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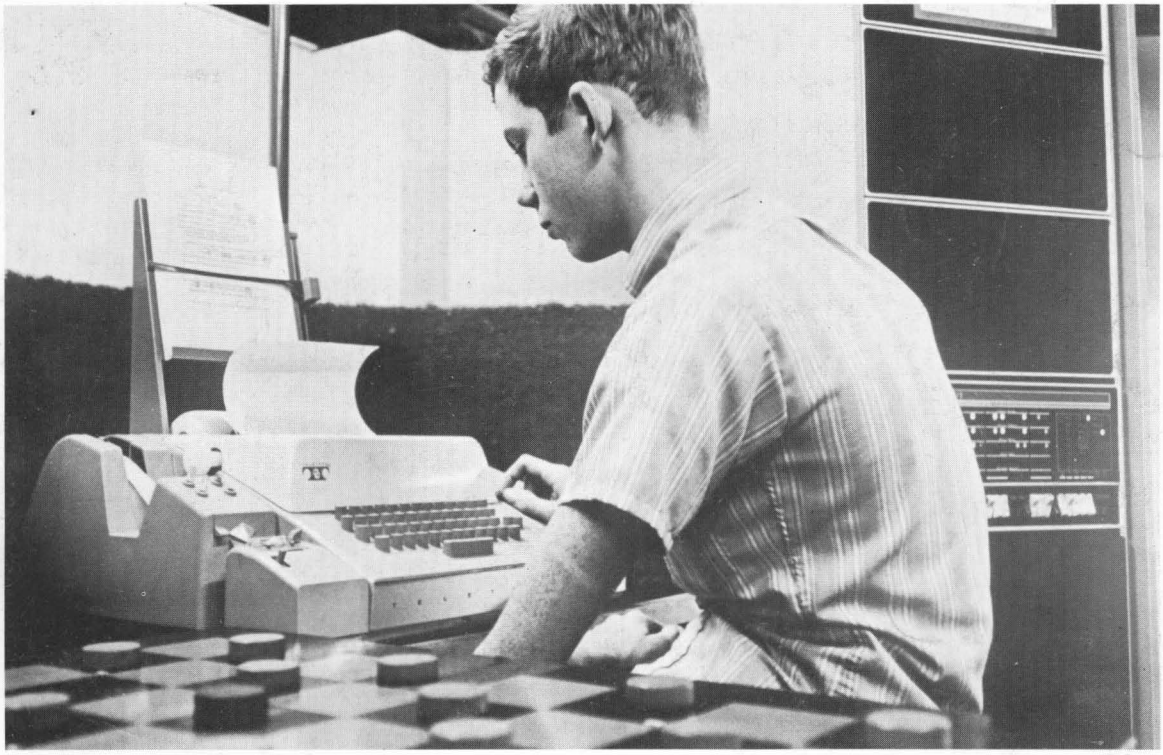
SCIENCE & TECHNOLOGY
February, 1972
Vol. 21, No. 2

computers and automation



Playing Checkers with a Computer

How To Get the Best Out of a Computer Manufacturer — *David Futcher*
Computers at Crisis — *Milton R. Wessel*
3400 Organizations Required by Court Order To Furnish Confidential Data to IBM
Computers and Dossiers — II — *Vern Countryman*
Pictorial Reasoning Tests, and Aptitudes of People — III — *Neil Macdonald*
Zingo — A New Computer Game — *Edmund C. Berkeley*

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Announcement

The Most Important of All Branches of Knowledge

(Based on the editorial in the April 1971 issue of *Computers and Automation*)

It may be that there is a branch of knowledge which is the most important of all.

If so, I would maintain that it is a subject which used to have the name "wisdom" but nowadays does not have a recognized scientific name, or in any college a recognized department or faculty to teach it. This subject currently is a compound of common sense, wisdom, good judgment, maturity, the scientific method, the trained capacity to solve problems, systems analysis, operations research, and some more besides. Its earmark is that it is a general subject, not a special one like chemistry or psychology or astronautics. Useful names for this subject at this time are "generalogy" or "science in general" or "common sense, elementary and advanced".

Many editorials published in "Computers and Automation" have in one way or another discussed or alluded to this subject:

Examples, Understanding, and Computers / December 1964
The Barrels and the Elephant: Crackpot vs. Pioneer / May 1965
Some Questions of Semantics / August 1965
Perspective / April 1966
Computers and Scientific Models / May 1967
New Ideas that Organize Information / December 1967
How to Spoil One's Mind – As Well as One's Computer / August 1968
The Catching of Errors by Inspection / September 1968
Tunnel Vision / January 1969
The Cult of the Expert / May 1969
Computers, Language, and Reality / March 1970
Computers and Truth / August 1970
The Number of Answers to a Question/March 1971

In the editorial "The Cult of the Expert" we offered a leaflet that belongs in this subject, "Right Answers – A Short Guide for Obtaining Them". More than 600 readers asked for a copy; so clearly this subject is interesting to the readers of C&A.

This subject is related to computers and the computer field in at least two ways:

First, many of the general principles which this subject contains can be investigated in experimental or real situations by means of a computer. In fact, far more can be investigated by computer than can possibly be investigated by ordinary analytical mathematics.

Second, since computer professionals are in charge of computing machines, many people consider these professionals responsible for the worthwhileness of the results of computers. Because of "garbage in, garbage out", computer professionals have a responsibility to apply common sense and wisdom in at least three ways:

Input – in the selection and acceptance of the data with which they begin;
Processing – in the processing through a system;
Output – in the interpretation and use of the answers.

Then the computerized systems will produce strong structures that human beings can use and rely on, and not weak structures which will crash with false information or ridiculous results.

" Computers and Automation" for April 1971 contains an article, "Common Sense, Wisdom, General Science, and Computers", which deals with this subject. For more than a dozen years I have been studying this subject – ever since I searched in a very large and good public library for a textbook on common sense or wisdom and found none at all. There is, however, a great deal of information to be gathered on this subject because a large number of great men, ancient, medieval, and modern, have made remarks and comments (usually while talking or writing about something else) that belong in this subject.

The subject of wisdom is particularly important in these modern days. The subject has been neglected, while special sciences have been cultivated. Investigators have pursued the special sciences with the enthusiasm of a child with a new toy. Specialized science and specialized technology have rendered our earthly world almost unrecognizable:

All major cities on the planet are only a few hours apart by jet plane.
Millions upon millions of people who otherwise would be dead are alive because of miracle drugs, – thus creating a population explosion;
Nuclear weapons if used can destroy mankind and civilization in a few hours; etc.

To deal with so many diverse, vast problems we need wisdom. To use wisdom we should study it.

The staff of "Computers and Automation" have decided that it is desirable to make the drawers full of information we have been collecting on this subject more accessible and more widely distributed. We have decided to publish twice a month a publication of newsletter type called "The C&A Notebook on Common Sense, Elementary and Advanced" For more details, see the announcement on page 3 opposite. (The first few issues of the Notebook are free.)

We invite you, our readers, to join us in the pursuit of this subject, as readers of the Notebook, and as participators with us in the research and study.

Wisdom is a joint enterprise – and truth is not shaped so that it can fit into the palm of any one person's hand.

Edmund C. Berkeley

EDITOR

DO YOU WANT TO

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- improve your capacities?

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The C&A Notebook on

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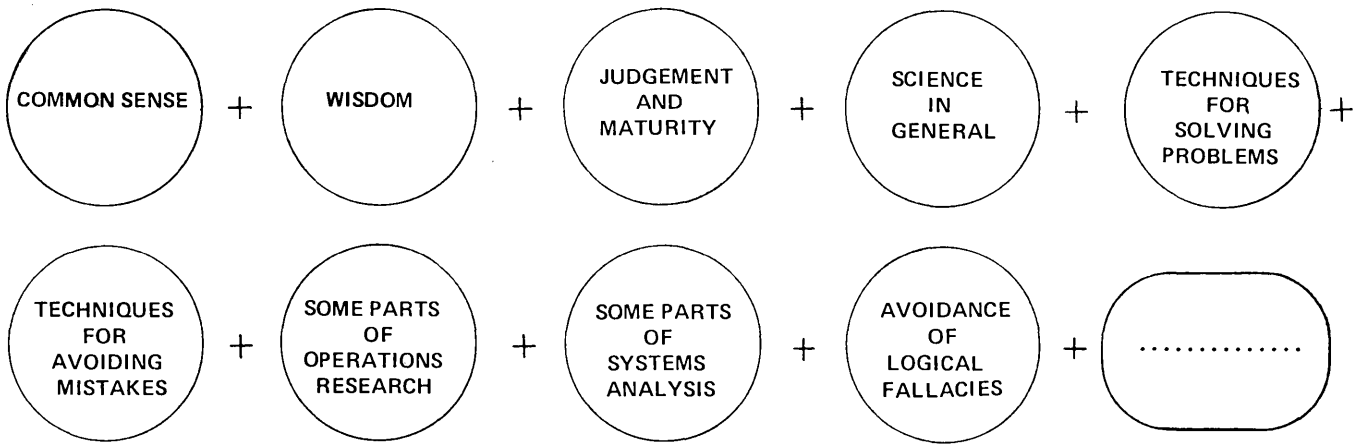
WHAT IS GENERALLY TRUE AND IMPORTANT =



Editor: Edmund C. Berkeley, author, businessman, actuary, scientist, computer professional, first secretary of the Association for Computing Machinery 1947-53, editor of *Computers and Automation*.

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25. The Subject of "What is Generally True and Important": Common Sense, Elementary and Advanced
26. Natural History, Patterns, and Common Sense

---(may be copied on any piece of paper)---

To: COMPUTERS AND AUTOMATION
815 Washington St., R5, Newtonville, Mass. 02160

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Vol. 21, No. 2
February, 1972

computers and automation

The magazine of the design, applications, and implications of information processing systems — and the pursuit of truth in input, output, and processing.

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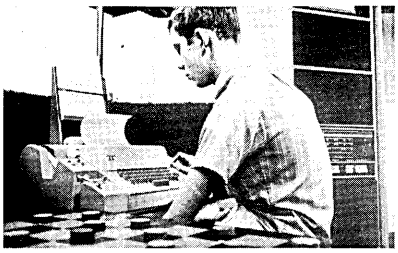

Front Cover Picture

At the Children's Museum in Boston, Mass., young people have an opportunity to play checkers with a computer. The young person makes his move on a numbered checkerboard, and then informs the computer (a PDP-8 made by Digital Equipment Corp.) by typing his move on a teletype keyboard. The computer types back its move and the person moves the computer's piece (no robot hand is available).

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THE CURSE OF A MAGAZINE

A periodical publication, a "magazine", carries with it a curse as well as charms. What is a magazine?

From the Encyclopedia Britannica (11th edition, published 1910-11):

> MAGAZINE, primarily a warehouse for goods or merchandise (Arabic, makhzan, a storehouse, from khazana, to store up). In Morocco makhzan (or maghzen) has come to be used as the name of the government. The Spaniards adopted the Arabic in the form magacen, and the English form comes through the older French magazin, modern magasin.
>
> The meaning of a storehouse or large shop, common in French, is rare in English except in the military use of the term for a building for the storage of explosives and ammunition. It is applied to the chamber of a repeating rifle or machine-gun containing the supply of cartridges.
>
> The name as applied to a periodical publication containing articles on various subjects was first used in the Gentlemen's Magazine (1731) described as "a monthly collection, to treasure up as in a magazine" of articles on the subjects with which it was proposed to deal.

For a publication that is a magazine, these then are the properties which we should focus on:

- timeliness vs. outdatedness;
- value vs. junk;
- storehouse, and access to the items in it.

The curse is this: what is in an issue of a magazine becomes more and more outdated, more and more junk, and harder and harder to get access to.

Timeliness and value are evanescent. A storehouse holding 100 treasures at one time at some later time almost always becomes a storehouse containing 5 treasures and 95 pieces of junk. The advent of the automobile caused hundreds of thousands of buggies to become junk. If new technology enables fine diamonds (which are only crystallized carbon) to be made for only a few dollars apiece, the world's entire stock of diamonds would fast become junk. The galloping progress of new technology in the computer field is converting a great many once good central data processors into pieces of first class junk. And many, many articles in the issues of a monthly magazine will after a few years become of remarkably little value.

But some things never become junk, never attain zero value or zero worth. An example is the painting of Mona Lisa by Leonardo da Vinci in 1505. It now hangs in the Louvre Museum in Paris. The painting has suffered over time: some of its paints have changed from one color to another; others have faded out; but there is still enough enchantment there for it to be interesting and appealing to thousands of visitors a year.

Some ideas, some poetry, some theorems like the Pythagorean theorem, even some articles expressing important ideas, remain of lasting value.

What about access to things of continuing value in the "storehouse" consisting of a magazine for which 20 volumes (about 250 issues) have been published from 1951 to 1971 — "Computers and Automation"?

1. Index. To provide some degree of access, we publish in the January issue of "Computers and Automation" in each year an index to the subjects, titles, and authors of every item we have published in the issues that came out in the preceding year. Usually the index includes well over a thousand entries. An index has been published covering every issue since we started publication in September 1951.

2. Reprinting. In addition, once in a while we reprint currently something that was published previously. In this issue we reprint an editorial — "The House is on Fire " — which was first published two years ago, and which reported a start in a new direction for us — the deliberate coverage in our magazine of certain non-computer subjects which deal with the great problems facing the human race: nuclear war, population, certain brands of dictatorship, etc. This change in editorial contents sought to encourage computer professionals to become information engineers.

3. Mining. But the crucial problem of access is access to the information that is still valuable in back issues of "Computers and Automation" — mining gold amid dross. Perhaps the best solution is to prepare books from time to time which include summaries, condensations, updatings and in some cases, full copies of things still timely and valuable that we have published in the past. We hope that during 1972 we can go further in this task. In the meantime, all back copies (except one — the June 1965 Computer Directory) are in print or should be in print and available (usually at $2) and we are also preparing lists of articles that together deal with certain topics.

In these three ways we hope to defeat "the curse of the magazine", and help our readers separate the treasure from the junk.

Edmund C. Berkeley

Edmund C. Berkeley
Editor

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- invite interested persons to fill out our "Pictorial Reasoning Test — C&A No. 1"
- help in other surveying and reporting tasks we need done

so that we, "Computers and Automation", can do a better and more effective job.

FRANKLY, THE POSTAGE INCREASES ARE MAKING A GREAT PROBLEM FOR US — AND SO WE NEED TO INCREASE THE EFFICIENCY OF OUR MAILING AND SURVEYING EFFORTS — AND WE ASK FOR HELP FROM PERSONS WHO HAVE SOME SPARE TIME (i.e., about 3 to 6 hours a week, usually, for which we would make reasonable payment.)

If you are interested, please fill in the following coupon and send it to us:

(Note: We now have volunteer publisher's assistants in the local areas: Orlando, Fla.; New Brunswick, N.J.; New York, N.Y.; Portland, Ore.; Philadelphia, Pa.; Milwaukee, Wisc. Anyone else interested?)

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How To Get The Best Out of a Computer Manufacturer

David Futcher
SCICON
Sanderson House
Berners St.
London, W1, England

". . . our chance of obtaining our share of our supplier's scarce resources depends on the relevance of our account to his marketing strategy."

Criticism of computer manufacturers is often unfair because of the unreasonable expectations of us users. So, having made this statement which may, I hope, stir you into thinking rather hard about it, let us examine the business relationship to see what expectations are reasonable for us to have from our suppliers. To do this it is useful to start by asking a few questions to help direct our thinking.

1. What business are computer manufacturers in?

2. Where do our suppliers make their profit now?

3. Whence do our suppliers expect to derive future profit?

4. What are the major factors that affect either their short or long term profitability?

These questions appear to have obvious answers, and indeed do. But before answering them it might be interesting and perhaps worthwile to state the assumptions underlying the answers we should give. Having started with four questions we might perhaps follow through with four assumptions. These are:

1. Computer manufacturing companies are run by able people who understand the business they are in and intend to continue in it.

2. These suppliers run on the basis of budgets, just as any other businesses do.

3. Budgets exist to control planned costs.

4. Budgeted costs recognise a planned level of service to discharge accepted responsibilities.

With these basic assumptions in mind let us now examine the questions first stated.

The Business Computer Manufacturers Are In

First was "What business are computer manufacturers in?". I suggest the answer is a very very simple one indeed and quite straightforwardly it is, Selling Hardware. The manufacture of hardware is undertaken by our suppliers to reduce their product costs and, in fact, until unit volume is sufficient, hardware is bought. We can all think of examples of disk drives, supplied from specialist manufacturers; drums, tapes; card equipment and indeed the great array now available of the various types of terminal. It would obviously be uneconomic for any computer manufacturer to undertake to make himself any type of terminal which any of his users required. My answer to the question is presumably going to stimulate questions in your mind about unbundling, as to what this really represents in the business of our computer suppliers, but if I may I should like to leave this and consider it a little later.

The Source of Profit

My second question was "Where do our suppliers make their profit now?" Before answering this I would like to rephrase it slightly and ask instead "From which part of the market in which they operate do they make a profit now?". The answer will vary slightly from one manufacturer to another. The first part of the market of importance is that of new users - people who have either not had computers before or are obtaining them for the first time from a particular supplier. Secondly, there are additions to existing installations where perhaps the need has been found to add a second printer or core storage, additional tape drives, or disk drives or any of the other types of hardware addition there may be. The third part of the market is replacement of earlier equipment where, with the availability of later equipment which is faster, better and has all the many other virtues claimed for it by computer hardware salesmen, somebody makes the decision that the earlier equipment should be replaced.

Having re-phrased the second question it would now in fact be sensible to follow suit with the third one. Re-phrasing of this would make it "From which part of the market do our suppliers plan future profits to come?" Again, the answer

would vary slightly with the manufacturer but the trend is towards upgrading and replacements to supply an increasing percentage of total sales and a higher percentage of profit.

New Accounts

One obvious implication is that to secure future profits manufacturers must, of course, have accounts now. Therefore we can expect an emphasis in their marketing policy upon obtaining new accounts. This can be seen and indeed is known to many people in terms of there being special commissions for salesmen obtaining new name accounts or winning accounts from users of competitive equipment; there are sometimes special prizes for this as well as special commissions.

One simple way of confirming the manufacturers' assessment of the market and its future can readily be obtained by demonstrating a serious interest in a change of supplier. The attention you receive from your regular sales representative can be an interesting departure from the norm.

Having answered the questions we should now perhaps look more closely at the implications of the underlying assumptions.

Business Plan

First, computer manufacturers intend both to be profitable and to continue in their business. They therefore have an appropriate business plan which in some cases may cover only three years, in one or two cases certainly covers ten, in most around five years.

Budgets for present operations are derived from the business plans. Since a plan covers considerably more than one year, the budgets reflect this with the distribution of revenue achieved by the budgets planned to leave some profit for the current year. The elements of the business plan will gather together the responsibilities the suppliers are willing to accept and also the unavoidable supporting functions.

The following major components of the manufacturers' business are listed in no particular order of priority but all are certainly considered in his business plan and we should therefore be aware of them.

Customer Engineering

First we have customer engineering. In general all costs of this service are now covered by separate maintenance agreements but historically this was not so. In the case of certain manufacturers there was a switch of revenue from what might be considered the sales budgets onto the engineering budgets and here perhaps we could divert momentarily to consider unbundling.

The various suppliers have now come out with statements wich say that they either are or are not unbundling now or at sometime in the future. As they all provide a similar array of software, much of it of course different in detail, and they all have to pay for the development of it, one can see that supply of this can in fact be covered in the way in which engineering used to be. Certain of the cost can be recovered by a separate specific budget and market position which is supposedly self-supporting while other manufacturers have decided not to do this but in fact to keep the lot bundled up. Of course, even in the case of IBM there is no definition to say that the cost of providing some software for each and every type of equipment will be covered from the individual arrangements they undertake under the unbundling pattern for supply of such facilities to their users, but, in total, the software costs are now planned to be recovered separately from hardware.

Research

A second major element in any business plan is going to be an allocation of funds to research and development - the "n"th generation has to be "discovered", planned and produced.

