White Hats or saw them as too powerful to challenge directly. But his first efforts at a bill to put more control in the hands of GSA, the General Services Administration, especially as regards procurement and service operations, had not prospered.

His newer bill had become law a year back, and it was to review its effects so far that he was calling hearings in June, before the House scattered for the summer. The NBS involvement was crucial, since it was the addition of technical surveillance to the administrative and financial governance that made PL89-306 different from the earlier legislation. The policy matters had been handed to the Bureau of the Budget [now OMB], procurement and shared services were still with GSA, and Commerce in the shape of its Bureau of Standards was told to provide technical leadership and to institute standards.

Staff functions regarding computers, which among many other interactions were setting up the hearings, were run for Brooks by one Ernie Baynard. I came to like him somewhat, but never to the point of expecting him to care a fig about HRJG, nor to the point of my forgetting the aphorism about A Little Knowledge. I'll come back to these and other Congressional figures later.

I had been told by Hurd, and at considerable length by my insider friends at and near the Bureau, that there had been a scaffolding erected when CCST, the Center for Computer Sciences and Technology, was started up. In spite of the need to immediately placate Brooks and the bemused Secretary of Commerce, it had been called a Center rather than an Institute, as the physics and metrology and other "Old Bureau" [ie pre-WW II and even pre-WW I] major partitions were labeled. It thus held a mezzanine position in the Institute of Applied Technology, which also had divisions doing building safety [fire codes], metrication, and similar miscellanies regarded with scorn by the purists.

Start-up had been so painful that the conflict over promises by Commerce and Astin himself to upgrade the newborn to full Institute status, and the overt and covert efforts in Gaithersburg to knock it down to a division, had never been resolved. So I came in as a report (albeit as a Director; division heads were only Chiefs) to one John Eberhard, director of IAT.

It was he and not Astin who stood beside me as I was hastily sworn in. The Civil Service, shuddersome custodian of the bureaucracy, had outdone itself by finding my old resignation papers from 1943 BuOrd in some West Virginia cave - the originals, not microfilms! - and using the antique wording about the Navy "not interposing" objections to a re-hire, had processed me in to full robust bureaucratic status in four days. And in order to get me top dollar, the same as the GS-18 heads of full NBS institutes, they invoked PL-313 status, which had been invented a few years before to bring my old friend Wernher von Braun into Civil Service and Huntsville. It paid only \$36,000 a year, but it was the most a GS could then hope for. Next step up in those days was to Astin's rank, E-5 ["Executive"], which reported to an E-4 assistant secretary, which reported to a Cabinet E-1 like Commerce or an E-2 like the head of NASA. The fancier Es required congressional approval, and all served at the "pleasure" of the President.

Shades of Generous Electric! Of course Smiddy would have prescribed a seven-person cabinet and bundled 49 E-2s under same. He would have said no E-3s, since Unders or Deputies were proscribed in 1955 GE. There would have been just over two thousand E-5s, which was indeed the 1967 real-life case among the Feds.

John was an architect by profession, and had been picked to head the catch-all institute at a time when fire safety and building codes were high in priority on The Hill. He served Astin during the Johnson era, when the Assistant Secretary of Commerce for Science and Technology (ruling the Weather Bureau and the Census as well as NBS) was one Herb Hollomon. Hollomon knew John, and in fact even knew a little about me, since he had come out of General Electric in 1950 in the sub-cabinet hirings of that year, and had kept his connections, especially to GE's research areas.

He "interposed" no objections to bringing me aboard. And John had no desire to hang on to the unruly and (at least within NBS) unassimilated CCST crew, which at my mid-1967 advent numbered 205. I had run 175 in my GE heyday, but I'd built up that outfit from a nubbin, while CCST was a congeries of old NBS and extra-NBS bods dating back to John Curtiss, the WPA Math Tables Project, wonderful but difficult Sam Alexander and the SEAC, and even a couple of indigenous computing helpmeets from earlier desk-calculator-support times. Hiding behind the arras was, amazingly, Howard Gammon of the old Clewlow Committee, and surely he still knew of subterranean passages leading back to Policy Country.