Thirdly, corporate management has to be financed in order to deal with

a) the future planning of the operations which, remember, are on an international basis.

b) with present operations supervision of these at high level, and

c) the co-ordination of various countries in their different requirements.

From the money we supply our manufacturers they also have to cover their provision of supporting services in order that their business can function so that they then can meet our orders. This includes such things as order processing; personnel functions; patents and legal functions; which in the case of IBM perhaps amount to a substantial amount of their revenue now and again; the accounts function; purchasing function; and, in fact, here we should even include hardware manufacturing or acquisition, as well as basic software writing or acquisition.

Sales and Marketing

We then come to another division which is a major one and also the one which most closely affects us as users; that is, the sales and marketing area with its multiple sub-divisions of cost. So let us examine this in rather more detail than we have the other major headings.

As I run through the list of headings you might perhaps care to reflect upon how many of these headings are in the areas in which manufacturers' management policy determines this investment in you rather than what you need. The various headings are again in no particular order of priority but all of them have to be financed.

Marketing Management

Marketing Management covers the cost of market research to determine the size of future markets and to try to estimate what the users' requirements might be in say ten years time. An example of this in any other field is easy to find; we might perhaps refer to the GPO survey into data transmission where we were required to report in 5, 10, and 15 year periods ahead from the date of the surveys.

Next there is sales management with its recruitment and management functions to perform on the various people that we meet.

Then we have salesmen's salaries and commissions, and you might pause to consider here for a moment

(Please turn to page 35)

COMPUTERS AT CRISIS

Milton R. Wessel, Attorney
New York, N.Y. 10022

"The hard commercial fact is that computers and computer services are simply not yet economically ready for every customer and every application, despite all too many claims to the contrary . . . and the evidence is that the public is learning the bitter, hard way."

The American computer industry has reached a point of crisis. Unless its present course is reversed, there is real danger that the much-heralded onset of the "computer age" will turn out to be as blue sky as the prices which Wall Street until 1969 was forecasting for almost any company with the name "computer" in it.

Despite some technical problems, the Apollo missions certainly prove that the computer can perform business applications as the industry claims. But it is a far cry from the multiple back-up systems and limitless testing of a moon mission, to operations in the competitive marketplace. The hard commercial fact is that computers and computer services are simply not yet economically ready for every customer and every application, despite all too many claims to the contrary. The public is beginning to learn this from hearing about a wide and increasing range of computer disasters and from bitter personal experience itself with business systems and credit billings. Computerized voting was set back for years by the November 1970 voting debacle in Detroit, when snafus kept the results from being known for several weeks, and the multi-million dollar charges by TWA and Burroughs against each other charging misrepresentation and incompetence in connection with an automated airlines reservation and management information system, show that even the giants are not immune.

Economic Precipice

How did the industry get here and why? The answers lie in a series of events coincidentally affecting the smaller companies in the industry. Thus far the impact has been most serious in the services and software segments of the industry, although every segment has been hurt, and the depression is spreading. By "software" we mean here the instructions and related intangibles by which the computer is told how to operate — the systems, programs, and operating manuals. These coincidences led, first, to fantastic growth; second, to financial disaster; and third, to the economic precipice now being faced.

If the industry's present course continues unchecked, the public may soon confuse cause and effect and conclude that computers just can't work in the new and yet unproved applications required for growth. Should this happen, the flow of business, confidence, and money will be so sharply cut off that the industry won't recapture its growth for a decade. This would be a tragic result, for the real cause of the current decline — mismanagement in all but the major hardware manufacturing segment of the industry — is correctible. The bright computer age could arrive on schedule, bringing all its promise to our society.

Fantastic Growth

The first stage of tremendous expansion of the computer industry started in the late 1950s and very early 1960s. It resulted from technical breakthroughs and developments in hardware which began in World War II (software did not become the major problem it is today until much later), coupled with a burgeoning economic climate and easy accounting techniques which permitted concealment of reality. "Creative accounting" became an industry catchphrase.

Capital Available

With the IBM example of investment success always in the forefront, confirmed by the even more telescoped early Control Data success story, the computer industry quickly became the public's darling. It could — and did — do everything. The natural consequence was that investors extrapolated from technical capability and IBM performance to commercial success generally. Partly because the industry practice of leasing equipment reduces the amount of initial capital required, the services and software segments have always been characterized by ease of market entry to new entrepreneurs. The

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This paper was originally presented as an address to an American Management Association conference, given in February, 1971. It is published now, because events such as RCA's demise in computer hardware manufacturing in September, 1971, and the disclosure of the computer services industry's overall 8.3% loss for 1970, totalling about $165,000,000 (ADAPSO, Fifth Annual Economic Survey), indicate that the comments may be more timely than ever.

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relatively limited capital needed soon became available to almost anyone and anything promising to employ it in a computer or computer-related enterprise.

What this investment enthusiasm wanted, of course, was an outlet — any outlet. Soon the ambitious young employees of the major computer manufacturers — technically qualified but many in their early twenties and without management and administrative training — began to realize this. Sam Wylie of University Computer Company and H. Ross Perot of Electronic Data Systems Corporation achieved Horatio Alger status. In small numbers at the beginning and then in ever-increasing hordes as the successes became apocryphal, computer salesmen and technicians of all kinds — engineers, scientists, programmers, systems analysts — began setting up electronic data processing services and software companies and, later, a wide variety of computer peripheral equipment and "minicomputer" manufacturing and assembling operations.

Second Wave of New Entrepreneurs

This second wave of industry entrepreneurs soon outnumbered the more conservative and established services/software industry pioneers, who consisted primarily of persons experienced in electrical accounting machinery, also called tabulating or punch card equipment. (The industry commonly calls these somewhat older persons who had constituted the first wave into the business, "EAM" or "TAB" men.)

The plethora of capital was at least equalled by the availability of customers for most services (time sharing, especially in scientific applications, was a notable exception in some areas). American industry was becoming overwhelmed with escalating wages and other costs, and the paper work resulting from growth was already unmanageable, as Wall Street was soon to learn. Any measure which promised cost savings and control had to be tried. A businessman could not afford to let his competitor get the jump on EDP equipment and services in very tight supply. Executives are also human; along the line the computer became a prestige item. This too had its impact, for many a self-respecting official turned to EDP because he did not want to admit to associates and friends that he didn't have a computer, or that he wasn't computer-reporting his inventory or sales or financial analyses; at least the reception accorded to a computer salesman was invariably far better than to any other.

Growth Financed by Public Money

The result was growth of an almost unparalleled character. New EDP companies got customers and more customers. By the mid-1960s, financial analysts had begun to value computer companies as a multiple of sales and sales growth rates, with little regard for profits, net worth, product, performance, or anything else. An EDP data center with a good growth curve in a large market was worth in 1968 (in shares of stock, not cash) as much as three times the preceding year's sales.

Because this growth was easily financed with public money, profits and cash flow were relegated to secondary and even tertiary or lower consideration. Money was in fact so easy to come by that neither the industry nor its financial advisers bothered to pay attention to financing techniques which would have permitted tens of millions of dollars in tax savings to be passed through to investors. Time sharing companies, necessarily predicting huge losses at their inception before sufficient volume could be even forecast to achieve profitability, adopted the routine corporate form rather than the limited partnership or Subchapter S structures, designed to provide investors with tax shelter advantages. Most of these benefits were thereby irretrievably lost — a double tragedy when considered in light of today's financing distress.

"Creative" Accounting

As far as investors were concerned, "creative" accounting permitted capitalization of huge software and related expenses — without much inquiry whether these were being spent upon intangibles of short or uncertain life. What couldn't be accomplished internally, was frequently achieved by merger and acquisition — and companies were bought and sold more for what could be done to the balance sheet and income statement than with an eye to real value. "Pooling of interests" was a term at least as well known to the EDP entrepreneur as any technical phrase.

Modern science is usually several steps ahead of society's ability to apply its learning, and computers are no exception. All of this growth was much too rapid to permit adequate personnel to be trained in the new technology. The result was that there were two pillars of sand upon which the new industry was built. These were almost totally concealed by the excitement until revealed by the 1969 financial crunch.

The first sand pillar was that both the initial wave of EAM/TAB men and the second wave of former computer salesmen and scientists running these companies were often entirely untrained in necessary management techniques. This was in sharp contrast to the competence of some of the major hardware manufacturers, notably IBM.

The Worst "People Shortage"

It will surprise laymen to learn that the worst people shortage in the computer industry is not programmers — it is competent managers. These new entrepreneurs may have been great successes when they had the staff support of IBM or others, but they simply did not know how to operate in the new free environment. The first wave lacked the needed imagination and marketing skills; the second relied all too much on what came to be known as the "PR" (public relations) approach. Neither had the essential professional expertise in such areas as finance, accounting or market research, nor, far more important, recognized the need to retain and use such professional assistance. Cost analysis and control and other key management tools were largely unknown — and appeared unnecessary with the great emphasis upon growth. Few companies even had adequate current financial reporting or income and cash flow statements or other projections. With essential information and controls missing, costs got out of line, products were marketed without regard to economics, and the seeds of disaster were soon sown. No one seemed to know it, but a good part of the industry was actually operating at a loss.

The second pillar of sand was that there simply weren't enough technically qualified people to do what had to be done in the face of this growth. As a result, new and often completely unqualified training schools sprang up, and began turning out thousands of new "programmers" and "systems analysts", induced to pay for training and join the industry by the promise of huge salaries and quick advancement in the new, exciting, and esoteric specialty.

Demand for Programming Talent

Programming talent was so much in demand that the right pre-employment interview questions weren't or couldn't be asked, and job skipping and escalating wages continued to be routine; yet it takes more than even a good six months training course to turn out a qualified programmer, and a great many of these new trainee-graduates (and some of the older ones also) couldn't perform as they were supposed to. (The extent of the demand for personnel is suggested by the six approaches made to me for jobs requiring technical background at the first Joint Computer Conference I attended — one handed to me in a sealed unmarked envelope by a lovely young lady recruiter as I walked off the plane — although I am a lawyer with none of the necessary qualifications.) Products became more and more uncertain and inadequate. Customer dissatisfaction increased alarmingly, although unsophisticated accounts could be put off with the special jargon and doubletalk of the industry — for a time.

Financial Disaster

Then a second set of coincidental events pin-pricked the economic bubble. Roughly simultaneously, tight money and recession set in, limiting the flow of cash; underlying quality and performance inadequacies increased to unacceptable levels, limiting the flow of customers and creating claims, liabilities and uncollectible receivables as well; and the accounting profession — smarting from wounds itself received in all kinds of attacks, including even criminal prosecutions — began to insist on more realism and fuller disclosure, limiting the location of new sources for these essentials of additional money and business. Huge write-offs of intangible assets were taken:

- Computer Applications, Inc., $16 million;
- discontinuance of operations of Speedata, Inc. an 81% owned subsidiary that used computers to provide a nation-wide information service on the movement, sales and pricing of groceries;
- Computer Sciences Corp.'s $13 million scrapping of Computicket Corp., a majority-owned subsidiary that sold theatre and sports tickets through computer terminals.

These were early examples of chargeoffs that sent shock waves through the industry. True losses finally came to light; disputes and sometimes lawsuits became the order of the day.

Some of the losses were these:

- Viatron's loss of $30 million on sales of only $2.5 million, disclosed after this paper was given, led the staid Wall Street Journal to write a front page feature, headlined "They Said It Couldn't Be Done, but Viatron Did It With Dispatch." Viatron petitioned for reorganization under Chapter II but was forced into Chapter 10 bankruptcy by the SEC;
- Scientific Resources Corp.'s net worth dropped from $46.8 million in 1969 to $4 million in 1970;
- Data Automation Co. posted a loss, including writedowns of $3.7 million for the 6 months ending July 31, 1970;
- University Computing Co. reported a 1970 net loss of $17,565,000, including an almost $5 million writedown;
- Computer Technology, Inc. wrote off $2.3 million in the second quarter of 1970.

Third Generation Equipment

Added to all this was the advent of the third generation of equipment, which proved a disaster to many of the older companies which turned to it before they were ready, as well as to those newer ones which acquired computer capability far beyond their reasonable requirements — perhaps hoping to sell excess time at a profit. By "third generation" we mean here computers with integrated circuitry; "second generation", transistorized circuitry; "first generation", vacuum tube circuitry. "Fourth generation," which is even less precisely defined, is generally a reference to large-scale integrated circuitry — that is, even more compact and concentrated equipment having far greater power and especially useful for major time-sharing applications.) Indeed, many service centers who had not yet recovered from the costs and other burdens of converting from first to second generation equipment, converted from second to third. A high percentage of these had not even upgraded their first generation programs so as to operate in second generation mode, and thus had never achieved the available economies of the second generation. But to tell stockholders and customers that one had an IBM System 360 Model 30 seemed most important of all!

Services and Software Segment

The result was — and still is — a financial crisis in the services and software segments of the industry, perhaps more severe than in any other important area of the American economy. Thus far the major hardware manufacturer segment of the industry has been less hard hit, or appears so, partly because dominant IBM at least has sustained itself with foreign sales (the rest of the world has not yet experienced the catastrophic rise and fall of the American computer services and software segments); partly because the practice of leasing has a leveling effect and results in projecting these economic problems into the future; and partly because profits from other operations unrelated to computers (credit or insurance, for example) have masked true losses in the computer divisions. But software and services are already larger in volume than hardware and there simply is no room for doubt that what hurts the former must ultimately and inevitably have effect upon the latter, which is both its customer (for software) and supplier (for hardware).

The Edge of the Economic Precipice: Duress Financing

Were the computer industry an ordinary one, the shakeout just described would have solved its problems by cleaning out the incompetent, and letting those who remain carry on. And indeed there are some signs that this could be happening and that the industry may be coming out of its despair — the result, predicted by some, would be an industry reorganization into a relatively few large economic units, something like that which occurred to the automotive industry two generations ago when a large number of shaky producers were consolidated (or eliminated) into a few large ones.

But a third set of related economic factors seems almost to reward the inefficient EDP company and drive the others down to its level, so that the necessary shakeout can be deferred for too long. The gravest danger lies in the impact on the public of such a third stage of the industry's debacle.

The clue is found in the oft-repeated industry phrase "you can't kill a computer services company." Despite the disaster of the last two years, only a

relatively few of the larger companies have closed up shop. (Smaller ones have been hit — hard in many areas. The 1971 New York yellow-page directory contains four less pages of EDP service offerings than its predecessor.) A great many survive using up funds raised from the public during the industry's heyday, or by a kind of duress financing obtained from suppliers and customers. Growth is achieved by incremental costing and pricing — all to disastrous effect.

Hardware expense represents about 20-25% of the costs of the average EDP services company. If the equipment was purchased during the public financing boom, the cost of depreciation need not actually be paid out and the day of reckoning can be put off. If the equipment is leased, the lessor can also be put off, at least for a time — for who wants an old computer back these days? The result is that in some areas excess computer time is being marketed at lower than the price required to be paid the manufacturer for the additional time, with the cash used to pay wages and other expenses rather than the manufacturer. Telephone line communications expense, sometimes representing an even larger fraction of the costs of the typical time-sharing EDP company, is beginning to appear as another example of the same kind of duress financing by suppliers in some of the local Bell Telephone areas.

The Locked-In Dissatisfied Customer

Customers who have given up their own manual bookkeeping operations can be so dependent upon their EDP supplier that they have no alternative but to assist the dying company to stay alive — by advance payment and even by guarantees or direct financing. At the least they remain far longer as dissatisfied customers than in most other industries.

Some forms of incremental costing and pricing were EDP services industry hallmarks even during apparent prosperity. With survival as the objective, it is not surprising that these have now degenerated into the most cutthroat variety, with other even more serious adverse consequences than just money losses.

Once a company has a computer and an office, the cost of putting on additional business is small. As long as the price charged is more than the incrementally related cash expense which must be paid out promptly — wages, electricity, forms and the like (and even here, all too many companies don't know what these variable costs really are) — the excess cash received contributes to survival and the greater loss makes no difference, for there are no material degrees of bankruptcy. The consequence has been an intolerable form of price competition, especially in the larger cities, with a special kind of "low-ball" sales to customers who really shouldn't have a computer or computer services in the first place but who thereafter become locked in to an uneconomic activity from which they cannot easily escape.

Destructive Competition and Decay

In this atmosphere of destructive competition and decay, integrity of effort and quality of service and performance necessarily suffer. The representation necessary to capture the sale is made, without regard to reality; the program patch of the moment is all that is done without regard to the basic revision necessary for tomorrow's problem. Even the adequately financed and capable manager finds it necessary to descend to the competitive level to avoid the loss of his own incrementally profitable business.

Of course there must and will be a finish to this. But it is going on right now with no early end in sight. And the evidence is that the public is learning the bitter, hard way. Businessmen no longer accept so readily the promises and representations of computer salesmen. More and more refuse even to submit proposals to the thorough analysis which would winnow reality from dream, in the belief that the effort isn't warranted. If this goes on too long, the consequence will be a loss of confidence that only a decade can repair.

The Outlook

The computer industry <u>can</u> produce a quality product for a sufficiently large part of our economy to more than sustain those competent to produce it — with great growth. It <u>cannot</u> yet serve everyone or everything. It must introduce a sense of true professionalism and industry responsibility, so that it limits its offerings and representations to the public to accord with reality.

Indictment

My industry friends — if they remain after this expression of views — will complain that this is an undeserved and unfair indictment of the whole industry. But if it is an indictment, it is one with a purpose, for the near-term future of the industry is at stake. There <u>are</u> some concerned industry associations and leaders who are trying valiantly to ring the bell. The American Federation of Information Processing Societies (AFIPS) is engaged in public information activities and is taking a long hard look at certification of professionals and systems; the Association for Computing Machinery (ACM) and Data Processing Management Association (DPMA) are concerned with industry training schools; and The Association of Data Processing Service Organizations, the industry's trade association (ADAPSO), is doing yeoman work in an effort to upgrade management capabilities. Also it has undertaken to educate the public to understand realistic computer capabilities and thereby nullify the extravagant and unjustified claims of the touts.

But thus far these voices have been lost to the shouts and clamor of the marketplace. DPMA, the EDP managers' association, which should be taking a lead in these areas, has done very little, and is being roundly criticized throughout the industry for its inaction. Some of the hardware manufacturers and larger services and software companies seem almost to delight in asserting their independence, and refuse to participate in or even support important industry corrective efforts. The manufacturers' industry association, Business Equipment Manufacturer's Association (BEMA), is notoriously silent and unconcerned. Government interference seems unlikely and probably would be ineffective in any event; so thus far the prognosis continues black.

Responsibility in Promise and Performance

But despite the seriousness of the problem, its solution is really not extremely difficult, nor need the present phase of the computer industry have any more serious adverse long-term effects than did similar experience in other developing industries. Essentially what is called for is responsibility in promise and performance — "Truth in Computers." To achieve it requires concerted and aggressive industry action, participated in especially by the presently still recalcitrant larger companies and associations, without whose active assistance the chances for success are slight. Let us hope they will hear the call. □

COMPUTERS AND DOSSIERS — Part II

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"The effect of computers on the vast number of personal dossiers already collected is to give us a National Data Bank now . . . and one more vulnerable to unauthorized use than a single storehouse of information would be."

(Part 1 of this article was published in the January, 1972 issue of "Computers and Automation", starting on page 13. It included information on dossiers, credit ratings, who can obtain credit reports and dossiers, their unreliability, and the threat of future dossiers by computer. Part 2 explores what information gets into official dossiers, where it comes from, and who can gain access to it — and suggests congressional interest and action in protecting privacy.)

What Gets Into the Files?

So much for sources. What of the official dossiers compiled from them? Starting with the proposition -- probably quite literally true -- that God only knows what is contained in the files of the CIA, some information is available about the files of the more obvious compilers.

FBI Files Closed to Public – and Growing

Congressional committees occasionally hear something about the FBI, but save for J. Edgar Hoover's annual appearances before appropriations committees, they never hear from the FBI. From the director's appearances we are advised that the FBI's computerized National Crime Information Center, which is tied to twenty-four computerized terminals throughout the country, contains in excess of 1.7 million personal files, as well as more than 195 million sets of fingerprints. The latter collection (with a substantial assist from state police forces and the Selective Service System, and a lesser one from visitors to FBI headquarters who are persuaded to ink their fingers) is increasing at the rate of about 7 million a year. Even with some allowance for foreigners, it must be approaching 100 per cent coverage of the adult population of the United States.

One can only speculate as to the contents of the 1.7 million files. They are not to be disclosed to the public, save as Hoover sees fit to reveal their contents in a book, an article or a speech. But we can be sure that they are not confined to information related to enforcing the criminal laws. Since 1947 the FBI has been investigating, under the federal loyalty-security program, federal employees and applicants for federal employment; somewhat later the program was expanded to cover the personnel of those who contract with various agencies and departments of the government. Investigations under that program delve even more deeply into the morality, beliefs and associations of the subjects than do the investigations conducted for private employers and insurance companies by the Retail Credit Company. From a careful study of all available data, Prof. Ralph Brown concluded in 1958 (Loyalty and Security) that the federal program then covered more than 13 million people, or one-fifth of the national labor force. The same fraction today would produce a figure in excess of 16 million. Professor Brown also estimated that the cumulative total of those dismissed under the program in 1958 was in excess of 10,000. It is a fair guess that their names, and the names of many others who were not dismissed but about whom derogatory information was recorded, are included in the FBI files. But there is no reason to suppose that all of them are included in the 1.7 million files reported in the National Crime Information Center.

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If that were all, most of us who have never worked for, or sought to work for, the executive branch of the federal government or its contractors, and who have never done anything which would be likely to make us suspects of a federal crime (including the burgeoning list of political crimes), could rest easy so far as the FBI files are concerned.

FBI Reports to "Interested Federal Agencies"

But that is not all. Under the Emergency Detention Act of 1950, the President is authorized to declare an "Internal Security Emergency" in the event of invasion, declaration of war or "[i]nsurrection within the United States in aid of a foreign enemy." In that event, the Attorney General is to apprehend and incarcerate "each person as to whom there is reasonable ground to believe that such person will engage in, or probably will conspire with others to engage in, acts of espionage or sabotage." Obviously, speed will be of the essence and any diligent Attorney General charged with enforcing this Act must have a list of suspects prepared in advance. The Washington Post recently remarked that the Department of Justice does maintain such a list and made a "conservative guess" that it contains 10,000 names. Data alleged to support such a list are doubtless lodged in the files of the FBI.

The FBI has long operated under a Department of Justice order providing:

> All official files, documents, records, and reports in the Department of Justice shall be regarded as of a confidential nature, and the content thereof shall be disclosed only in the performance of official duties.
>
> Except upon specific authorization of the Attorney General, no officer or employee shall forward to any person outside the Department of Justice . . . any information obtained from the Federal Bureau of Investigation . . .

But there are vague authorized exceptions. Department regulations allow for exchange of "identification records, including personal fingerprints voluntarily submitted," with "law-enforcement and other governmental agencies," and for the operation of "a central clearinghouse of police statistics . . . and a computerized nationwide index of law-enforcement information under the National Crime Information Center." And Hoover has said that "the FBI has long followed a policy, approved by several Attorneys General, of relaying information believed to be of interest to other Government agencies."

Private Favors, Too?

The official position remains that the contents of FBI files are not to be disclosed to private parties, but there is room for doubt about operations in the field. Do the FBI agents who receive information from Retail Credit Company and the credit bureaus ever return the favor? Mayor Alioto of San Francisco recently told a Senate subcommittee that he had proof that the FBI had supplied information to Look for an article charging him with underworld connections. The Department of Justice replied that an FBI agent had not "furnished," but had "confirmed," information which the magazine might have obtained from other federal agencies and that the agent involved had been disciplined and forced to retire.

How IRS Spies on Taxpayers

Most adults in the country are required to initiate a file with the IRS by filing a tax return. The file is augmented when the IRS launches an investigation of tax liability or has to resort to collection efforts. In some instances, those efforts are quite strenuous.

In 1965 the Commissioner of Internal Revenue admitted to a Congressional committee that the Service had in the past used two-way mirrors and bugging devices in conference rooms where taxpayers and their lawyers met prior to and during discussions with IRS agents; and that some agents, in an excess of "zeal emanating from the highest motives," had employed illegal bugs and wire taps. He assured the committee that all such practices had been terminated. Later he advised the committee that agents who engaged in illegal eavesdropping had been disciplined by reprimand and transfer and that there had been some voluntary separations from service. There was no mention of criminal prosecution.

Illegal Search of First-Class Mail

Another practice, not disavowed by the IRS, involved the opening of a taxpayer's first-class mail, either in search of evidence of tax liability or of assets from which taxes might be collected. Federal statutes forbid, and prescribe criminal penalties for, the opening of first-class letters or parcels by anyone save an employee in the dead letter office or a person holding a search warrant. But it is a nuisance to obtain a search warrant: the application must make some showing of probable cause for the search, the warrant may be annoyingly specific as to the items to be seized, and there have been instances when warrants have been refused. Hence, the IRS hit upon a more "efficient" scheme.

Provisions of the Internal Revenue Code authorize the IRS to make its own administrative levy on "property of" a taxpayer "for the payment of" taxes. These provisions also direct that "as soon as practicable after the seizure of the property" it shall be sold. In any event, they reach only to property of the taxpayer, and postal regulations provide that the sender of mail can reclaim it at any time before it is delivered to the addressee. Nonetheless, it was the practice of the IRS to serve levies on the Post Office, which would thereupon surrender mail addressed to taxpayers -- not for the purpose of sale but to be opened and examined by the IRS. When this practice was exposed, Congress promptly amended the Internal Revenue Code to exempt all undelivered mail from the IRS levy.

The Well-Travelled Federal Tax Return

It might be supposed that information which the government compels the citizen to supply in his tax returns would be held in confidence and used only for the purpose for which it is supplied. In fact, the confidentiality of tax returns is preserved by a statute which has all the containing qualities of a sieve. Federal tax returns are fully available to state tax officials and The Wall Street Journal has reported (April 21, 1970) that at least 45 million of some 75 million returns filed in 1970 were to be put on computer tapes and mailed to at least thirty states.

Tax returns are available also to any select committee of either House of Congress "authorized to investigate returns," and to anyone authorized by executive order. Between 1957 and 1970 fifty-three such orders were issued. These orders are not confined to the returns of named persons, but authorize inspections of all returns for designated

periods of years. Two of the chief beneficiaries of these Presidential dispensations have been committees that have nothing to do with internal revenue matters -- the House Un-American Activities Committee (which changed its name to the House Internal Security Committee two years ago) and its counterpart in the Senate, the Senate Subcommittee on Internal Security.

Moreover, by relying on these executive orders, I am substantially understating the extent to which tax returns, or their contents, are disseminated. The discovery about a year ago that Presidential aide Clark Mollenhoff was examining tax teturns without an executive order -- or at least without a published order -- led to further disclosures that similar practices had been followed in the Kennedy administration. It was reported also that IRS employees had not infrequently leaked the contents of returns, and that in one instance a friendly revenue agent had obliged a federal prosecutor by screening the tax returns of 150 prospective jurors in a tax case. No one could recall, however, that any IRS employee had ever been prosecuted under a statute imposing criminal penalties for such activities.

Army Investigation of Civilians

The Army, of course, has personal files on those who are, or have been, in its service. But in January of last year, a former captain of Army intelligence revealed that the Army since 1965 had been collecting information on civilians and maintaining files on them in its computerized data bank at Fort Holabird in Baltimore -- ostensibly to enable it to anticipate civil disturbances. Then followed a series of somewhat contradictory reports. Rep. Cornelius Gallagher, chairman of the House Subcommittee on Invasion of Privacy, announced that the Army had assured him that its surveillance of civilians would cease. Somewhat later, Secretary of Defense Melvin Laird announced that the surveillance operation had been transferred to civilian control in the Department of Defense.

Later hearings before a Senate subcommittee revealed details of the Army's 1968 "Civil Disturbance Information Plan." Defense Department spokesmen testified that the Department had since 1968 maintained an index of 25 million names (now being computerized), about 80 per cent of which were keyed to dossiers; and that since 1968 the compilation had included civilians who had taken part in civil rights or anti-war activities, and who were thus regarded as at least potential civil disturbance risks.

Also included were prominent persons friendly with such suspects, among them Sen. Adlai E. Stevenson III, Rep. Abner Mikva and former Illinois Gov. Otto Kerner. The Army's share of the dossiers -- about 8 million -- were said to be accessible to only 688 authorized officials. Asst. Atty. Gen. William Rehnquist testified that surveillance of civilians had now been transferred from Defense to Justice, conceded that there had been abuses due to "excessive zeal," opposed any legislative limitations on such surveillance, and urged the Congress to rely upon "self-discipline" on the part of the executive branch.

Case of Army vs. Privacy to be Tried

Before the Congressional hearings started, the ACLU had filed two actions to enjoin the Army's civilian surveillance programs as a violation of the First and Fourth Amendments and of a constitutionally protected right of privacy. In each instance the complaint was dismissed; in both cases appeals were taken and the Court of Appeals in the District of Columbia has in one case reversed the dismissal and ordered the Army to trial.

House Internal Security Committee

Not all the dossier compilers of the federal government are in the executive branch. Since 1938 the former House Un-American Activities Committee has been compiling dossiers on persons and organizations it deems insufficiently anti-Communist. (In a more sporadic fashion, the Senate Internal Security Subcommittee does the same thing.) The House committee does not reveal the number of its dossiers, but by 1949 they occupied thirty file cabinets, and by 1955 the committee was converting them to microfilm.

The Supreme Court has held unconstitutional a state statute requiring registration of members of organizations cited by the committee, because the committee's procedures do not include minimum safeguards to "insure the rationality" of its compilations. Those compilations are, nonetheless, widely used both privately and officially.

Anyone can obtain a copy of a committee dossier by requesting it through a member of Congress. During the past year the committee responded to 1,057 such requests, and its files were also examined 1,348 times by twenty-five executive departments and agencies of the federal government. In 1968 Rep. Don Edwards wrote to several executive agencies and departments and asked them to what extent they searched committee files and why. All responded that they searched the files in connection with the federal loyalty-security program and estimated the frequency of their searches as follows:

Housing and Urban Development -- "about once a month."
Health, Education and Welfare -- "several times each week."
Defense Department -- "approximately 120 times a week."
Civil Service Commission -- "approximately 288,000 times in fiscal 1967."

Bill To Restrict Committee's Actions

Rep. Edward Koch has recently introduced a bill, applicable only to the House Internal Security Committee, which would require the committee to notify each individual on whom it keeps a file that the dossier exists, to allow the individual to inspect and supplement the file (but not learn the source of the information in it), and to forbid any disclosure of the file to persons outside the committee and its staff without the consent of the subject -- but with a blanket exception from all these provisions for files that two-thirds of the committee decide should "be kept secret in the interest of national security."

List of "Radical" Speakers

During the summer of 1970 the committee sent a questionnaire to 179 colleges and universities, asking them to list all campus speakers for the previous two-year period, together with the honoraria paid. After checking the replies received against its dossiers, the committee produced and released to the press a list of sixty-five "radical" campus speakers. Some of those so named protested and the list was pared to fifty-seven.

The ACLU brought an action to enjoin official publication and distribution of the list. Judge

Gesell decided that he could not direct an injunction to committee members because of the "speech or debate" clause of the Constitution, but did enjoin the Public Printer from printing or distributing the list, which he found to have no legitimate legislative purpose but to be designed solely to agitate college officials, alumni and parents in an effort to inhibit free speech on the campuses. Although the government has appealed the decision, the committee persuaded the House to adopt a resolution directing the Public Printer to publish the list and he has done so.

Index of "Names Mentioned"

From time to time, the committee also publishes a cumulative index of the names of all individuals, organizations and publications mentioned in any of its own publications. The index for the period 1938-54 includes the names of some 38,000 individuals. A supplement published last year lists about 25,000 names mentioned in committee reports, hearings or "consultations." Since I am in the supplement, though not in the original volume, I used the index to discover what had brought me into such distinguished company. I discovered that in the 1966 hearings a witness had cited an article of mine which described as unconstitutional a "Criminal Conspiracies Control Act" which the committee was sponsoring. [See "Clear and Present Danger" by Vern Countryman, The Nation, July 4, 1966.] But that was not the extent of my misdeeds. During the 1967 hearings of the committee, the Washington representative of the National Committee to Abolish HUAC, of which I am also an official, distributed to the press a statement I had written contending that proposed amendments to the Internal Security Act, which were enacted in 1968, were also unconstitutional. Of course I have no ground for complaint at being included in a list which also names, among others, all known and suspected members of the Communist Party and the Ku Klux Klan. The committee protects my good name by saying, in fine print in the front of the index: "The fact that a name appears in this index simply indicates that said individual, publication, or organization, has been mentioned in a hearing, report, or consultation. It is not per se an indication of a record of subversive activities. A careful check of references in the hearing, report, or consultation will determine the circumstances under which such individual, publication or organization is named." Anyone with access to the committee's hearings and reports, and time to devote to them, can determine the basis for most of the citations. The committee does not explain, however, how one is to check out its "consultations." Presumably one asks his Congressman to obtain a copy of the committee's dossier on the person in question.

Census Data Officially Restricted

Although the Constitution directs a decennial "enumeration" of the population for the purposes of apportioning Representatives among the states, the Census Bureau, an arm of the Department of Commerce, is now directed by statute to collect and publish information not only on the population but also on industry, business, agriculture and governments, on crime and on defective, dependent and delinquent classes. The population census, far from being a mere "enumeration," covers matters of sex, race and national origin, place of birth, marital status, family size, nature of household, quality of housing, geographical location and mobility. In addition to the information which it collects itself, the Census Bureau also obtains information from such other agencies as the Internal Revenue Service and the Social Security Administration. Like the benevolent private compilers, the Census Bureau is not interested in individuals but in groups. But, as in the case of the private compilers, its data cannot be kept up to date or programmed for new uses unless a key to the identity of each individual is preserved, and such a key is preserved.

Everyone over 18 years of age is required by law to respond to the bureau's inquiries. The bureau is authorized to furnish state governments, courts and individuals with "data for genealogical and other proper purposes," but the information so furnished is not to be "used to the detriment of" the subject. Otherwise, the bureau is forbidden to use the information supplied by the citizens for "other than statistical purposes," or to permit anyone outside the Department of Commerce to "examine individual reports." Criminal penalties are prescribed for unauthorized disclosure.

The Federal Trade Commission Found a Loophole

The bureau claims that there has never been a known violation of these restrictions on use and that it does not supply individual information to other federal agencies, but the Federal Trade Commission found a loophole. Pursuant to an investigation of possible violation of antitrust laws, it issued an administrative subpoena for a corporation's file copy of its census returns. The Supreme Court, in an opinion equally applicable to all census returns, and probably to tax returns as well, held that the subpoena should be judicially enforced, although the census report form was marked "Confidential" and stated that it could not "be used for purposes of taxation, investigation or regulation." Both the legend on the forms and the statutory restrictions on disclosure were held to run only against the Census Bureau and not to impose limitations on the power of other governmental agencies to compel the subject to disclose its file copies. Congress promptly passed an amendment forbidding any governmental agency from obtaining copies of census returns retained by the subject.

Other Federal Dossiers

This survey of official dossier compilers is by no means complete, even at the federal level. For instance, The Associated Press reported last year that the Civil Service Commission has files on 10 million persons who have sought federal jobs since 1939, and additional files on 1.5 million suspected of "subversive activities," who presumably have lost or will never get federal jobs. The Secret Service has computerized 100,000 names and accumulated 50,000 dossiers. Personal files are kept on virtually all of the labor force by the Social Security Administration, and the Passport Office keeps a computerized file of more than 243,000 citizens whose applications for passports are brought to the attention of law-enforcement agencies. A 1966 survey of all federal executive departments and agencies revealed that they had 3.1 billion personal files, including 264.6 million police records, 342 million medical histories, 279.6 million psychiatric records, and 187.8 million "security or other investigative reports."

Congressman Koch and Sen. Birch Bayh have introduced bills to enact a Citizens' Privacy Act. Applicable to all federal agencies and departments subject to the Administrative Procedure Act (but not to Congressional committees), the Act would require the same notice to the subject, opportunity for him to supplement the file, and petition against disclosure without his consent that Congressman Koch's

bill would impose on the House Internal Security Committee -- but with exceptions for files "compiled for law-enforcement purposes" so long as "reasonably necessary to commence prosecution or other action," and for files "specifically required by executive order to be kept secret in the interest of the national security."

The States' Efforts to Inform Themselves

Taking a cue from the federal government, the states are also compiling mountains of data. The New York State Identification and Intelligence System, established in 1965, has a computerized central data bank serving 3,600 law-enforcement agencies in the state. The Oklahoma Office of Inter-Agency Coordination, established in 1969 with federal Law Enforcement Assistance funds, is now facing an ACLU lawsuit seeking the dismantling of its files of 6,000 dossiers. The Massachusetts Civil Liberties Union is preparing a similar suit against the State Police's Subversive Activities Division, whose continued operation is also being challenged in the state legislature.

In a New Orleans suit now before the United States Court of Appeals for the Fifth Circuit, the commander of the city's intelligence division has testified that his men attend and take photographs at all public events where "controversial" views are likely to be expressed. In New Jersey, the attorney general sent a memorandum to local law-enforcement officials asking them to report to the State Police Central Security Unit the names of all persons involved in "incidents" such as "civil disturbance, riot, rally, protest, demonstration, march, confrontation, etc.," including information on spouses, draft status, affiliations, education and credit status. In a class action for a declaratory judgment that such a program violated the First Amendment, the trial court gave summary judgment for the plaintiffs and ordered the attorney general to produce and destroy all dossiers except those that "will be used to charge persons with specifically defined criminal conduct." On appeal, the decision was reversed. The summary judgment was held to be improper because plaintiff's fears that the dossiers would be improperly used was considered "fanciful" -- the police, it was suggested, may have intended to use the dossiers only to call upon those listed to help dissuade others from resorting to violence! An amended complaint has been filed in this action.

We Already Have a "National Data Bank"

As I mentioned earlier, a proposal, originating with certain academics and encouraged by the Bureau of the Budget, was made several years ago to establish a Federal Data Center, not for the purpose of compiling personal dossiers but solely to compile statistical information on groups. After a series of Congressional hearings in which it was conceded that some key to the identity of those in the group must be maintained if the group compilations were to be kept up to date and adaptable to new uses, a commitment was obtained from the Bureau of the Budget that, before such a central data bank was established, the problems of threat to privacy would be evaluated by a panel including constitutional lawyers, computer experts, suppliers and users of statistical information and representatives of Congress, and that specific legislative authorization would be sought on any recommendations of the panel. There the matter rests.

It would be incautious to conclude from that, however, that a National Data Bank is an issue for another day. The effect of computers on the vast numbers of personal dossiers already collected by private and official compilers is to give us a National Data Bank now, albeit one not as "efficient," and one more vulnerable to unauthorized use, than a single storehouse of information would be.

Computerized Dossiers Can Be Raided

Many private compilations are already computerized, more are in process of transfer to computers, and the dossiers of many noncomputerized compilers have been fed into the computers of other private or official compilers. The federal government acquired its first all-electronic computer during World War II for use by the Army Ordnance Corps. By 1964 at least 2,000 computers were in federal use, excluding "equipment which is used in military operational and certain classified activities within the Department of Defense."

The computer can store infinite bits of information and can retrieve them at the rate of a few nanoseconds (billionths of a second) per bit. Computers can be connected by interfaces and can be tapped, not only by theft of printouts or by tampering with wires but by laser beams and other nonmechanical intrusions. Access codes can and are broken, after which the intruder can "display and manipulate the data stored within the system." No completely effective security system against such intrusions has been or probably ever will be devised.

The intruder in quest of data on a particular subject will, of course, have to locate his quarry in the bank, but in many cases that may not be difficult. Enough knowledge in advance about the subject to pose a few pertinent questions to the raided computer will quickly identify him. In many other cases, an even easier technique may be available. Social Security numbers are entered on federal and many state tax returns. In several states that number is also used on drivers' licenses. One and a half billion of those 3.1 billion federal personal files also contain the subjects' Social Security numbers.