CCST was mostly organized into six divisions, which even in the first weeks I felt no need to re-clump. And I had a vigorous but difficult lead secretary, who thought of herself as really running the joint in the absence of a director. Kitty Bailey, her name was, and she ran a shop with two "girls" who took dictation and typed (no copy machines yet!) and covered for her during her political forays. She was of course a mine of information, but I was wary - I had trusted Jean Miller implicitly, but -..

For many years I had had a warm friendship with Ethel Marden, one of the very first programmers on Sam Alexander's SEAC. Ethel was head of what I would today call a software division, was the first in the Center to hear of my possible apotheosis, and the first to call me, warn me of the horrors of NBS opposition, of CCST divided loyalties, and beg me to come anyhow. We are still good friends, 35 years later. She went so far as to offer explicitly to resign her chiefship if I came, and let me hire "one of my own people" - what a woman! I could sense the tensions between her and Kitty, and between her and another female chief from SEAC/SWAC times, and was sure I could benefit from it.

That other chief was Margaret Fox, who as I have said was Sam Alexander's right-hand "man" for many years. She was the nexus of the "it ought to be Sam" faction in CCST, which had helped the rest of NBS undermine my unfortunate predecessor. I didn't have to hear that from Ethel or Kitty - I could almost smell the poison dripping from her fangs at my first staff meetings.

Before I go on to other denizens of CCST I'll tell about the horrid months of its 1966 creation. The first director, who could not have had friends inside the moat as I had had, was Norman Ream. I asked Cuthbert several times how Norm could possibly have been selected, but never got a clear answer; he perhaps didn't know, but more likely was afraid to scare off his last bottom-of-the-barrel candidate! Norm's background was accounting, his experience and wingtip appearance IBM. And they dumped him into a pool of PhD scientists who hated the CCST idea, and hated pinstriped business types, and (quietly) hated being told what to do by congressmen.

He barely managed to touch palms with his opposite number in Budget, Joe Cunningham, and his opposite number in GSA, Ed Dwyer, and then NBS ate him up. I never heard much from him, when I visited him later in the Pentagon, or from Joe or Ed, about what he tried to do. But it was obvious from internal traces in CCST that even his simple attempts to set up housekeeping for "his" Gaithersburgers had been thwarted. Eberhard seemed hardly to have known him.

Norm managed to wangle a Special Assistant to the Secretary of the Navy post, with a plush office and white-jacketed Filipino coffee server and such, and escaped his Gaithersburg agonies. CCST writhed and twisted on its mezzanine. The Old Bureau types smirked.

This is a good place to tell about Hearing Day [19 July], the climax of my first days at NBS. Astin, supported by Eberhard and two or three CCST persons, was scheduled to follow Cunningham and Dwyer in the late morning. I was perched at a Bethesda motel, and set out in good spirits in my top-down California-plates Jag to experience my first Hearing. A siren !!

I was dragged off to a station house, yammering about Brooks and Astin. This was Maryland; in the District they might have paid attention. Finally an unconcerned sergeant called Baynard's number (Ernie was at the hearings, of course) and confirmed that a bearded crew-cut California freak was indeed supposed to be on The Hill that day. "Leave the car," he said. I dashed out and flagged a cab.

"Doctor, " Brooks is saying to Astin, "tell us about these computer generations that seem to make federal installations become obsolete overnight." Astin turns to Eberhard, Eberhard turns to probably Joe Wegstein - and I burst into the room! Grrrrreat scene!

After minimal excuses, which do not appear in the printed proceedings, I settled in. I knew more about virtually any computer topic than the sum total of all the audience and participants, including Cunningham and Dwyer and Baynard, was quite willing to say so, and was as yet uncorrupted by much knowledge of what Brooks wanted done, what Ream had tried to do, or what NBS willingnesses (few), CCST capabilities (in sum, considerable), and cooperation with Downtown (unexplored) could do. The stenotypist folded his overheated machine, and we all went away.

The story is told more formally in Hearings before a Subcommittee of the Committee On Government Operations, House Of Representatives, Ninetieth Congress July 18,19, and 20, 1967: "Data Processing

Management In The Federal Government", especially pp.69-106. In rereading it I am most impressed by the fact that Congressman Ogden Reid of New York referred to Korzybski and general semantics.