Laws — and Their Goals — Inadequate

Computers not engaged in compiling or stealing dossiers can also make their contributions to the data bank. The airlines' computerized reservation service will reveal where you flew, whether you rented an automobile for use after landing and, perhaps, where you made hotel reservations. The hotels' computerized reservation service will provide the latter information if the airlines' service does not, and will say also whether you shared the accommodation with one claiming to be your spouse. Your bank's computerized check-processing system will reveal details of many of your expenditures and, as we move into the checkless, cashless society, will ultimately reveal the details of your every expenditure.

Measured against this monstrous technological capacity to search out most of the details of our lives, the present state of the law -- and most of the proposals for new law -- seem to me inadequate to achieve their professed objectives. And those goals, in time, promise inadequate protection, even if they could be achieved.

Insuring the Accuracy of Dossiers

Some concern about the accuracy of the proliferating dossiers arises from what computer men call

the GIGO principle -- Garbage In, Garbage Out. In fact, the computerization of personal dossiers may provide the first literal application of that principle, since the investigators of private individuals have been known to comb through the subjects' garbage.

The main purpose of the Fair Credit Reporting Act, and of the proposals for legislative restrictions on some federal compilers, is to insure that the information in all our dossiers will be accurate. The chief mechanism provided to achieve this end is notification to the subject, who then has an opportunity to correct erroneous entries; the Act also requires the compiler to discard out-of-date entries on his own initiative. These measures almost surely will not achieve their objectives for at least two reasons:

(1) Many subjects will never receive notice that their dossiers exist. The only sanctions in the Fair Credit Reporting Act are compensatory damages for negligent failure to give notice and punitive damages for willful failure to give notice. The Act even purports to prevent the states from expanding their tort law to award damages for erroneous reports against compilers who are not guilty of malice or willful intent to injure. Since subjects who do not receive notices will never know that they may have a cause of action, compilers have considerable incentive to be sparing with notices.

The proposed legislation applicable to executive departments and agencies not excepted in "law-enforcement" and "national security" cases seems to provide even less incentive to give notice. The legislation contains no sanctions of its own, and it is doubtful that the nebulous provisions of the Federal Tort Claims Act can be read to incorporate the compensatory damage provisions of the Fair Credit Reporting Act. Beyond this, there appears to be only the possibility of an action, possibly a class action, to compel compliance, and that will also be of little value to one who does not learn that he is the subject of a dossier. The proposed legislation applicable only to the House Internal Security Committee, which also contains no sanctions of its own, seems even more toothless. Since the Federal Tort Claims Act extends only to executive departments and agencies, an action to compel compliance may not reach to members of Congress, and apparently will not reach to employees of the committee if the committee is careful not to delegate to them the duty of giving notice.

(2) The credit reporting agencies managed to put over on Congress the monstrous proposition that they should remain free to collect and disseminate erroneous dossiers -- subject only to liability for malice or willful intent to injure -- and that the burden should fall upon their subjects to come in and correct the errors. The pending bills that are applicable to some federal compilers proceed on the same assumption. But many subjects, even if they receive notice, may conclude that life is too short, or their resources too limited, to make the effort toward correction. Particularly may they reach this conclusion when they discover that they cannot learn the sources of adverse entries (except for credit bureau reports), nor compel deletion of such entries, but must content themselves with entering their version of matters in the file -- and that under the Fair Credit Reporting Act they cannot actually see the files but must be content with the compiler's disclosure of the "nature and substance" of the information therein.

Restricting Access to Dossiers

The Fair Credit Reporting Act imposes two restrictions on access to the dossiers of commercial compilers without consent of the subject. First, the compiler is to furnish information only to persons and governmental agencies who, the compiler "has reason to believe," have a "legitimate business need" for the information or, in the case of a government agency, wish to determine the subject's eligibility for a license or other benefit. Any compiler who is negligent in establishing his "reason to believe" is liable for compensatory damages, and any compiler who willfully acts without such reason is liable for punitive damages -- if the subject learns what was done and is able to persuade a court that the need was not "legitimate" and that the compiler acted negligently or willfully. These remedies, I would suppose, will be invoked almost as rarely as the criminal penalties prescribed for officers or employees of a compiler who knowingly and willfully disclose information to one "not authorized" to receive it. The standard for authorized access -- "legitimate business need" -- is probably too vague to satisfy due process requirements for a criminal statute and is certainly too vague to hold out much promise for an effective civil remedy.

Second, the Fair Credit Reporting Act forbids disclosure, except in response to court order, of more than identifying information -- name, present and former addresses, and present or former places of employment -- to any government agency not engaged in determining eligibility for a license or other benefit or which does not have a "legitimate business need." No substantive limit at all is placed upon governmental agencies empowered to issue statutory subpoenas enforceable by court order, that can convince the court that the information is relevant to an inquiry they are authorized to make; the Act does impose upon them the inconvenience of obtaining the court order.

Should the Subject Decide Who Sees His Files?

The FBI has no subpoena power. It is thus left with three alternatives in cases where it does not wish to obtain a search warrant or to proceed on the assumption that the Fourth Amendment does not apply to the federal executive: (1) it can stop using the files of the commercial compilers; (2) its agents can obtain access to the files by means of false pretenses and risk prosecution by the Department of Justice; or (3) without false pretenses, its agents can persuade officers or employees of the commercial compilers to risk prosecution by the Department of Justice by knowingly and willfully making an unauthorized disclosure. The record of Department of Justice prosecutions for illegal wire taps under the Communications Act of 1934 strongly suggest that the FBI will not feel confined to the first alternative.

Some concerned computer men have suggested that privacy may be adequately protected if disclosure of personal data is limited to instances when the subject consents to such disclosure. The Fair Credit Reporting Act also authorizes disclosure of dossiers to anyone, pursuant to "the written instructions of" the subject. But obviously, when the subject is seeking employment, when he is seeking insurance, or even when he is seeking credit, his consent will be far from voluntary. Indeed, one of the compilers' arguments against compelling them to give the subject a copy of his dossier was that someone else might, by economic coercion, "invade his privacy" by compelling him to produce it.

The proposed legislation applicable to some federal compilers would -- with generous exceptions for "national security" and "law-enforcement" files -- forbid any disclosure of information without the "permission" of the subject. Here again, any consent given by a subject seeking federal employment will often not be voluntary. In any event, the limited sanctions available under these proposals are not likely to deter improper disclosure, or to provide effective relief to one injured by such disclosure.

Limiting the Content of Dossiers

It has been suggested that limitations be placed upon the content of personal dossiers. Some of the proponents of a formal National Data Center, for instance, suggested that its files should include only "statistical" data, not personalized data of the sort found in FBI, IRS, military, civil service and medical records. But they could devise no standard precise enough to permit effective control. Moreover, they apparently contemplated the continued compilation of the various types of more personal dossiers that they would not include in the National Data Center, and it is the existence of such dossiers and the ubiquity of the computer which have created the present, informal, National Data Center.

The Right to Privacy

Even if all dossiers were absolutely accurate, or if remedies for inaccuracy were absolutely adequate, the question of the right to privacy would remain. By a "right to privacy" I do not confine myself to the right to protection against unwanted publicity and palpable intrusion into private affairs which finds some limited protection by common law or by statute in some states. Nor do I confine myself to recently emerging constitutional concepts which thus far have forged slightly beyond the Fourth Amendment to permit married persons to receive birth control information, and anyone to contemplate in the sanctity of his home material which might otherwise be forbidden as obscene, but which do not protect against erroneous but nonmalicious publicity about public officials, public employees embroiled in public issues, and private citizens who have been injected into the news by events beyond their control.

"The Right to be Let Alone"

I refer rather to a concept of privacy which Justice Brandeis described as "the right to be let alone -- the most comprehensive of rights and the right most valued by civilized men." Justice Douglas has characterized it as the freedom of the individual "to select for himself the time and circumstances when he will share his secrets with others and decide the extent of that sharing." Such a concept of privacy is offended by the gross compilation of details about a person's private affairs, however accurately and delicately the compilation is ted, and the dissemination of those details ers, whether they be private or public users information and regardless of their number.

Congress and the Limitation of Dossiers

I do not regard it as conceivable that courts or state legislatures, in the development of private law remedies, or that courts in the development of constitutional doctrine, will establish such a concept of privacy in time to meet the dangers of the computerized dossier. Only the Congress seems capable of acting with the speed required. And, in order for it to act effectively, it must first comprehend the concept of privacy which its efforts must be designed to insure. It must also rid itself of three misconceptions which it shares with many outside of the Congress:

(1) That whatever technology can produce should be used; (2) that anyone who can show that information is useful, or comforting, to him in the conduct of private or public affairs has shown a "legitimate need" for its use; (3) that whatever is efficient is desirable.

If a meaningful concept of privacy were adopted and these three misconceptions were discarded, Congress should then proceed on the assumption that, as long as dossiers exist on the present scale, they will be used in disregard of whatever restrictions may be imposed. Law-enforcement officials "in an excess of zeal" will disregard those restrictions and, in an excess of tolerance, will not invoke criminal sanctions against themselves or others who similarly disregard them. And with the use of dossiers at its present magnitude, no privately enforceable remedies will suffice to check unauthorized use.

To Eliminate Dossiers — Appraise Need

The only hope for substantial protection of privacy against the computerized dossiers, therefore, is that they not exist -- at least that they not exist on the present scale. And if the "legitimate need" for dossiers were appraised as an actual need for a vital public purpose, rather than as a convenience or comfort for any acceptable purpose, the great bulk of existing dossiers could be eliminated and the growth of dossiers in the future drastically curtailed. Careful study of the contents of various compilations, and careful consideration of the justification therefor, would be required before lines could be drawn, but it seems apparent that a rigorous application of the test of actual need for a vital public purpose would drastically clear the files.

To cite but a few examples: No such need justifies the retention in FBI files of all information amassed by it and by cooperating state police authorities on all persons investigated in connection with a particular crime after the case has been closed. Similarly, there is no such need to retain in both FBI and Civil Service Commission files the collection of gossip, rumor and hearsay -- or even of hard facts -- on an applicant for federal employment after his application has been denied. The only "need" for preserving keys to personal identity in the Census Bureau's population statistics is that those keys facilitate keeping the statistics up to date and adapting them to new uses during the ten-year period between censuses. How vital is that need, and could it not perhaps be met instead by taking a population census at more frequent intervals?

Efficiency or Individual Liberty?

There is no such need at all for the highly untrustworthy files of the House Internal Security Committee. There is even room to question the need for those permanent dossiers which constitute the lifeblood of the credit bureaus. As I have previously indicated, they are as likely to induce as to preclude an unwise credit extension. Yet the business volume of the users of those dossiers is

(Please turn to page 36)

3400 Organizations Required by Court Order to Furnish Confidential Data to IBM

Leon Davidson, John D. French, Norman R. Carpenter, and Philip Neville

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1. Introductory Note: Something Almost Unbelievable

Edmund C. Berkeley
Editor, Computers and Automation

Once in a while something happens in the United States that is almost unbelievable.

An example is the order of Judge Philip Neville of the U.S. District Court, St. Paul, Minn., at first to 2700 organizations and then to 700 additional ones to furnish confidential data to IBM Corporation (formerly International Business Machines Corp.). The purpose of this order is to aid IBM in their defense in a suit on charges of monopoly brought by Control Data Corporation.

Furthermore, each of the 3400 responding organizations has to pay the cost itself of gathering and furnishing the required information; and there is apparently nothing in the court order(s) which enables the plaintiff, CDC, to obtain access to the information in order to counteract whatever IBM may assert about the information in court.

A reporter of Business Week has stated that over 1500 organizations have so far responded to these inquiries, at heavy expense; and that he was able to see and read their responses on a visit to the court clerk.

We publish here the actual text of the letters from IBM attorneys and the court orders accompanying them. We include first a letter from the president of one small organization, Metroprocessing Corporation of America, White Plains, N.Y., who courageously refuses to submit to an act that bears all the earmarks of dictatorship, even when issuing from a judge of the United States District Courts.

2. Challenge

METROPROCESSING
CORPORATION OF AMERICA
64 Prospect Street
White Plains, NY. 10606

December 21, 1971

Re: 3-68 Civ. 312
3-70 Civ. 328
3-70 Civ. 329

Clerk
U.S. District Court
316 N. Robert St.
St. Paul, Minn. 55101

Dear Sir:

1. We have received a Court Order dated Dec. 13, 1971, in the above matter, requiring us (and some 700 other deponents not named) at our own expense to furnish to you sensitive and proprietary details of our business, for use by IBM and its outside experts, in defending IBM in the Antitrust actions.

2. Some 2700 firms were ordered to provide such information in the Sept. 20, 1971 Court Order in this matter. Since IBM is limited to only 15 full-time employees to work with the information being collected in these depositions (under terms of the Protective Order of Nov. 12, 1971), no feasible means exists for using this mass of material except for IBM and its outside experts to create a large "data bank" from it.

This data bank would contain detailed proprietary information from every major and most minor firms in the computer industry, as well as firms which buy or are likely to buy computers or use computers. If the court proceedings and appeals last for three to ten years more, the data bank would remain available to IBM for the same period. There is no actual means today for guaranteeing that this data will not leak out within the IBM organization (despite the intent of the Protective Order) and be used for competitive advantage. It is possible that IBM will periodically request the Court to order deponents to furnish updated information as the years go by, to help perfect its case (and its data bank).

3. IBM is seeking to maximize the Court's idea of the size of the so-called "EDP Industry", to minimize its apparent share of the market. To this end, it has tried to include significant investments and revenues of the telephone companies, the teletype networks, radar defense networks, and other "information processing" systems in the so-called EDP industry. This is shown by the examples provided in the Sept. 22, 1971, letter from IBM's law firm, Faegre & Benson.

If the Court permits this "catch-all" approach, everything from gas station pumps to self-timing kitchen sink garbage disposers would be subject to inclusion, and IBM would have made its case. Every telephone in the country can transmit data to a computer; so if the telephone plant investment is figured as part of the computer industry, IBM becomes proportionally quite small.

4. To adapt a phrase, "De minimus non est disputandum."

Our firm is so small that we feel that the following information about us provides all that the Court or IBM could reasonably need, for purposes of the Antitrust case. We were organized in 1967 and incorporated in N.Y. state in 1968. We have never had gross sales exceeding [deleted] in any year. (The protective order of Nov. 12, 1971, applies to this information.) Our price list and product brochure are enclosed.

Even if there were 10,000 other firms such as our own, on your list of required deponents, the total annual gross sales represented would be less than IBM's annual earnings. The time and effort of digesting the requested detailed information from such small firms would clog up the proceedings under way, to the advantage of the respective defendants. Yet nothing substantive would be added to the true picture of IBM's domination of the market.

5. The natural human leakage of the information gathered from these depositions, despite the Protective Order, would probably benefit IBM's sales and marketing organization, well known to contain highly-motivated individuals under strong pressure to produce sales.

The quantitative probability that such leakage could be prevented by the protection provided in the Protective Order of Nov. 12, 1971, is arguable. The Order only refers to the destruction of files by the "outside experts", after the case is disposed of, and says nothing about what IBM's 15 full-time employees must do with their copies of the files and data banks of the deposition data.

We do not believe that the Court has considered all of the implications of the Protective Order, as issued, and suggest that "amicus curiae" advice be sought from the "Protection of Privacy" committees of the professional computer organizations such as A.C.M., D.P.M.A., I.E.E.E., etc.

6. The Protective Order (page 9, par. (3)) implies that the Court Order of Sept. 20, 1971, instructed the Clerk of the Court to disclose the depositions only to a designated list of names. However, the actual text of the Sept. 20 order contains no such instruction or list.

We would like to receive from the Clerk a copy of the list of persons filed with the Clerk pursuant to par. (1) of the Protective Order of Nov. 12, 1971, who are authorized to have access to the "protected" responses in the depositions.

7. The Clerk is also hereby requested to send us a copy of the list of some 700 "additional companies" covered by the Court Order of Dec. 13, 1971, on which our name purportedly appears, according to Faegre and Benson. We have been refused a copy of this list by Faegre & Benson, when we requested it by telephone.

8. We will await a reply to this letter before taking any further action pursuant to the Court Order of Dec. 13, 1971. We believe that this letter fully satisfies the spirit of the Court Order, and therefore request that all information furnished in this letter (and noted as coming under the application of the Protective Order) be indeed covered by the Protective Order, as provided by Par. (2) thereof.

Very truly yours,

Leon Davidson
President

3. "Your Company is One of Those That Must Answer"

Faegre & Benson
1300 Northwestern Bank Building
Minneapolis, Minnesota 55402
Area Code 612
227-0827

December 13, 1971

Re: Greyhound Computer Corporation v. IBM
CDC v. IBM; CCC, Additional Defendant

Gentlemen:

This packet of material contains several orders of a United States District Judge requiring many companies to answer the written questions enclosed herein. Your company is one of those which must answer those questions, pursuant to the orders of the Court.

The date for your written response to the questions has been set for January 21, 1972. In the preparation of your response, your attention is called to the guidelines, particularly #3 and #9, which are intended to facilitate and simplify preparation of your answers.

Very truly yours,

John D. French (signed)
Norman R. Carpenter (signed)

4. "Attached is List of Examples Which IBM Believes are Part of Electronic Data Processing Industry"

Faegre & Benson
1300 Northwestern Bank Building
Minneapolis, Minnesota 55402

September 22, 1971

Re: Greyhound Computer Corporation v. IBM
CDC v. IBM; CCC, Additional Defendant

Gentlemen:

In connection with the accompanying census (questions 1 through 5 of which were proposed to the Court by IBM and questions 6 through 10 of which were proposed by Greyhound Computer Corporation) you

are, as indicated in the Guidelines, to submit information with respect to all electronic data processing products or services. Attached is a list of examples of some companies and examples of some products and services which IBM believes are part of the electronic data processing industry. Please bear companies and products and services of those types in mind in answering the questions.

Very truly yours,

John D. French (signed)
Norman R. Carpenter (signed)

5. Examples of Some EDP Products and Services

IBM Corporation

EXAMPLES OF SOME EDP PRODUCTS AND SERVICES

American Telephone and Telegraph
  Electronic Switching Systems
  Teletype Inktronic Data Terminal
  Teletype Model 33 KSR Terminal
AMP, Inc.
  SYSCOM Credit Card Reader
Ampex Corp.
  TM-1624 Magnetic Tape Transport
Anderson Jacobson, Inc.
  ADAC 1200 Coupler
Applied Data Research
  AUTOFLOW Flowcharting Program
Applied Data Research Programmatics, Inc.
  PI SORT 2 Sort Program
Astrodata, Inc.
  1561 Electronic Data Sorter
BASF Systems, Inc.
  1100 Disk Pack
Bunker-Ramo Corp.
  Telequote III Stock Quote System
Burroughs Corp.
  D825 Modular Data Processing System
  E101 Electronic Digital Computer
  F4224 Electronic Bookkeeping Machine
  TC-500 Terminal Computer
  204 Computer
California Computer Products, Inc.
  563 Plotter
Calma Co.
  480 Analog Graphical Data Digitizer
Cincinnati Milacron Co.
  CIP/2100 Minicomputer
Clary Corp.
  3030 Electronic Sales Recorder
Collins Radio Co.
  C8401 Data Processor
Comma Corp.
  "EDP" Maintenance Service
Computer Communications, Inc.
  CCI-7000 Communications Processing System
Computer Learning and Systems Corp.
  CASE Simulation Program
  X-RAY Hardware/Software Monitor Systems
Computer Network Corp.
  COMNET-ALPHA Time Sharing System Program
Computer Sciences Corp.
  "EDP" Systems Analysis and Design Service
Computer Usage Co.
  "EDP" Programming Service
Comress, Inc.
  Dynaprobe Computer Performance Monitor Program
  SCERT Computer Simulation Program
Control Data Corp.
  162 Magnetic Tape Synchronizer
  180 Data Collector
  915 Optical Character Page Reader
  3106 Communication Channel
  6601 Central Computer
  7614 Central Processing Unit
  8068 Supervisory Console
  9300 Ticket Printer
Data General Corp.
  NOVA Central Processing Unit
Data Products Corp.
  1500 Uptime Speedreader
  Satellite Print Station
Digi-Data Corp.
  System 11 Magnetic Tape to Paper Tape Converter
The Diebold Group, Inc.
  "EDP" Consulting Service
Digital Equipment Corp.
  PDP-8 Computer
Digitronics Corp.
  522 Magnetic Tape Terminal
  D7530 Communications Buffer
Electronic Data Systems Corp. EDS
  "EDP" Facilities Management Service
Electronics Associates, Inc.
  TR-20 Analog Computer
  205 Variplotter
Ex-Cello-O Corp.
  Bryant CPhD Drum Memory System
Fabri-Tek, Inc.
  Mod 30+ 360/30 Compatible Main Storage
Fairchild Camera & Instrument Corp.
  Comp/Set 330-1 Typesetting Computer
Ford Motor Co.
  Philco Basicpac Tactical Field Computer
  Philco-Computer Control Console
Foto-Mem, Inc.
  FM-390 Photo-Optical Random Access Memory
Fujitsu, Ltd.
  Facom 230/25 Processor
General Automation, Inc.
  1200 SPC-12 Stored Program Controller
General Electric Co.
  GE/PAC 4020 Processing Unit
  General Instrument Corp.
    Am Tote-Computer Totalisators Pari-Mutuel System
  General Telephone and Electronics Corp.
    Programming Methods, Inc.—INTERCOM Communications
      Communications Monitor Program
      Sylvania 9400 Central Processing Unit
Graham Magnetics, Inc.
  Epoch 4 Magnetic Tape
Honeywell, Inc.
  CCT Communications Control Terminal
  HDC 501 Computer
  Peripheral Interface Unit
  111 Central Processor (Series 200)
  201 Central Processor (Series 200)
  285 Audio Unit
  GE CP 8064 GE-615 Central Processor
  GE DC 8032 Input Output Processor
Informatics, Inc.
  "EDP" Custom Contract Service
  MARK IV/2 File Management Program
Information Displays, Inc.
  IDIIOM (IDI Input Output Machine)
Information Storage Systems, Inc.
  ENVIRON/1 Data Management System Program
Interdata, Inc.
  Model 3 Central Processing Unit
International Business Machines Corp.
  SAGE Computer (AN/FSQ7)
  4 Pi TC2 Central Processing Unit
  026 Printing Card Punch
  1131 Central Processing Unit
  1402 Card Read Punch
  1403 Printer
  1801 Processor Controller
  2030 Processor (System/360 Model 30)
  2065 Processing Unit (System/360 Model 65)

2282 Film Recording Scanner
2721 Portable Audio Terminal
4872 Modem
6405 Accounting Machine
7255 Radar Data Buffer

International Telephone and Telegraph Corp.
245 Cryptel Electronic Scrambler
600 Vanguard Data/Message Controller

Kybe Corp.
TMS 200 Tape Certifier

Lambda Corp.
TIMES Forecasting Program

Litton Industries, Inc.
L 3050 Tacfire Computer

Lundy Electronics and Systems, Inc.
9600 MICR Reader-Sorter

The Magnavox Company, Inc.
FADAC (Field Artillery Digital Automatic Computer)

Memorex Corp.
630 Disk Drive

Mohawk Data Sciences Corp.
1101 Keyed Data-Recorder

National Cash Register Co.
Thermal Page Printer
315-501 Central Processor
353 CRAM (Card Random Access Memory)
395 Electronic Accounting System
481 All Field MICR Encoder
627 Emulation Unit

North American Rockwell Corp.
Autonetics D37 Airborne Central Data Processor

Olivetti Corp.
TC 600 Retail Terminal

Peripheral Equipment Corp.
Series 800 Incremental Magnetic Tape Recorder

Potter Instrument Co., Inc.
AT 2427 Magnetic Tape Unit

Raytheon Company
70410 Central Processor (Model 704)
75431 Digital Plotter and Controller

RCA Corp.
MICROPAC Digital Computer
70/55 Processor (Spectra)
70/216 Input/Output Typewriter
70/820 VIDEOCOMP Typesetter
70/6381 Line Concentrator
110 Industrial Control Computer
6042 Code Translator

Sanders Associates, Inc.
708 CRT Display Console

The Singer Co.
Friden 2301 Flexowriter
Automatic Writing Machine
Friden 5015 COMPUTYPER
Electronic Accounting Machine

Sperry Rand Corp.
UNIVAC AN/UYK-7 Processor
UNIVAC 2010 1004 Processor
UNIVAC 3011 1108-II Processor
UNIVAC 3030 9300 Processor
UNIVAC 8187 490 Central Processor

Standard Computer Corp.
IC 6000 Processing Unit

Systron-Donner Corp.
SD 80H Analog/Hybrid Computer

Tally Corporation
R-5000 Paper Tape Photoreader

Texas Instruments, Inc.
Model 960 Manufacturing and Process Control Computer

Toshiba America, Inc.
1415P Electronic Calculator

Turnkey Systems, Inc.
TASK/MASTER Telecommunication Monitor Program

Varian Associates
ADCO 626 Microfilm Storage and Retrieval System

Wang Laboratories, Inc.
700 Advance Programmable Calculator
PHI Computer Services Generalized Payroll Program Package

Xerox Corp.
XDS 8201 Sigma 5 Central Processor
XDS AD20 Analog-to-Digital Converter

6. "Companies Shall Mail Their Written Answers Not Later than January 21, 1971", Court Order

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA
THIRD DIVISION

Control Data Corporation, Plaintiff, vs. International Business Machines Corporation, Defendant, and Commercial Credit Company, Additional Defendant on Counterclaim.	3-68 Civ. 312
Greyhound Computer Corporation, Inc., Plaintiff, vs. International Business Machines Corporation, Defendant.	3-70 Civ. 328 3-70 Civ. 329

ORDER

Upon motion by International Business Machines Corporation, and without opposition from any other party, IT IS HEREBY ORDERED:

(1) This Court's Order for the Taking of Depositions Under Rule 31 of the Federal Rules of Civil Procedure dated September 20, 1971 entered in the above-titled consolidated litigation be and it hereby is extended to include those additional companies herewith designated by International Business Machines Corporation and Greyhound Computer Corporation, Inc.;

(2) Copies of the Court's Order of September 20, 1971 be mailed forthwith to those newly designated companies;

(3) Those Companies shall mail their written answers to the questions posed under the said Order not later than January 21, 1972 to

Clerk
United States District Court
316 North Robert Street
St. Paul, Minnesota 55101

In all respects except as herein, the court's orders of September 13, 1971 and September 20, 1971 shall remain in force and effect.

DATED: this 13th day of December 1971.

Philip Neville
UNITED STATES DISTRICT JUDGE

7. "Order Requiring Written Answers to Questions On or Before October 20, 1971", Court Order

To: THE PRESIDENT OR CHIEF EXECUTIVE OFFICER

XYZ Corporation (total of 3400 organizations)

UNITED STATES DISTRICT COURT
District of Minnesota
Third Division

Control Data Corporation, Plaintiff, v. International Business Machines Corporation, Defendant. Commercial Credit Company, Additional Defendant on Counterclaim.	3-68 Civ. 312
	Order for the Taking of Depositions under Rule 31 of the Federal Rules of Civil Procedure
Greyhound Computer Corporation, Inc., Plaintiff, v. International Business Machines Corporation, Defendant.	3-70 Civ. 328 3-70 Civ. 329

In the above actions brought under the Federal Antitrust Laws, the relevant market for electronic data processing and its various subdivisions and components is a material factor. Rule 31 of the Federal Rules of Civil Procedure provides for the taking of depositions upon written questions rather than on oral examination. This order is directed to some 2,700 companies or concerns said to be members of the industry in one capacity or another. This order requires written answers to the questions which accompany the mailing of a copy of this order. Answers shall be mailed on or before October 20, 1971 to

Clerk
United States District Court
316 N. Robert Street
St. Paul, Minnesota 55101

Answers shall be subject to this court's protective order of January 24, 1970. Let a copy of this order be transmitted to the various deponents by registered mail, return receipt requested.

Dated: September 20, 1971.

S. by PHILIP NEVILLE

Philip Neville
United States
District Judge

8. Guidelines to Questions That Must Be Answered by You

1. The following questions must be answered by you and the answers executed in writing by an officer of your company having knowledge of the facts before a notary public or other qualified person.

2. As used herein, "you", "your" and "respondent" includes the Organization identified in the accompanying order and all subsidiaries (whether owned or controlled in whole or in part) and affiliates thereof. In answering, information for unconsolidated subsidiaries and affiliates should be separately stated.

3. Where some or all of an answer is not readily available, provide (a) an explanation of why such information is not available and (b) whatever comparable, related or estimated information is available. For example, where figures on a calendar year basis are required but records are only maintained on a fiscal year basis, state that records are only maintained on a fiscal year basis and provide the available fiscal year figures. Likewise, if the precise amount of revenue from leases of a product to customers located in the United States [called for by Question 4(g)(2)] is not available, give your best estimate, identifying your response as an estimate.

4. Electronic data processing ("EDP") products and services includes all EDP products and services.

5. The sale and lease of EDP products and services includes the sale and lease (and resale and release) of products and services by leasing companies, data centers, time-sharing services and service bureaus and all other instances in which products and services are sold or leased by the minute, day, week, month or year, or fractions or multiples thereof.

6. As used herein "customers located in the United States" includes the United States government regardless of where the products or services are shipped, installed or used.

7. Where responses by calendar year are required, respond for each calendar year since and including 1952 and for the first six months of 1971.

8. Responses will be subject to the protective order in effect in the above cases which limits use of responses to the litigation and which prohibits use in the business of the parties or use for any other purpose.

9. Where applicable, the information called for with respect to assets, revenue and operations is that provided in papers furnished to the SEC, reports to stockholders and other comparable statements.

10. Questions or requests should be directed to Norman R. Carpenter, Esq., or John D. French, Esq., Faegre & Benson, 1300 Northwestern Bank Building, Minneapolis, Minnesota, telephone: (612) 227-0827.

11. Where additional space is required to answer the questions please so note on the form provided and attach additional pages, each referring by number, to the question being answered.

9. "Questions That Must Be Answered by You"

1. Specify:
   (a) your full name and address together with any prior names and addresses
   (b) date organized
   (c) date(s) incorporated (together with state(s) of incorporation)
2. Specify by each calendar year your
   (a) net assets (in dollars) at year end and at date of organization
      (1) total
      (2) used in connection with the development, manufacture, marketing or maintenance of EDP products or services

(b) gross revenue
  (1) total
  (2) from the sale and lease of EDP products and services to customers located in the United States
  (3) from the sale and lease of EDP products and services to customers located outside the United States
(c) number of customers for EDP products
(d) number of customers for EDP services
(e) expenditures for EDP
  (1) research and development
  (2) customer education
  (3) sales and marketing other than advertising
  (4) advertising
  (5) promotion
(f) name of chief executive officer (together with last known address for persons no longer employed by respondent)

3. List and identify by calendar year
(a) each of your subsidiaries, affiliates and divisions involved in EDP business
(b) each organization involved in EDP business acquired by you together with from whom acquired
(c) each organization involved in EDP business sold, spun off or otherwise disposed by you
(d) each joint venture involved in EDP business in which you participated, together with a list of all other participants therein.

4. List and identify each EDP product which you offer or have offered for sale or lease and for each specify
(a) its name and type and model number
(b) its specifications
(c) its general function
(d) applications for which it may be used
(e) if such product is manufactured or developed by respondent,
  (1) the period (by beginning and ending dates) planned
  (2) the period (by beginning and ending dates) developed
  (3) the date publicly announced
  (4) the date first offered for sale or lease
  (5) the date first installed
  (6) the date withdrawn
(f) if such product is purchased or leased by respondent and then resold or released in whole or in part, specify the date(s)
  (1) first announced or offered for sale or lease by respondent
  (2) first purchased or leased by respondent together with from whom respondent purchased or leased it
  (3) first sold or leased by respondent
(g) revenue by calendar year
  (1) total
  (2) from customers located in the United States
  (3) from sales of new product to customers located in the United States
  (4) from sales of used product to customers located in the United States
  (5) from other sales of new product
  (6) from other sales of used product
  (7) from leases to customers located in the United States
  (8) from other leases
(h) quantity sold by calendar year
  (1) to customers located in the United States
  (2) other
(i) quantity sold after installation on lease by calendar year
  (1) to customers located in the United States
  (2) other
(j) quantity installed (total) by calendar year at year end together with the monthly rental value and purchase value thereof
  (1) with customers located in the United States
  (2) other
(k) quantity installed on lease by calendar year at year end together with the monthly rental value and purchase value thereof
  (1) to customers located in the United States
  (2) other
(l) quantity manufactured by calendar year together with the monthly rental value and purchase value thereof
  (1) in the United States
  (2) other
(m) quantity uninstalled i.e., in inventory at year end together with the monthly rental and purchase value thereof
(n) the quantity presently on order for sale
(o) the quantity presently on order for lease
(p) prices at which product was offered by respondent for sale or lease together with period (by beginning and ending dates) offered and the class of customers to whom offered.

5. List and identify each EDP service which you offer or have offered, and for each specify:
(a) its nature and description
(b) its purpose
(c) date(s)
  (1) planned
  (2) first offered
  (3) first rendered
  (4) withdrawn
(d) revenue by calendar year
  (1) from customers located in the United States
  (2) other
(e) prices at which service was offered together with the period (by beginning and ending dates) offered and kinds of customers to whom offered.

6. Have you manufactured any style or type of Central Processing Unit (CPU) during the period 1956 to date?
(a) If your answer is in the affirmative, then:
  (1) identify each style, type or model CPU manufactured and state the number of units of each style or type manufactured during the period 1956 to date.
  (2) during the period in which you have manufactured CPUs, state the years in which you have leased such CPUs to customers.
(b) if your answer is in the negative, have you, during the period 1956 to date, purchased any CPUs? If so:
  (1) identify each CPU which you have purchased and give a general description of what other equipment has been used with each such CPU since you purchased the same.

7. If you are not a manufacturer of CPUs but have purchased CPUs state:
(a) were such purchases of CPUs exclusively for your use?
(b) have you leased CPUs which you have purchased? If so, state the annual receipts from such leases during the period 1956 to date.
(c) have you sold CPU time on a "time-sharing" basis? If so, state the annual revenues for such service for the period 1956 to date.

8. If you are a manufacturer of CPUs for the period 1956 to date, state the approximate percentage of your CPU sales to each of the following customers:

(a) United States government (all parts)	%
(b) Universities and colleges	%
(c) Leasing companies (who purchased CPUs to leaseback)	%
(d) All others (general commercial users)	%
Total	%

9. If you leased CPUs, estimate your total lease revenues for each year from 1956 to date, broken into

the following categories:

(a) United States government (all parts) %
(b) Universities and colleges %
(c) Leasing companies (who purchased CPUs to leaseback) %
(d) All others (general commercial users) %
Total %

10. If you have sold CPU time on a "time-sharing" basis estimate your total receipts per year, broken into the following categories:

(a) United States government (all parts) %
(b) Universities and colleges %
(c) Leasing companies (who purchased CPUs to leaseback) %
(d) All others (general commercial users) %
Total %

.....
Signature of Company Officer

Sworn and subscribed to before me
this day of , 1971

.....
Notary Public

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA
THIRD DIVISION

Control Data Corporation,
Plaintiff,
v.
International Business Machines Corporation,
Defendant,
and
Commercial Credit Company,
Additional Defendant on Counterclaim,
3-68 Civ. 312

PRETRIAL ORDER NO. 9

Greyhound Computer Corporation,
Plaintiff,
v.
International Business Machines Corporation
Defendant.
3-70 Civ. 328
3-70 Civ. 329

During the past several weeks a series of pretrial conferences has been held in St. Paul, and Minneapolis, Minnesota and in New York City, New York, principally to hear motions objecting to the court's order of September 20, 1971 (originally issued September 13, 1971) entitled Order for the Taking of Depositions Under Rule 31 of the Federal Rules of Civil Procedure (The Rule 31 Order). Hearings were held on October 28, and November 5 in St. Paul, November 2 in Minneapolis and on October 29 in New York City.

Oppenheimer, Brown, Wolff, Leach and Foster, St. Paul, Minnesota, by Richard Lareau, Elmer B. Trousdale and Eric Miller, Esqs., together with McBride, Baker, Wienke & Schlosser, Chicago, Illinois, by John P. Ryan, Jr. Esq., appeared for Control Data Corporation; Winston, Strawn, Smith & Patterson, Chicago, Illinois, by Edward L. Foote, Robert Bernard and Stanley A. Walton, Esqs., together with Haverstock, Gray, Plant and Mooty, Minneapolis, Minnesota, by Robert E. Bowen, Esq., appeared for Greyhound Computer Corporation: Faegre & Benson, Minneapolis, Minnesota, by John D. French and Norman R. Carpenter, Esqs., together with Cravath, Swaine & Moore, New York, N.Y., by Thomas D. Barr, Frederick A. O. Schwarz, Jr., and Leonard P. Novello, Esqs. appeared for International Business Machines; John M. Furlong, Esq., appeared for Honeywell, Inc.; Henson, Webb & Tully, Minneapolis, Minnesota, by Robert F. Henson, and Joseph T. Dixon, Jr. Esqs. appeared for Burroughs Corporation; Donald P. McCormick and Theodore F. Brophy, Esqs. appeared for General Telephone & Electronics Corporation; Gaston, Snow, Motley & Holt, Boston, Massachusetts, by Ansel B. Chaplin and Richard J. Testa, Esqs. appeared for Digital Equipment Corporation; Ropes & Gray, Boston, Massachusetts, by John S. Hopkins, III, Esq., appeared for Bolt Beranek and Newman, Inc. and The Delos International Group Inc.; William H. Talmadge, Esq. appeared for National Cash Register; Irell & Manella, Los Angeles, California, by Richard H. Borow and Gregory R. Smith, Esqs. appeared for Computer Design Corporation, Memory Systems, Inc., Unicorn Systems Company, and Wyle Laboratories.

The order as will appear is designed to secure information from some 2,700 companies not parties to the litigation said to be in the electronic data processing industry in an effort to define the relevant market for purposes of trial.

The court has before it several matters with respect to its Rule 31 order dated September 20, 1971: (a) Motions of Honeywell, Inc., Burroughs Corporation, Digital Equipment Corporation joined in by National Cash Register, Computer Design Corporation, Memory Systems, Inc., Unicorn Systems, Inc., Wyle Laboratories and a separate order to show cause of General Telephone and Electronics Corporation, all objecting to compliance with the Rule 31 order and in the alternative seeking a protective order pursuant to Rule 26(c) of the Federal Rules of Civil Procedure and payment of expenses incident to compliance; (b) IBM's motion to compel General Telephone and Electronics Corporation to respond to the census.

1. Jurisdiction to Enter Rule 31 Order

The court has concluded that its appointment as a transferee judge for coordinated and consolidated pretrial proceedings pursuant to 28 U.S.C. § 1407 empowered it with jurisdiction over the various non-party deponents at the time of entering its Rule 31 Order. This conclusion is consistent with the interpretation that one of the purposes of § 1407 is "to avoid unsupervised wrangling of counsel and breakdown of the continuity of the deposition and inefficient references of questions ... to a judge with no prior knowledge of the litigation." Manual for Complex and Multidistrict Litigation, § 2.32 (1970). Moreover, the Judicial Panel on Multidistrict Litigation believes it desirable to have all determinations in the transferred litigation made by the transferee court to avoid inconsistent rulings, multi-circuit appeals, and dual control over the litigation by two or more district courts. See McDermott and Peterson, "Multidistrict Litigation: New Forms of Judicial Administration," 56 A.B.A.J. 737, 745 (1970).

To meet the jurisdictional arguments raised by some of the deponents, however, this court has received an intercircuit assignment by Mr. Chief Justice Burger pursuant to 28 U.S.C. § 292 designating it as a District Judge in the Southern District of New York, the District of Massachusetts, and the District of the District of Columbia.