Astin's craggy old face had flushed several times as I got off typical zingers, some of which made Baynard scowl and some, Brooks grin. My putative boss was probably wishing for Genial Norm, or at least that he had not bought this free-swinging replacement. But as word filtered up from The Hill next week, probably via Cunningham and Dwyer and perhaps Howard Gammon, that Brooks had been if not convinced at least encouraged that NBS would keep trying, things settled down. Clearly the ex-Marine had found my frankness acceptable.

This is a good place to write about other differences I was coping with: wives, sons, pets, houses, cars, even air conditioning. I had left Kensington for Lonn Guyland in wartime 1943, with Dorothy, in a very old second-hand Plymouth, and with a small part-load of belongings to follow. I was returning in relative splendor 24 years later, a veteran computer expert instead of a novice optical engineer. I was at the very top instead at the bottom of the civil service scale. Trumpets were not exactly sounding, especially inside NBS, but I was pretty pleased with myself.

It was not clear when I drove away from Santa Barbara whether the marriage was shattered, but it certainly was badly fissured. Joyce was angry at my craziness, the boys didn't want to leave their father, their friends, their schools. Santa Barbara was (to me also) a lovely place. And my wife had a house, and we had pets, and the boys knew I'd never race again, and wanted to go on with skiing at Mammoth.

I stopped off in Scottsdale and told some of this to Elizabeth, who kept claiming we should get back together and clearly would fit the Fancy Fed ambiance like hand in silken glove. But she was adamant: "Dump your little California floozy, and then we'll talk." And I was due in Washington - hurry, hurry, said Eberhard.

The Jag overheated. A radiator big enough for coolish SB was too small for summer cross country, and this pointed up that it couldn't possibly be air-conditioned (and would be over-powered for Washington winter snow and slush) - and I would be too busy for a hobby car, and not rich enough for a 3-car garage.

Well, as I struggled with NBS and CCST and standards, and Ernie Baynard, it began to work out. Joyce missed me, the boys missed me, the pets missed me, the house was empty (and the little old Falcon inadequate). I wrote loving letters - I missed them too, all of them, in spite of the ravages of my new job. Joyce's replies, beautifully handwritten, grew more frequent as well as warmer. Yes, they would come - wife and boys and four pets (but not the Falcon). NBS would pay, and Eberhard tried to help me buck the system, for instance by supporting reconciliation air trips. On one of them I traded Joyce's old car for a huge new navy blue Ford wagon, so that she and the boys could drive across and see the wonders of early fall America. Put it in her name, which reassured her. Said, ship the pets; I'll scoop 'em up at the airport, and take care of 'em at the new house while you guys enjoy the Rockies.

Joyce began to put sex in her letters.

John was still enough of an architect that he had bought an interesting house instead of a center-hall colonial, in a Maryland development called Carderock Springs, near the David Taylor Model Basin. He encouraged me to rent a similar place, with sloping lot and winding access, and lots of skinny pine trees. Three levels, big two-car attached garage, well designed but poorly constructed. I indeed decanted four crates of poodles and cats into its considerable spaces a few days before the wagon arrived --- and a big furniture van. Don't remember any more how I camped out, but I was living there in some fashion when the pets descended.

The grand arrival of the Santa Barbarans was greatly helped by a deep early snowfall, so that Wyman and Walter could build snowmen and hug the poodles and enthuse over their new house while Joyce and I laughed and cried. Before Thanksgiving!!

Before the pets and people arrived I had opened an account with the local bank which had a branch inside the administration building at Gaithersburg. That gave me instant credit - GS-18 credit - with which I descended on the local Porsche dealer. He eagerly scooped up my lovely Jag and proffered a somewhat special 911: a tweaked motor and Recaro racing bucket seats. It was a placid beige, where I would have preferred something more vigorous, or at least elfenbein, but it was still pretty fancy. And needless to say, it was air conditioned! I reluctantly passed on a rag-top.

I was stymied the day the pets arrived at Dulles; no way to handle four shipping crates! But Eberhard loaned me a wagon, and United agreed I could keep the crates for an extra day (no way I could decant the victims into the wagon, or from the wagon into the empty Carderock house, without losing one or two). We did Capitol sightseeing after the troops arrived in Joyce's big Ford, frequently with two poodles leaping about (it too was air conditioned).