2. Motions to Vacate Rule 31 Order

Attorneys for the non-party deponents have ably argued their clients' opposition to the Rule 31 Order. It is true that the Order does not envision literal compliance with Rule 31 of the Federal Rules

of Civil Procedure. Rather, it is an innovative attempt by the court to permit discovery and at the same time to limit the burdensome and time-consuming procedure or oral depositions of non-party witnesses. While the court realizes that some oral depositions may be sought in addition to the Answers to the Rule 31 Order, it is the court's opinion that this streamlined Rule 31 Order would alleviate a significant number of proposed depositions. Plaintiff Greyhound Computer has urged that the "leasing industry" of which it is a part is or may be in distress if certain alleged practices are not abrogated and thus an early trial date is requested. The Rule 31 Order was evolved in an effort to accomplish such.

The court has a broad discretion in managing the discovery process fashion that will implement the philosophy of full disclosure of relevant information. The basic philosophy of the amended Federal Rules of Civil Procedure is to allow a very broad scope of discovery and to have any restrictions imposed directed to the use of, rather than the acquisition of, the information discovered. C. Wright & A. Miller, Federal Practice and Procedure: Civil § 2001 (1970). It is the court's belief that the protective order issued herein will provide deponents the maximum protection against harmful side effects from the use of information provided in responses to the Order.

THEREFORE, IT IS ORDERED That non-party deponents' motions to vacate the Rule 31 Order are hereby denied.

IT IS FURTHER ORDERED That each deponent who has not heretofore responded, including the objectors above named, must file, by December 20, 1971, its complete response to the court's order of September 20, 1971, mailed to the clerk of court as provided in that order.

IT IS FURTHER ORDERED That responses to the Rule 31 Order need only encompass data and information through December 31, 1970, or any fiscal years occurring thereafter.

3. Objections Raised by Various Deponents.

The basic contention of the deponents objecting to the Rule 31 Order is that disclosure of the information requested by IBM, claimed to be the dominant competitor, would result in irreparable injury to their competitive position in the EDP industry. Defendant IBM, of course, has the right to undertake discovery of information and material relevant to the issues in the case, and should have the opportunity to develop by pretrial discovery the facts upon which its defenses may rest. Turmeme v. White Consolidated Industries, Inc., 266 F. Supp. 35, 37 (D. Mass. 1967). Thus, the claims of irreparable competitive injury asserted by deponents must be balanced against IBM's need for the information in the preparation of its defense. Covey Oil Co. v. Continental Oil Co., 340 F.2d 993, 999 (10th Cir.), cert. denied, 380 U.S. 964 (1965).

The non-party deponents must remember that the delineation of the relevant market in an antitrust case presents a complex and difficult issue. An informed resolution of such an issue requires information from competitors in the industry. See United States v. Lever Bros. Co., 193 F. Supp. 254, 256 (S.D. N.Y. 1961), cert. denied, 371 U.S. 932 (1962); Julius M. Ames Co. v. Bostitch, Inc., 235 F. Supp. 856, 857 (S.D. N.Y. 1964). The court does not feel that it can deprive IBM of its attempt to discover information which it asserts will aid it in showing what its share of the relevant market is, and yet an early trial date must be kept in mind.

The court is unaware of any rule or statute that requires it necessarily to protect sensitive competitive information from such disclosure as is relevant to the subject matter involved in the pending action. Olympic Refining Co. v. Carter, 332 F.2d 260, 265 (9th Cir. 1964); accord, National Util. Serv. Inc. v. Northwestern Steel & Wire Co., 426 F.2d 222, 227 (7th Cir. 1970). The court agrees with the response in United States v. Lever Bros. Co., supra, to a similar concern expressed by a third party in that litigation:

> "...[T]he framers of the discovery rules gave much thought and consideration to this facet of the problem, and concluded that the inconvenience caused to third parties in the federal courts was outweighed by the public interest in seeking the truth in every litigated case, with both sides better prepared, and the element of unfair surprise completely eliminated." Id. at 257 Accord, Carter Products, Inc. v. Eversharp, Inc., 360 F.2d 868 (7th Cir. 1966).

It is the court's hope that through negotiations with IBM's counsel and a sensible application of Guidelines 3 and 9 accompanying the Rule 31 Order problems relating to the compilation of data and submission of responses can be resolved without intervention by the court. The court strongly urges IBM to negotiate with deponents and to be agreeable to accepting information as prepared which complies as far as possible and in good faith in response to the order. All responses are to be furnished by December 20, 1971. This is necessary to prevent undue delay in the preparation of the trial of the Greyhound case.

Burroughs claims that information requested for the period 1968 to 1970 is extremely sensitive from a competitive position. The court does not intend to alleviate the burdens imposed upon Burroughs by the Rule 31 Order for the years leading up to 1968. However, for the years 1968 through 1970, Burroughs can respond to the Order by furnishing consolidated systems figures in arriving at its answers and where appropriate, preparing averages for groups of systems.

Deponent General Telephone and Electronics Corporation (G.T.E.) has resisted answering the order on the ground that it would have to gather information from some 130 subsidiaries. The court has been apprised by counsel for IBM that relatively few of those 130 subsidiaries are involved in the EDP industry. The court believes that IBM should issue copies of the Rule 31 order to those relevant subsidiaries and G.T.E. should require said subsidiaries to answer where they are involved in the EDP business.

Counsel for IBM have informed the court that no order is necessary with respect to the Massachusetts respondents, Bolt Beranek and Newman, Inc. and The Delos International Group, nor Sperry Rand, as they have agreed to produce and furnish the requested answers.

4. IBM Must Respond to Rule 31 Order by December 20, 1971.

The court sees no reason why IBM should be placed in a posture differing from the other deponents with respect to responding to the Order. Surely if IBM expects the non-party deponents to respond by Decem-

(Please turn to page 49)

C.a NUMBLES

Neil Macdonald
Assistant Editor
Computers and Automation

A "numble" is an arithmetical problem in which: digits have been replaced by capital letters; and there are two messages, one which can be read right away and a second one in the digit cipher. The problem is to solve for the digits.

Each capital letter in the arithmetical problem stands for just one digit 0 to 9. A digit may be represented by more than one letter. The second message, which is expressed in numerical digits, is to be translated (using the same key) into letters so that it may be read; but the spelling uses puns or is otherwise irregular, to discourage cryptanalytic methods of deciphering.

We invite our readers to send us solutions, together with human programs or computer programs which will produce the solutions. This month's Numble was contributed by:

Andrew M. Langer
Newton High School
Newton, Mass.

NUMBLE 722

```
      W H O S E
    × B R E A D
  -------------
      W T O H A B
    I R B S O E
  I W D S O A
T T H I W D
R T O H E D
-------------
W R I G S A D R I D    26619   24470   524205
```

E = A
W = R
B = D

Solution to Numble 721

In Numble 721 in the January issue, the digits 0 through 9 are represented by letters as follows:

S = 0	O = 5
V = 1	A = 6
H = 2	I, Y = 7
R = 3	C = 8
E = 4	P = 9

The message is: Very cheap is very dear.

Our thanks to the following individuals for submitting their solutions — **to Numble 7112:** Ed Balke, Bellwood, Ill.; Marijoe Bestgen, Shawnee Mission, Kans.; T. P. Finn, Indianapolis, Ind.; Joe Krashoc, Bartlett, Ill.; Harold L. Smith, Thomson, Ga.; and Howard B. Wilson, Richmond, Va. — **to Numble 7111:** R. J. Farrar, Barrington, Ill.; T. P. Finn, Indianapolis, Ind.; and Howard B. Wilson, Richmond, Va. — **to Numble 7110:** Marc Graham and Brenda Peck, Cambridge, Mass.

PICTORIAL REASONING TESTS AND APTITUDES OF PEOPLE — III

Neil Macdonald
Assistant Editor, Computers and Automation

"There is a place for non-verbal, non-mathematical testing, which is not culture-limited and not background-limited — and which might enable finding and employing many useful people."

In the October 1970 issue (p. 40), and again in the December 1970 issue (p. 42), we published Pictorial Reasoning Test C&A No. 1. The so-called "correct" answers to this test, the reasoning for them, and the statistical analysis so far, will be published in the March issue.

More Tests

In this issue we publish two more tests, C&A Pictorial Reasoning Tests No. 2 and No. 3 (pp 30, 31). Both contain many items produced by a "Pictorial Reasoning Pattern Generator" computer program, which we have worked out to run on our Digital Equipment Corp. PDP-9 computer. This program has enabled us to produce easily, diagrams made by a pseudo-random number generator as well as diagrams made by definite rules.

Consequently, this program broadens considerably the complexity of a picture or diagram which we can easily design, and the kind of reasoning that we can test. For example, it enables us to pose items which ask: "Can you decide that such and such a picture was produced randomly?" "Can you decide that the pattern of this item is the same as the pattern of that item?"

Responses

In regard to C&A Pictorial Reasoning Test No. 1, we have now received additional responses from (1) another 150 readers of "Computers and Automation", and (2) over 100 responses from high school students, sent to us by Mr. Howard P. Dodge, Wilbraham Academy, Wilbraham, Mass.

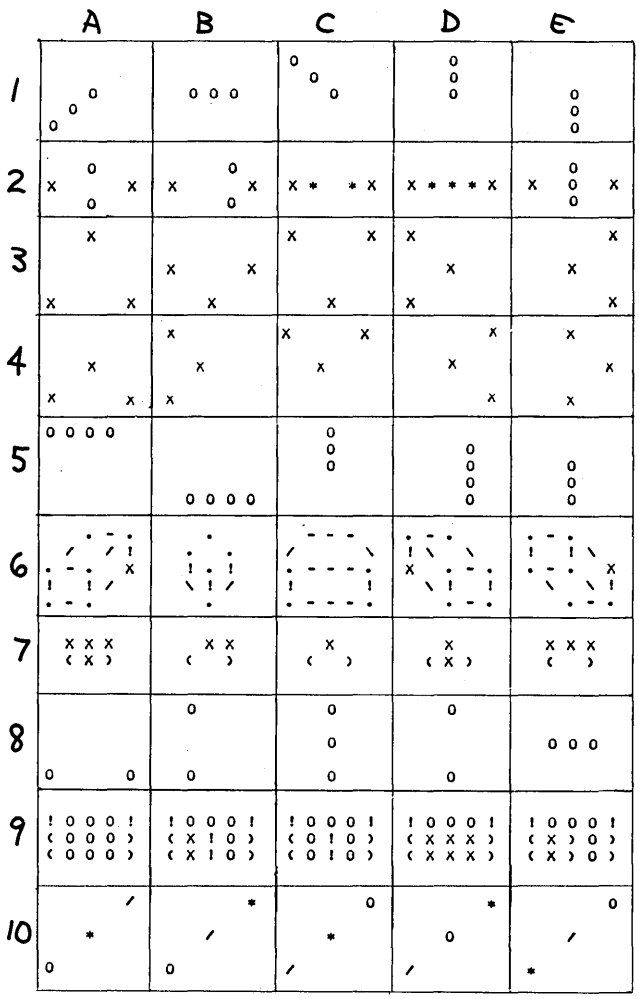
The number of responses on pictorial reasoning tests has surpassed our greatest expectations. We feel as if we were mining a pocket of gold in a ledge of gold-bearing quartz. We invite our readers to come with their picks and shovels, respond, and contribute. Since these pictures, tests, and ideas can be copied freely, the gold of one miner is the gold of all.

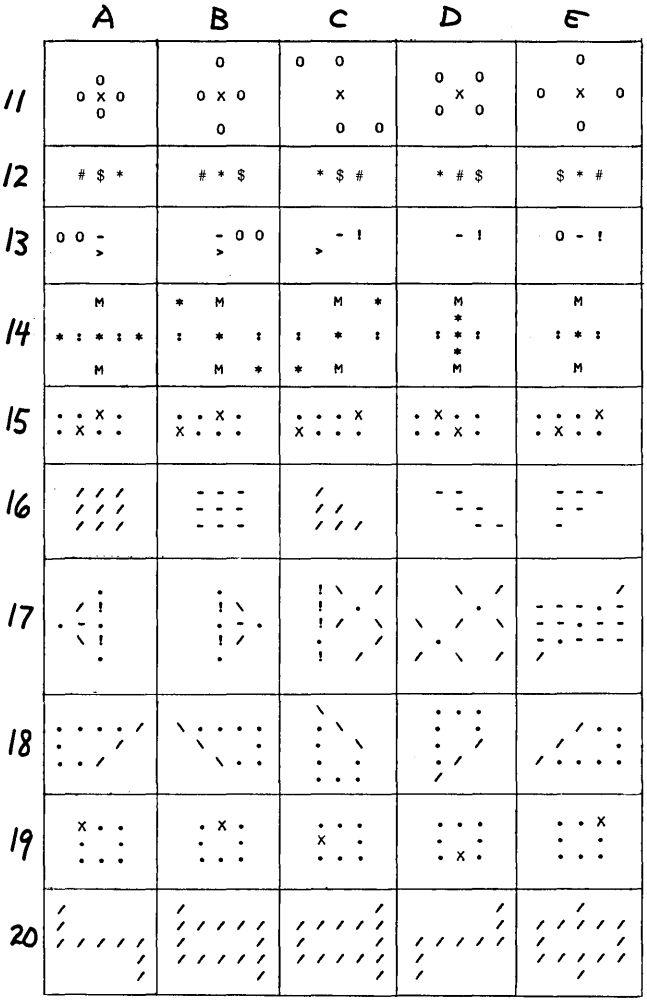
CORRECTION

In the December 1971 issue, on page 42, at the bottom, delete "(Please turn to page 56)". Many readers referred to this as "the most difficult item" on the page, since the December issue only contained 52 pages. We regret the error.

PICTORIAL REASONING TEST — C&A No. 2 — *(may be copied on any piece of paper)*

1. The following Pictorial Reasoning Test is a test to see how carefully you can observe and reason. It is not timed.
2. In each row, find the four pictures that are alike in some way, and find the one that is not like all the others and write its letter as your answer.
3. If you become convinced that no picture is essentially unlike the others, write F (for "defective" or "fatally ambiguous") as your answer.





Answers: Insert in each blank one letter out of A, B. C, D, E, or F, designating your choice.

1 ____	5 ____	9 ____	13 ____	17 ____
2 ____	6 ____	10 ____	14 ____	18 ____
3 ____	7 ____	11 ____	15 ____	19 ____
4 ____	8 ____	12 ____	16 ____	20 ____

Survey Data: 1. Name_____ 2. Title_____

3. Organization_____

4. Address_____

	Average?	Good?	Excellent?	Not your field?	Other (please specify)
5. In computer programming, are you:					
6. In systems analysis, are you:					
7. In managing, are you:					

8. What fields (not mentioned above) are you fairly good in (or even expert in)?_____

9. What other capacities do you have? (Please don't be bashful — but be objective)_____

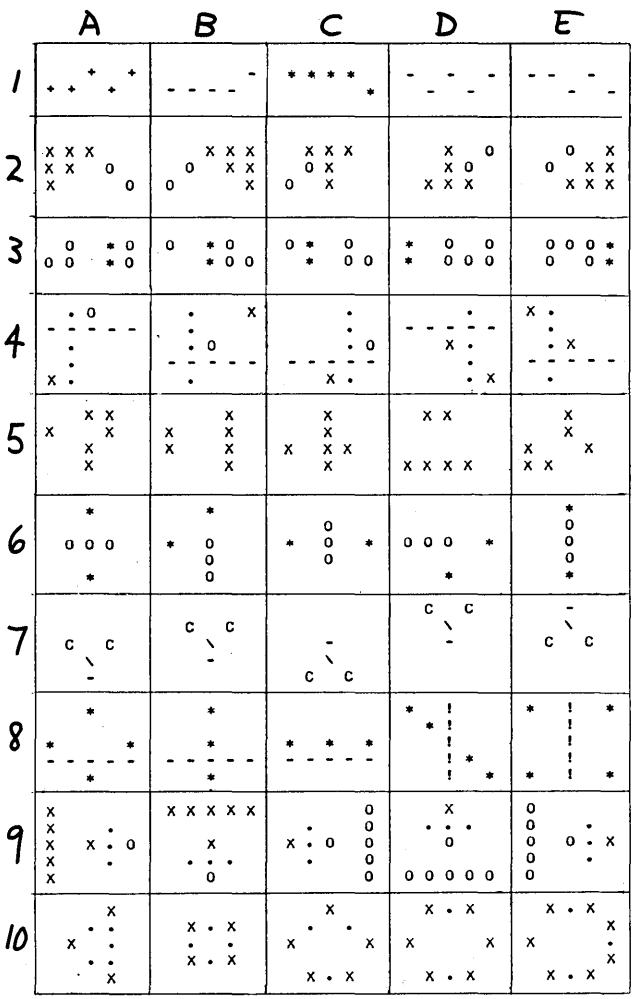
10. Any remarks?_____

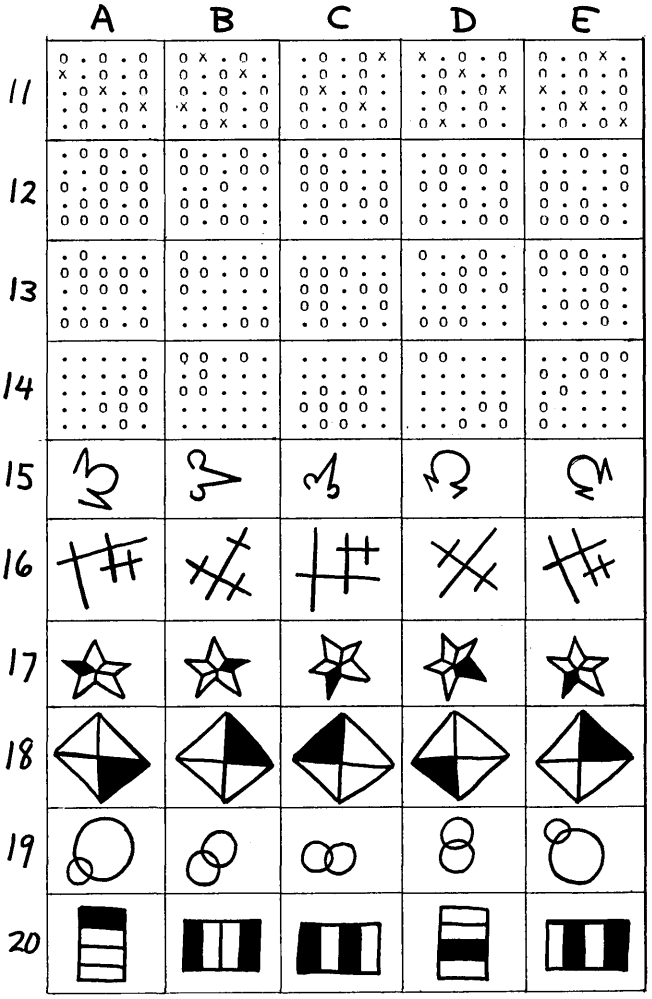
(attach paper if needed)

When completed, please send to: Neil Macdonald, Survey Editor,
Computers and Automation, 815 Washington St., Newtonville, Mass. 02160

PICTORIAL REASONING TEST — C&A No. 3 — *(may be copied on any piece of paper)*

1. The following Pictorial Reasoning Test is a test to see how carefully you can observe and reason. It is not timed.
2. In each row, find the four pictures that are alike in some way, and find the one that is not like all the others and write its letter as your answer.
3. If you become convinced that no picture is essentially unlike the others, write F (for "defective" or "fatally ambiguous") as your answer.





Answers: Insert in each blank one letter out of A, B, C, D, E, or F, designating your choice.

1 ____	5 ____	9 ____	13 ____	17 ____
2 ____	6 ____	10 ____	14 ____	18 ____
3 ____	7 ____	11 ____	15 ____	19 ____
4 ____	8 ____	12 ____	16 ____	20 ____

Survey Data: 1. Name _____ 2. Title _____

3. Organization _____

4. Address _____

	Average?	Good?	Excellent?	Not your field?	Other (please specify)
5. In computer programming, are you:					
6. In systems analysis, are you:					
7. In managing, are you:					

8. What fields (not mentioned above) are you fairly good in (or even expert in)? _____

9. What other capacities do you have? (please don't be bashful — but be objective) _____

10. Any remarks? _____

When completed, please send to: Neil Macdonald, Survey Editor,
Computers and Automation, 815 Washington St., Newtonville, Mass. 02160

ZINGO — A New Computer Game

Edmund C. Berkeley
Editor, Computers and Automation

"Dice in quantity, instead of just singles or pairs, provide an exciting 'learn-as-you-play' introduction to probability and statistics. They are much more interesting and much easier to toss, than pennies in quantity."

From time to time computer people hunt for games that are fun to investigate, fun to play with another person, and fun to play with a computer.

Such a game is Zingo. The rules for playing it are as follows:

Rules of Zingo

1. Number of Players. There are two or more players, each using 21 dice (or some other chosen number of dice).
2. Choices. The players agree on a NUMBER to be PRODUCED from a throw of the dice and the allowable arithmetical OPERATIONS to produce it.

For example, in Advanced Zingo, the number to be produced might be 35, and the allowable operations might be addition, subtraction, multiplication, division, raising to a power, and factorial. In Elementary Zingo, the number to be produced might be 2, and the allowable operations might be addition and subtraction.

3. Throw. Each player then rolls his 21 dice, and obtains a THROW.
4. Production. Each player then arranges his dice in allowed arithmetical COMBINATIONS to PRODUCE the agreed NUMBER.

Thus in Advanced Zingo, suppose the NUMBER to be produced is 35. If a player's THROW of 21 dice included a two, a three, and a five, he could use those 3 dice to PRODUCE 35 because of the COMBINATION 2 to the 5th power plus 3 equals 35.

In Elementary Zingo, suppose the NUMBER to be produced is 2. Then the player could use the two by itself to PRODUCE one 2, and the three and the five to PRODUCE a second 2 because of the COMBINATION 5 minus 3 equals 2.

5. Scoring. If a player uses up all the outcomes shown by his dice in his throw, by making combinations that produce the agreed number, he scores 2 points, for "going out". If the number of his combinations exceeds the number of combinations of the other player (or all the other players), then he scores 3 additional points.

Thus there is a premium on using all of the dice in one's throw, and a premium on making more combinations than the other player (or players).

Incidentally 35 is a particularly interesting number to produce because it cannot be produced by two dice, but it can be produced by about 10 or 11 or 12 combinations of 3 of the numbers 1 to 6 using addition, subtraction, multiplication, division, raising to a power, factorial, and square root. If a player finds that he cannot produce 7 combinations making 35, each of them using 3 dice, he is compelled to drop back to 6 combinations and is very likely to lose.

An Example

For example, suppose that Player A rolls the following throw:

1 1 1 2 2 3 3 3 4 4 5 5 5 5 5 6 6 6 6 6 6

In Advanced Zingo, he can use up all the outcomes of his dice in the manner given in Table 1, and he will thus score 2 points. Whether Player A scores 3 additional points depends on Player B, and whether B makes 6 combinations or fewer.

In Elementary Zingo he can use up all the outcomes of his dice to produce 2, in the manner given in Table 2, and he will thus score 2 points. Whether Player A scores 3 additional points depends on

Player B and whether Player B makes 9 combinations or fewer.

Supply of Dozens of Dice

It is usually difficult to buy or obtain a supply of dozens of dice at a reasonable price. Yet dice in quantity — instead of just singles or pairs — provide an exciting "learn-as-you-play" introduction to probability and statistics. They are much more interesting — and much easier to toss — than pennies in quantity. I remember the first time I tossed about 60 dice together on to a table, and began to note the proportions of the outcomes 1, 2, 3, 4, 5, 6. Of course, the proportion tended to be 1/6 (or ten dice) for each outcome. Right in front of me was visible evidence of the working of probability laws.

If any reader is interested in obtaining dozens of dice for use in Zingo (and similar games and statistical experiments), please see our offer at the end of this article.

A computer, of course, is a source that is even better than a large supply of dice for obtaining random or pseudo-random numbers in quantity. Also, the computer can be programmed to count, average, determine the standard deviation, etc., for each category of observations that one thinks of. The computer eliminates much tedious clerical work with statistical observations. But even so, there is still an undeniable satisfaction in actually taking many small dice in one's hands, and tossing them — as the Romans did over 2000 years ago, and countless other persons have ever since.

Table 1

USE OF THE THROW TO PRODUCE 35 – ADVANCED ZINGO

(1) Formula	(2) Combination	(3) Amount of Use	(4) Total Dice Used Up
(6X6)-1 = 35	1, 6, 6	3	9
4!+3!+5 = 35	3, 4, 5	2	6
2^5+3 = 35	2, 3, 5	1	3
(2+5)X5 = 35	2, 5, 5	1	3
		Count, 7	Cost, 21

Table 2

USE OF THE THROW TO PRODUCE 2 – ELEMENTARY ZINGO

(1) Formula	(2) Combination	(3) Amount of Use	(4) Total Dice Used Up
2	2	2	2
1+1 = 2	1, 1	1	2
5-3 = 2	3, 5	3	6
6-4 = 2	4, 6	2	4
6+1-5 = 2	1, 5, 6	1	3
(6+6/6)-5 = 2	5, 6, 6, 6	1	4
		Count, 10	Cost, 21

The Working Out of a Throw

For example, suppose a throw of 21 dice is as follows:

1 1 1 2 2 3 3 3 4 4 5 5 5 5 5 6 6 6 6 6 6

and the Agreed Number to be produced is 35. The possible combinations of least cost (which is 3) are shown in Table 3.

Table 3

COMBINATIONS THAT PRODUCE 35 – ADVANCED ZINGO

Ident. No.	Formula	Combination
1	6^2-1	1, 2, 6
2	(6+1)X5	1, 5, 6
3	(6X6)-1	1, 6, 6
4	2^5+3	2, 3, 5
5	(5+2)X5	2, 5, 5
6	(3+4)X5 or 4!+3!+5	3, 4, 5
7	5!/3-5	3, 5, 5
8	5!/4+5	4, 5, 5
9	4!+5+6	4, 5, 6
10	(6X5)+5	5, 5, 6

It is usually easy to "use up" left-over numbers n by means of one or both of the following devices:

(1) Plus zero, which equals plus n minus n;
(2) Times one, which equals n divided by n;

In fact, it may be possible to demonstrate that "going out" is fairly trivial, and can be achieved in a great many common cases.

A Computer Program for Zingo

This game can be easily programmed for a computer on many different levels from simple to complex. Some of the programming modules which will be needed inside a computer program for playing Zingo will be the following:

Module 1: A "message handler" which can input a "throw" of 21 dice, as typed on the keyboard by a human being, for instance, and which will store these 21 numbers accessibly in a buffer, which we can call the Throw Buffer.

Module 2: A "pseudo-random number generator", which when "filtered" will give just the numbers from 1 to 6. Then the computer instead of the human being could produce a throw of 21 dice to be placed in the Throw Buffer.

Module 3: A buffer which we can call the Combination Buffer, which will store combinations producing the agreed number, and "cost". For example, to produce 35, the Combination buffer will store 1, 6, 6 (since six times six minus one equals 35) and its "cost" of 3, the number of dice this combination uses.

In Stage 1 the inventory of combinations for a given number to be produced can be input by a human being using the keyboard. In Stage 2, another module will calculate the suitable combinations.

Module 4: A subprogram which will "tag" the set of dice outcomes in the Throw buffer according to whether or not they have been "used up" to make a combination. For example, 1, 6, 6, "used up" out of a throw of 21 dice, will leave only 18 unused dice available for the next selection of a combination.

In view of the nature of the Zingo program, it is foolish to include certain possible modules. One such is floating point arithmetical operations.

Instead we need a simple module which will store the sum, difference, product, quotient, and result of exponentiation and factorial, for only a certain few numbers.

The reason is that (1) the only numbers we start with are the six whole numbers 1, 2, 3, 4, 5, 6, and (2) to make many successful combinations, we have to keep the "cost" of each combination low. That is, we shall probably never want to use a combination of numbers that "costs" more than 4.

In about six hours of programming we worked out a Zingo computer program to run on our computer, a DEC PDP-9. This program gives exactly five least-cost solutions for this throw. (See Table 4) The program at present contains about 230 machine language instructions. It receives as one input the combinations listed in Table 3; the other input is the throw. The program does not yet compute the least cost combinations since a module for that purpose has not yet been written. The function which we have put into this program is the one that is hardest for a human being: testing selections and patterns of combinations exhaustively one after another, and making sure that no possible case has been omitted. The program is the work of Andrew Langer, Junior, Newton High School.

Table 4

ALL LEAST-COST COMBINATIONS FOR GIVEN THROW

Ident. No.	Combination						
1	126	166	166	235	345	345	556
2	126	166	166	235	345	355	456
3	156	166	166	235	235	345	456
4	166	166	166	235	235	345	455
5	166	166	166	235	255	345	345

Note on the Origin of Zingo

This game was worked out in my family when my two sons were very young, in a very elementary version. As they grew older, the version of Zingo that we played became more and more sophisticated until now, ten years later, the game is still fun, in an advanced version. And it has taught a good deal of arithmetic, mathematics, probability, and statistics in a learn-as-you-play style. □

- - - - - - - - -(may be copied on any piece of paper)- - - - -

To: Computers and Automation
815 Washington St., Newtonville, Mass. 02160

( ) Yes, please send me_____package(s) of 50 small dice (about 3/8-inch on an edge) for playing Zingo, and making other statistical investigations.

For each package, I enclose $2.30 plus 20 cents for handling (a total of $2.50 per package).

Total Enclosed $_____ (Prepayment is necessary.)

Name_____

Address_____

_____Zip_____

MARTIN LUTHER KING MEMORIAL PRIZE CONTEST

"Computers and Automation" announces the fourth year of the annual Martin Luther King Memorial Prize, to be awarded for the best article on an important subject in the general field of:

The application of information sciences and engineering to the problems of improvement in human society.

The judges in 1972 will be:

Dr. Franz L. Alt of the American Institute of Physics; Prof. John W. Carr III of the Univ. of Pennsylvania; Dr. William H. Churchill of Howard Univ.; and Edmund C. Berkeley, Editor of "Computers and Automation".

The amount of the prize in 1972 will be $150.

The closing date for the receipt of manuscripts this year is April 30, 1972, in the office of "Computers and Automation", 815 Washington St., Newtonville, Mass. 02160.

The winning article, if any, will be published in a subsequent issue of "Computers and Automation." The decision of the judges will be conclusive. The prize will not be awarded if, in the opinion of the judges, no sufficiently good article is received.

Following are the details: The article should be approximately 2500 to 3500 words in length. The article should be factual, useful, and understandable. The subject chosen should be treated practically and realistically with examples and evidence — but also with imagination, and broad vision of possible future developments, not necessarily restricted to one nation or culture. The writings of Martin Luther King should be included among the references used by the author, but it is not necessary that any quotations be included in the article.

Articles should be typed with double line spacing and should meet reasonable standards for publication. Four copies should be submitted. All entries will become the property of "Computers and Automation". The article should bear a title and a date, but not the name of the author. The author's name and address and four or five sentences of biographical information about him, should be included in an accompanying letter — which also specifies the title of the article and the date.

Futcher — *Continued from page 9*

the special commissions mentioned earlier in terms of obtaining new accounts, again a policy matter.

There are the sales training costs associated with having any effective sales force.

There are branch office costs, rents, with rates, administration overheads, etc. which again are controlled by policy because as users we would probably each of us like to have the local branch office next door, or certainly not too far away.

In that office we expect to see branch systems and programming staff and again they have to be paid for from this overall budget for Sales and Marketing.

There is then specialist industry in terms of people who know the industries in which we work and who should be able to provide specialist advice about various types of problems we might meet. Again these are financed from the same budget, but the people available are unlikely to be located in the branch next door.

Special Software

There is also the provision of special software to be financed; development of compilers which are needed by perhaps an uneconomically small number of users, the development of special operating systems where again the same might apply, for very few users need large complex operating systems to handle the various types of device which are available, and of course having mentioned that, there are special software routines to be written for the handling of the various terminals which may be attached.

To attract new business there will be advertising and public relations costs.

There will be costs for providing a technical education service to customers, and of course one's own staff have to be trained, and so there is the overhead cost of technical education to be considered.

Having indicated a number of headings (and I would not suggest that this list is exhaustive) we must remember that financial and manpower resources are limited. Allocation of them both will depend again upon management policy, so let us now look at a summary of our suppliers' business situation.

Costs Reduce Profit

All costs reduce profit. To be justified all avoidable expenditure must therefore either provide essential customer services at a planned level or it must work to procure future business. So allocation of revenue will depend upon our supplier's marketing position and his particular planned strategy to improve it. We can therefore say that our chance of obtaining our share of his scarce resources depends on the relevence of our account to our supplier's marketing strategy. We should, however, as users buying a system -- and here let us remember that we are buying a system that we need to do a job for our business; we are not buying just the computer -- have reasonable expectations of what should be supplied to us and these are:

- Working hardware, working software. for the basic system, not highly advanced and specialised software, and by this I mean sufficient software to enable applications programs to be written and made to work.

- Advice. We can expect advice on the use of that software and on the resolution of difficulties with it and, here let's be honest and perhaps a little self-critical for the moment: there are sometimes calls made on manufacturers which result from failure to read manuals and other instructions properly; and understandably they become a little cross about this and perhaps reluctant, as in the case of the fairy tale about "crying wolf", to come rushing to our rescue whenever we howl. We can expect engineering support to provide an acceptable (to the manufacturer) standard of performance from our hardware.

Uptime. It is interesting to discuss with different potential suppliers how they calculate what their up-time or available time is, and in fact if you analyse in detail what various formulae mean, you can see very easily that an acceptable performance standard to the manufacturer may provide a completely unacceptable continuing availability of computer time for our own use.

- Installation. We can also expect advice on the installation of the equipment, the environment in which it should be, the power supplies it needs, and perhaps fall-back power supplies in the case of break-down.

- Layout. We can expect advice also on efficient layout of the equipment so that the operators don't waste too much time skirting round little utilised peripherals in order to change tapes or disks, or change the paper, or insert the cards, or whatever, in the various input devices. Availability of technical training and availability of manuals can be expected, but here let me re-emphasize my use of the word availability. It is again a matter of policy for the manufacturer as to how much if anything is charged for either of these two particular requirements of ours. Again practice has changed. Historically there used to be unlimited technical training available; there used to be unlimited numbers of manuals sent to users. The costs however became disproportionate and manufacturers then recognised that they were not in a glamorous game of supplying computers, they were in a competitive business in which there were costs to be managed and they therefore started charging or limiting the availability of both technical training and manuals.

- Standards. We can also expect a supply of basic advice and standards to cover such things as systems, programming and operations. And here it is perhaps constructive to consider what might be considered basic and what therefore we should not expect to have as a free service.

One simple analogy is a basic standard for motor car maintenance which says that at 5,000 miles you must change the oil. This could be considered a basic standard, more detail is in fact needed to

make the thing worthwhile as an instruction. For example, we should be told whether or not the filter is to be changed at that mileage and also it would perhaps be useful to know what grade of oil should be supplied to replace that being drained out.

- Software Supplied. To return to computers, most manufacturers will supply commonly used routines in the commercial or the mathematical field and examples of these are PAYE calculation routines, and routines to perform certain basic mathematical functions.

- Common Applications. We can also expect some advice on common applications. Recognise though, what it is reasonable to request. One major supplier, I.C.L., has established a separate company to provide other than minimal support and this reflects that company's business plan. Here again must be borne in mind the relevance of our account to our supplier's marketing strategy. So, pick the right one for your business. Here, of course, you will have conflicts where the manufacturer's representative will say very cheerfully, "Yes, we have lots and lots of lovely people who don't know your business in detail, but yours will be our first account in your business area and you will therefore be given special attention as the lead-in to this sector of the market for us." This sounds fine, but remember the picture often given of the pioneer is that of the man out in front with the arrows sticking out of his bottom! It could well be much more to your advantage to pick a supplier already familiar with your business from whom you can therefore expect some worthwhile advice based on experience. Also you may well be able to obtain useful advice from discussions with fellow users.

- Contract. Do look at a supplier's contract. There are few, if any, which do not exclude anything which has gone before, in particular the sales proposal, and any letters. You will find the contract relates only to the supply of hardware, not the system you need for your business.

Support

In order to obtain the right support for you, I would advise drawing up an agreement with the local branch and here do remember that the branch manager can only commit the resources under his direct control. In this he is little different from any other manager that we might discuss in terms of position within any company. In this local agreement you should define all the items to be supplied which are not covered by the head office contract. The aspects of support covered by marketing policy are the relevant ones and if specialist support is supposedly available from a different part of the organisation, obtain a letter of undertaking from the responsible manager at that location. When drawing up this agreement or attempting to persuade people that such an agreement should be drawn up and should exist because an understanding on the old boy net is simply not good enough for a large business investment -- remember you are trying to buy, as we have to try to buy, something which our supplier may not be selling.

We want a system; he is selling hardware. □

Countryman — *Continued from page 20*

such that their losses are almost infinitesimal. I have asked many bankers and finance company representatives about their loss ratios on consumer receivables and have yet to be given a figure higher than .5 per cent. In other instances the consumer finance companies have claimed a loss ratio of 1.5 per cent, and the bankers have claimed 2 per cent. But the latest word I have seen, from a spokesman for the American Bankers Association, is that on consumer transactions "in commercial banks the loss ratio is less than half a per cent; it is perhaps now getting close to a quarter of 1 per cent." If the customers of the credit bureaus can do that well on the sort of information they now receive, how much worse would they do if left to their own devices? The oft-stated assumption that losses would greatly increase, with a consequent increase in the cost of consumer credit and a throttling of the economy based on that credit, has not been sufficiently challenged.

If a tough-minded inquiry were directed to the actual need for most of the existing compilations, we might expect to hear even more from the compilers than we have in the past about "efficiency." It is more efficient to preserve the dossiers for future possible use than to require a new investigation of the subject whenever information about him becomes necessary, or helpful, or comforting. Certainly it is more efficient. It is more efficient to preserve in a place of convenient access every police investigation of anyone ever made, no matter how unwarranted, against the possibility that such an investigation may again be made in the future. It is efficient to have the Selective Service System provide the FBI with fingerprints and other information on all persons it processes, against the possibility that a small percentage of them may at some future date be involved in an infraction of the law. It would be more efficient to extend the Alien Registration Act to citizens.

But we have not, in this country, been content in the past to let efficiency be the determining factor when individual liberty was jeopardized thereby. We have decided against efficiency and in favor of constitutional bans on unlawful searches and seizures and self-incrimination, and for jury trials in criminal cases. In view of the massive threat to individual privacy posed by the present and growing body of computerized dossiers, efficiency will hardly serve to justify their preservation.

Adequate Inquiry Overdue

These are the assumptions on which, it seems to me, Congressional inquiry should proceed. If it were to proceed so, I am confident that it would conclude that most of our present National Data Bank must be wiped out. If the inquiry were to proceed on those assumptions it would also produce some meaningful restrictions on access to the dossiers which survive because they have some reasonable relation to a vital public purpose, and these restrictions would themselves justify the preservation and continuing use of such dossiers. If Congress were to proceed on those assumptions, finally, it would not place the policing of restrictions to access in the hands of those most likely to violate the restrictions.

We have not yet had an inquiry based on such assumptions, and the time for it is overdue. The computerized dossiers are multiplying by the day. We are only thirteen years from 1984. □

(Reprinted from *Computers and Automation,* February, 1970.)

c.a EDITORIAL

"The House is on Fire"

In the computer field, there are basically two kinds of attitudes about the applications of computers and data processing—information handling—to the solving of problems.

On the one hand there is the attitude:

> Computers are tools like matches—and we are just mechanics. We take the data as given (the kindling). Our responsibility is the processing—swift, economical, correct (making a fire with matches). The answers belong to our employer (he uses the fire as he sees fit).

The group who holds this attitude—let's call it Group I—takes the data and the problem as given—given by the corporation or the government, the employer or the client, who has the problem.

This group works on payrolls, etc.—and on the targeting of nuclear missiles and on calculations of the dissemination of nerve gases. And they work on the latter with the same "I'm just doing my job" attitude that they work on the former. In Nazi Germany Group I would have worked "under orders" on the design of ovens for efficient mass incineration of thousands of corpses from the gas chambers. (The Nazis put to death in concentration camps over 11 million Jews, Russians, Poles, Czechs, French, etc., in pursuit of the "final solution".) If you read "Treblinka" by Jean-Francois Steiner (Simon & Schuster, New York, 1967) you find out how one Nazi scientist graded corpses from fat to thin so the fires would burn better.