Parenthetically, the 911 had a curious advantage over the Ford, and other cars with integrated air conditioning. The A/C was an add-on, and could be run at the same time as the German heating system. The fogging up so common in high-humidity climates could thereby be avoided: cooled air recirculated dropped its moisture, and the heater warmed it back to comfort.

Joyce was pleased with the modern house, and of course it was larger than hers in SB. Each boy had his own room. I no longer remember about radios or record players or even TVs, but there must have been a proliferation. Wyman went into Winston Churchill, a very famous Montgomery County high school full of Hill offspring, and Wallie was to follow him. All this went very well, but we all four agreed we would want to buy a place soon - keeping the Winston Churchill connection.

Both boys were excited about the Porsche, and Joyce enjoyed driving it occasionally. But my horrid experience on Hearing Day turned out to be an indicator of continuing trouble. I drove on local roads to the notorious 495 Beltway, then north to NBS on 270. And on the two major highways I was repeatedly pulled over by troopers in cars or on motorcycles, even when I was barely keeping up with traffic. I dared not tiger, and in fact was usually brooding over CCST complications - didn't matter. I finally realized that it was an ingrained dislike of Foreign Sport Cars, and traded the pretty Porsche for a Mustang. After that, no tickets for months at a time.

It was a regional thing. I drove the Jag in California, and a later 240Z in Massachusetts, with no problems. Joyce, who sometimes got carried away by the sensuous pleasures of the former, got stopped in SB a couple of times, but her brother George was a local cop -. It was a minor warning that while the District was a world capital, it was embedded in the Maryland and Virginia countryside.

CHRONOLOGY

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- 1918 Born, Saskatoon, Canada (US citizen from 1934)
 - 1924-28 Primary school, Windsor, Canada
 - 1928-30 Junior high school, Toledo
 - 1930-34 High school, Royal Oak
 - 1934-41 University of Michigan, Ann Arbor
- 1934 Entered, as University Scholar
- 1936 Published first computing paper (orbit of asteroid 2101 Adonis)
- 1937 Lawton Fellow
- 1938 Mandelbaum Scholar; BSc (Astronomy)
- 1939 Rackham Fellow

- joined AmAstronSociety
Harvard summer school
- 1940 University Fellow
Harvard again, with Dowse lectureship
- 1941 University Fellow; thesis, Jupiter's eighth satellite
Junior Astronomer, Naval Observatory; final photographic recovery J VIII
married Dorothy Carlson
- 1942 PhD (Astronomy), University of Michigan
Assistant Physicist, Navy BuOrd
- 1943 Optical Engineer, Sperry Gyroscope (LI NY)
joined OptSocAm
- 1944 Optical Designer, Farrand Optical (Bronx NY)
- 1945 Drafted into IBM by Los Alamos;
installed and managed computing at Watson Scientific Computing Laboratory (Columbia)
charter member FedAtomicSci (later FedAmericanSci)
- 1946 Joined AmRocketSoc (later AIAA)
Associate in Astronomy, Columbia
world's first university computing courses
Aberdeen relay calculators arrive at WSCL
last-minute ephemeris of 783 asteroids
- 1947 Charter member ACM
- 1948 Aided installation of SSEC at IBM HQ
edited IBM Forum Proceedings
- 1949 IBM 604 prototype at WSCL
- 1950 Established Technical Computing Bureau, IBM Washington,
with prototype CPC II
- 1951 Elected president AmRocketSoc
fired by IBM [1st time]
Director Logical Design Research, WHIRLWIND (MIT) under Forrester
- 1952 Drafted by GE Aircraft Gas Turbine Division, Evendale OH
- 1953 Number Six IBM 701; raised female staff to professionals
- 1954 Built world's first industrial building solely for computing;
Number Three IBM 704
spoke for Wilkes in Cambridge (first European tour of computing labs)
- 1955 Added GE Lynn MA subsection with Number Twelve IBM 704
- 1956 Dorothy died
helped establish new GE Computer Department, Phoenix AZ
professor, Arizona State College [now ASU]
married Elizabeth Yeager
- 1957 Number 23 IBM 704 at ASC;
first computer literacy course at a university
major GE computer facilities management contract for von Braun at Huntsville AL
- 1958 Hired back into IBM HQ by Watson Junior
DATAMATION column
- 1959 First manager IBM space program; fired [2nd time: "Wild Duck"]
pre-IFIP meeting at UNESCO, Paris
- 1960 Consultant NYC; examined ITT computer prospects in Europe
established Los Angeles office for C-E-I-R
first visit to Japanese computing milieu

- 1961 Consultant Monte-Carlo
Fellow AIAA
- 1962 Visited European computing labs and computer manufacturers for Control Data
IFIP Munich
- 1963 International editor, DATAMATION
deaths in family
- 1964 Moved Elizabeth to Europe
consultant Lausanne;
evaluated IBM 360 for Univac Europe
- 1965 Recalled by GE to manage DEACON computational linguistics project, Santa Barbara
IFIP NYC
divorced Elizabeth
- 1966 Married Joyce Labots-Misbeek
- 1967 Drafted by NBS [now NIST] to direct Center for Computer Sciences and Technology (Brooks Bill;
computer standards)
- 1968 Elected to ACM Council
founding chairman Intergovernmental Council for ADP [ICA]
began FIPSPUB [federal standards publication]
IFIP Edinburgh
- 1969 US representative OECD computer group
Fellow British Computer Society
- 1970 Removed as CCST director for halting federal procurement of IBM System/3;
appointed Senior Research Fellow NBS
- 1971 IFIP Ljubljana
- 1972 Editorial Director COMPUTERWORLD
divorced by Joyce
Massachusetts Governor's Commission on Privacy and Personal Data
adjunct professor Boston University with early social implications course
- 1974 Elected ACM vice president
IFIP Stockholm
- 1975 Consultant Sunnyvale CA
married Nancy Hall
- 1976 Nominated by petition and elected ACM president
- 1977 Major client Fujitsu
contributing editor COMPUTING London
IFIP Toronto
- 1979 Major client Burroughs International
- 1980 Moved back to Europe following Nancy's career path
consultant Den Haag
IFIP Tokyo/Melbourne
- 1983 Nancy appointed scientific associate CERN
consultant Mies Switzerland
IFIP Paris
- 1986 Began work on autobiography/history COMPUTER
IFIP Dublin
- 1987 Resigned from ACM Council after record 19 years
- 1989 IFIP San Francisco
- 1991 COMPUTER published

- 1994 Began work on second part of memoirs
returned to US; professor NMSU Las Cruces
Fellow ACM
- 1996 Nancy died of cancer
awarded NSF grant as "unaffiliated individual" to extend memoirs
three-year appointment at Smithsonian
moved to Washington DC
- 1998 Awarded second NSF grant to chronicle early years of DATAMATION
- 1999 Produced second edition of COMPUTER on CD-ROM [through 1967]
- 2000 Moved to Riga to examine Latvia University collection of antique Soviet IT hardware
- 2001 Returned to US; Distinguished Professor UNLV Las Vegas
- 2002 Awarded third NSF grant to further extend memoirs [NBS and later years]
- 2003 Moved back to Canada after 76 years: IHPST, history of science institute, UToronto

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A COMPUTER PIONEER still active at the policy level, and very much concerned about futures in the computer field, Dr. Grosch is known for the relationship between speed and cost which he discovered in the early Fifties. He worked twice for IBM, twice for GE, and twice for the Federal government - the second time as director of the Bureau of Standards institute which was charged with improving the overall effectiveness of government information processing.

He lived and worked in Europe for many years, and consulted for companies there, in North America, and in Japan. Many years ago he was active in celestial mechanics and in optical design; later, before becoming the first manager of IBM's space program, he was president of the major aerospace society. He was a charter member of the Association for Computing Machinery, and is a former president and council member of that 84,000-member organization.

He has been a contributing editor of DATAMATION, was on the editorial board of MANAGEMENT TECHNOLOGY, and for some years was editorial director of COMPUTERWORLD. He travels and speaks widely, both to technical and to popular audiences; in his speeches as well as his writings he is renowned for his insights and notorious for his frankness.

(End)