On the other hand there is the attitude:

> Computers are tools like bridges—and we are professional engineers. We take the data as given (the materials and the site) but we check the data independently. Our responsibility is not only processing—swift, economical, correct (building a bridge with girders)—but also worthwhile answers (bridges that work). The bridges we build must carry people, and we don't want them to crash.

The group who holds this attitude—let's call it Group II—works on payrolls, etc.—but they will refuse to work on calculations for the dissemination of nerve gases, or on calculations for targeting of nuclear weapons, or on calculations for the design of crematoria for thousands of human corpses. They see a responsibility greater than that to their government or employer—they see a primary responsibility to their fellowman.

A recent vote of members of the Association for Computing Machinery indicated that the proportion of Group I to Group II is about two to one. In other words, two-thirds of the computer people who replied to the survey on the "questions of importance", voted that the ACM should not "take a stand on deeply political questions."

The attitude of Group I is a characteristically conservative attitude: "The world is going along pretty well"—"Let us not rock the boat"—"The existing system should be tolerated"—"Things will eventually work out all right"—"Professional people have their major allegiance to the persons who pay them"—"A computer professional has no social responsibility different from that of the nonprofessional man". . . .

The attitude of Group II is a characteristically liberal attitude: "The world can be a much better place than it is now"—"It is important to try to improve the world"—"Such a vast number of sad and evil things happen in the world that everybody must do something significant to help prevent them"—"The fact that thousands of human beings have been killed by both sides in the Viet Nam conflict requires people everywhere to seek withdrawal of foreign armed forces from that unhappy civil war."

Scientifically it is easy to show that the attitude of Group I will lead to the destruction and extinction of the human race, just as the dinosaurs became extinct. Scientifically it is not possible to show that the attitude of Group II will lead to the survival of human beings on the earth: it is only possible to show that the attitude of Group II offers human beings some hope of survival in the increasingly more difficult environment on earth, the "house" for all of us.

For "the house is on fire": the earth as an environment for human beings has changed enormously in the last 25 years and is deteriorating fairly rapidly. Before 1945, the factor of sufficient distance from a danger could almost always save human beings alive. Now, distance is not enough. Now, because of interlocking planet-wide systems of consequences, the environment of the earth is no longer safe for human beings. For example:

- Large-scale nuclear war (and its radioactivity) between two countries in the Northern hemisphere can kill all the inhabitants of that hemisphere. International anarchy allows this to break out at the choice of one government.
- The explosive increase in the number of human beings alive—the so-called population explosion—seriously threatens the power of the earth to support them. Worldwide anarchy allows any man and woman to bear children unrestrictedly.
- Pollution of the air, the water, and the land by man's activities is becoming world-wide. Again, international anarchy allows this to happen everywhere.
- Etc.

"The house is on fire". So it is necessary for all persons living in the "house" to take some time away from their play rooms, their work rooms, and their bedrooms, their computer rooms, their laboratories, and their ivory towers—and to try to help put out the fire. The fire is licking at the edges of the roof and the walls and the floors—and time is pressing and will not wait.

Accordingly, **Computers and Automation** with this issue is starting a department in the magazine which for the present will bear the subtitle "The House is on Fire" and the title "The Profession of Information Engineer." Here we plan to publish information from time to time which will help focus the attention of computer professionals in the direction of becoming information engineers, "bridge" engineers,—not mechanics, not artisans. For we are, first of all, human beings with professional training, and secondly, we are computer professionals. We need to shed light on major urgent problems of the earth today. These are the great problems which cause our children to be "a generation in search of a future," to use the phrase of Professor George Wald, Nobel prizewinner in biochemistry. These are the great problems which raise the great question:

Will there be any future at all for our children?

Edmund C. Berkeley
Editor

The Activities of the Central Intelligence Agency, at Six Billion Dollars a Year

Edward K. DeLong
United Press International
Washington, D.C.

"Whenever you are working on a problem that the military is deeply interested in — because it's affecting one of their programs . . . and you're not saying what they want you to say, the browbeating starts . . . the pressure to get the report to read more like they want it to read."

(Based on a dispatch distributed by UPI on October 3, 1971)

Victor Marchetti embarked 16 years ago on a career that was all any aspiring young spy could ask. But two years ago, after reaching the highest levels of the Central Intelligence Agency, he became disenchanted with what he perceived to be amorality, overwhelming military influence, waste and duplicity in the spy business. He quit.

Fearing today that the CIA may already have begun "going against the enemy within" the United States as they may conceive it — that is, dissident student groups and civil rights organizations — Marchetti has launched a campaign for more presidential and congressional control over the entire U.S. intelligence community.

"I think we need to do this because we're getting into an awfully dangerous era when we have all this talent (for clandestine operations) in the CIA — and more being developed in the military, which is getting into clandestine "ops" (operations) — and there just aren't that many places any more to display that talent," Marchetti says.

Running Operations Against Domestic Groups

"The cold war is fading. So is the war in Southeast Asia, except for Laos. At the same time, we're getting a lot of domestic problems. And there are people in the CIA who — if they aren't right now actually already running domestic operations against student groups, black movements and the like — are certainly considering it.

"This is going to get to be very tempting," Marchetti said in a recent interview at his comfortable home in Oakton, (Va.),a Washington suburb where many CIA men live.

"There'll be a great temptation for these people to suggest operations and for a President to approve them or to kind of look the other way. You have the danger of intelligence turning against the nation itself, going against the 'the enemy within.'"

Marchetti speaks of the CIA from an insider's point of view. At Pennsylvania State University he deliberately prepared himself for an intelligence career, graduating in 1955 with a degree in Russian studies and history.

Offer of Job in CIA

Through a professor secretly on the CIA payroll as a talent scout, Marchetti netted the prize all would-be spies dream of — an immediate job offer from the CIA. The offer came during a secret meeting in a hotel room, set up by a stranger who telephoned and identified himself only as "a friend of your brother."

Marchetti spent one year as a CIA agent in the field and 10 more as an analyst of intelligence relating to the Soviet Union, rising through the ranks until he was helping prepare the national intelligence estimates for the White House. During this period, Marchetti says, "I was a hawk. I believed in what we were doing."

Moving Up

Then he was promoted to the executive staff of the CIA, moving to an office on the top floor of the Agency's headquarters across the Potomac River from Washington.

For three years he worked as special assistant to the CIA chief of plans, programs and budgeting, as special assistant to the CIA's executive director, and as executive assistant to the Agency's deputy director, V. Adm. Rufus L. Taylor.

"This put me in a very rare position within the Agency and within the intelligence community in general, in that I was in a place where it was being all pulled together," Marchetti said.

I Began To See Things I Did Not Like

"I could see how intelligence analysis was done and how it fitted into the scheme of clandestine operations. It also gave me an opportunity to get a good view of the intelligence community, too: the National Security Agency, the DIA (Defense Intelligence Agency), the national reconnaissance organization — the whole bit. And I started to see the politics within the community and the politics between the community and the outside. This change of perspective during those three years had a profound effect on me, because I began to see things I didn't like."

With many of his lifelong views about the world shattered, Marchetti decided to abandon his chosen

career. One of the last things he did at the CIA was to explain to Director Richard Helms why he was leaving.

"I told him I thought the intelligence community and the intelligency agency were too big and too costly, that I thought there was too much military influence on intelligence — and very bad effects from that — and that I felt the need for more control and more direction.

"The clandestine attitude, the amorality of it all, the cold-war mentality — these kinds of things made me feel the agency was really out of step with the times," Marchetti said.

"We parted friends. I cried all the way home."

Marchetti, 41, hardly looks the stereotype of a man who spent 14 years in the CIA.

His dark-rimmed glasses, full face, slightly stout figure, soft voice, curly black hair and bushy sideburns would seem more at home on a college campus. He pronounces his name the Italian way — Marketti.

"The Rope Dancer"

Marchetti's first impulse after quitting the CIA was to write a nonfiction account of what was wrong with the U.S. intelligence community. But, he said, he could not bring himself to do it then.

Instead he wrote a spy novel — "a reaction to the James Bond and British spy-story stereotypes" — which he says looks at the intelligence business realistically from the headquarters point of view he knows so well.

The novel, "The Rope Dancer," was published last month. It is a thinly disguised view of the inner struggle over Vietnam and Russian strategic advances as Marchetti saw them within the CIA, the Pentagon and the White House under President Johnson.

Writing the novel took a year. Then came two tries at nonfiction articles — one rejected as too dull and the other turned down as too chatty — and a start on a second novel.

But Marchetti said the need for intelligence reform continued to gnaw at him, and as his first novel was about to come out he came into contact with others who agreed with him, including Representative Herman Badillo (Dem.), of New York.

Now, Marchetti said, the second novel has been laid aside so he can devote full time to a campaign for reform.

"Intelligence Business is Just Too Big"

Although now a dove — particularly on Vietnam, which he calls an unwinnable war to "support a crooked, corrupt regime that cannot even run an election that looks honest" — Marchetti says he still believes strongly in the need for intelligence collection.

"It's a fact of life," he said. "For your own protection you need to know what other people are thinking.

"But intelligence is now a 6-billion-dollar-a-year business, and that is just too big. It can be done for a lot less, and perhaps done better when you cut out the waste."

For instance, Marchetti said, the National Security Agency — charged in part with trying to decode intercepted messages of foreign governments — wastes about half its 1-billion-dollar yearly budget.

"They have boxcars full of tapes up at Fort Meade (Md.) that are 10 years old — boxcars full! — because in intercepting Soviet (radio) communications, for instance, the Soviets are just as sophisticated as we are in scrambler systems. It is almost a technical impossibility to break a scrambled, coded message. So they just keep collecting the stuff and putting it in boxcars. They continue to listen all over the world. They continue to spend fortunes trying to duplicate the Soviet (scrambling and encoding) computers," he said.

"By the time someone can break it, a decade or two has gone by. So you find out what they were thinking 20 years ago — so what?"

Marchetti said at one time a national intelligence review board tried to cut out an expensive NSA program that analysts agreed was useless. The CIA Director, he said, wrote a memorandum recommending the program stop.

"But Paul Nitze, on his last day in office (as Deputy Secretary of Defense), sent back a memo in which he said he had received the recommendation and considered it, but had decided to continue the program," Marchetti said. He said this was possible for Nitze because, although the Director of the CIA is officially in charge of all the nation's intelligence activities, 85 per cent of the money is hidden in the Defense Department budget.

This, said Marchetti, gives the military considerable power to shape intelligence estimates. He gave as an example a conflict between military and CIA estimates of the number of North Vietnamese and Viet Cong in South Vietnam during the late 1960s.

The military wanted a low figure "to show they were killing the VC and North Vietnamese and were winning the war." The CIA reported far too many Communists in South Vietnam to support this military desire, he said.

Ultimately, Marchetti said, the military won and the CIA issued an estimate in which "tricky wording" seemed to make its views agree with those of the generals.

"Browbeating, Pressure" to Change Reports

"Whenever you're working on a problem that the military is deeply interested in — because it's affecting one of their programs or their war in Vietnam or something — and you're not saying what they want you to say, the browbeating starts: the delaying tactics, the pressure to get the report to read more like they want it to read," he said — "in other words, influencing intelligence for the benefit of their own operation or activity.

"Somehow, some way, you've got to keep your intelligence objective. It can't be a private tool of the military — nor, for that matter, a private tool of the White House."

Marchetti said there is also waste in almost every technical intelligence-gathering program — such as spy satellites, special reconnaissance aircraft, and over-the-horizon radars — because when either the military or the CIA makes a new advance the rival agency follows suit with something almost the same but just different enough to justify its existence.

"The CIA People Can Start Up Wars"

The thing that troubles Marchetti most about the CIA is its penchant for the dark arts of clandestine paramilitary actions — an area made doubly attractive to the Agency because the military scarcely can operate in this field.

"One of the things the CIA clandestine people can do is start up wars," he said. "They can start up a private war in a country clandestinely and make it look like it's just something that the local yokels have decided to do themselves."

This, according to Marchetti, is how the United States first began active fighting in Vietnam. It is the type of activity now going on in Cambodia and Laos, where recent congressional testimony revealed the CIA is running a 450-million-dollar-a-year operation, he said.

Marchetti said he is convinced the CIA not only engineered the 1963 overthrow of the Diem regime in (South) Vietnam, which President Nixon also has said was the case, but was also responsible for the coup that ousted Prince Norodom Sihanouk (of Cambodia) in early 1970, making possible the U. S.-South Vietnamese raid on Communist sanctuaries in that country several weeks later.

The Southeast Asia clandestine operations years ago caused the CIA to set up a phony airline company, Air America, which now has as many employees as the 18,000-member working staff of the CIA itself, he said.

Moving Up

"Well, the CIA is not only monkeying around in Vietnam and in Laos," Marchetti said — "they're looking at other areas where these sorts of opportunities may present themselves.

"When they start setting up private air companies and everything else that goes with the wherewithal for supporting a government or an antigovernment movement, this is very, very dangerous, because they can do it in a clandestine fashion and make it difficult for the public to be aware of what is going on."

Marchetti said areas where the CIA might launch future clandestine paramilitary activities include South America, India, Africa and the Philippines — all places in the throes of social upheaval. Upheaval, he said, is what prompts the CIA Director to begin planning possible clandestine activities in a country.

"That is so if the President says, 'Go in and do something'; he's already got his fake airlines to fly in people. He may have a program going with the police in this country or the military in that," according to Marchetti.

In addition to Air America, Marchetti said, the CIA has set up both Southern Air Transport in Miami and Rocky Mountain Air in Phoenix for possible use in paramilitary operations in South America.

Similar fake airlines have been bought and sold all over the world, he said, including one in Nepal and another in East Africa.

He also said the CIA has a big depot in the Midwest United States "where they have all kinds of military equipment, all kinds of unmarked weapons."

"Over the years they have bought everything they can get their hands on all over the world that is untraceable — to prepare for the contingency that they might want to ship arms to a group in a place like Guatemala," Marchetti said. "They even used to send weapons buyers around to buy arms from the (Soviet) bloc countries."

Understanding the Men of the CIA

To fully understand why the CIA conducts semi-legal operations around the world, why it might begin to conduct them in the United States and why it more control needs to be exercised over the Agency, Marchetti said it is necessary to understand the men of the CIA.

Most of them, he said, got their start in the intelligence business during or shortly after World War II, when the cold war was going strong.

"These people are superpatriots," he said. "But you've got to remember, too, they're amoral. They're not immoral; they're amoral.

"The Director made a speech to the National Press Club where he said, "You've just got to trust us. We are honorable men.'

"Well, they are honorable men — generally speaking. But the nature of the business is such that it is amoral.

"Most things are right or wrong, good or evil, moral or immoral. The nature of intelligence is that you do things because they have to be done, whether it's right or wrong. If you murder — ."

Marchetti did not complete the sentence.

Because the men of the Agency are superpatriots, he said, it is only natural for them to view violent protest and dissidence as a major threat to the nation. The inbred CIA reaction, he said, would be to launch a clandestine operation to infiltrate dissident groups.

That, said Marchetti, may already have started to happen.

"I don't have very much to go on,' he said. "Just bits and pieces that indicate the U. S. intelligence community is already targeting on groups in this country that they feel to be subversive.

"I know this was being discussed in the halls of the CIA, and that there were a lot of people who felt this should be done."

Needed: "More Controls by Congress"

With the lack of control that exists now over the Agency, Marchetti said, an extremely reactionary President could perhaps order the CIA's clandestine activities to go beyond mere infiltration.

"I don't think the likelihood of this is very great," Marchetti said, but one of the ways to prevent this is to let a little sunshine in, to have some more controls by the Congress.

"There's no reason for so much secrecy. There's no reason the intelligence community shouldn't have its budget examined. It just bothers the hell out of me to see this waste going on and this hiding behind the skirts of national security. You can have your national security — with controls — and you don't need 6 billion dollars to do it." □

THE CIA: A VISIBLE GOVERNMENT IN INDOCHINA

Fred Branfman and Steve Cohn
New York, N.Y.

"The CIA may or may not be an invisible government here at home . . . but to those close to the war it is one of the most visible – and important – governments in Indo-China today."

As American soldiers are withdrawn from Indochina, the role of the Central Intelligence Agency (C.I.A.) is increasing. The C.I.A. may or may not be an invisible government here at home. But to those close to the war, it is one of the most visible — and important — governments in Indochina today.

CIA Secret Army

As we shall explain further in weeks to come, the C.I.A.'s budget in Laos and Cambodia exceeds those of the Laotian and Cambodian Governments by 20 or 30 to 1; the C.I.A. recruits, supplies, and directs a polyglot "Secret Army" of 100,000 men that does most of the front-line fighting in these two nations; C.I.A. photo interpreters and intelligence operatives control targetting, the most important part of the air war; C.I.A. political operatives are the main day-to-day intermediaries between the U.S. Government and local Lao and Cambodian politicians and generals.

And, of course, normal espionage, sabotage, assassination, and extortion — the C.I.A.'s standard fare anywhere — continue as usual (see Pentagon Papers memos No. 15 and No. 22 for Colonel Lansdale's descriptions of such activities as long as 10 and 20 years ago.)

In South Viet Nam, the C.I.A. role is also rising. The "pacification" program has taken on greater importance under Richard Nixon, and this of course is under the direct control of the C.I.A. through the deputy ambassador for pacification, always a C.I.A. man.

Phoenix Project

The key aspect of pacification is the Phoenix Project, an admitted program of murder and torture of civilians suspected to be working for the National Liberation Front. Since Phoenix's inception, it openly admitted that the C.I.A. has killed and abducted more civilians than even the U.S. Government claims have been similarly mistreated by "Viet Cong terrorists" (see accompanying chart).

In discussing the role of the C.I.A. in Indochina today, let us note at the outset that this is not an aberration: the C.I.A. devotes most of its budget and personnel to waging political and military warfare in all corners of the globe, with only a small percentage going into strict intelligence-gathering.

Carefully Cultivated Myth

This is not generally known, of course, for one of the most carefully cultivated myths in America today is that the C.I.A.'s main job is to prepare intelligence estimates for the President — the only job it is legally mandated to perform.

Whether in a recent Newsweek cover story on C.I.A. chief Richard Helms, or in a speech by Helms himself to an association of newspaper editors earlier this year, the theme is constantly repeated that the C.I.A.'s major role is merely to provide estimates of things such as Russian missile strength or morale in North Viet Nam.

In fact, nothing could be farther from the truth.

Highly informed sources reveal that of 18,000 people employed directly by the C.I.A. today, no more than 2,000 are actually involved in intelligence-gathering and analysis. The vast majority are engaged in C.I.A. covert operations stretching from Bolivia to the Congo to Iran to Viet Nam.

Four Major Divisions

The C.I.A. is divided into four major divisions:

(1) The DIRECTORATE OF PLANS (cover name for the division of covert operations or clandestine services) — 6,000 people;

(2) The DIRECTORATE OF SUPPORT (the division providing logistics support to the Directorate of Plans) — 6,000 people;

(3) The DIRECTORATE OF SCIENCE AND TECHNOLOGY — 4,000 people;

(4) The DIRECTORATE OF INTELLIGENCE — 2,000 people.

Thus fully two thirds of the C.I.A.'s direct-hire employees — and a far higher percentage of its estimated two- to six-billion dollar budget — go to waging political and/or military warfare.

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"CIA Contractors"

In addition, our sources reveal that the ranks of C.I.A. operatives are greatly swelled by a vast number of individuals employed on a contract basis. Even more men are contracted to the C.I.A. than are on direct hire, ranging from former Green Berets and mercenaries now leading its "Secret Army" in the jungles of Laos and Cambodia, to the men running and flying its giant airline, Air America, to assassins and killers in every corner of the globe.

A Novel on the CIA

A new novel on the C.I.A., The Rope Dancer, vividly and authoritatively describes the true nature of the agency, running from its buying and selling of foreign politicians and governments to its increasing power here at home.

The Rope Dancer itself is not too different from the scores of spy novels that appear every year. What makes it special, however, is its author, Victor Marchetti.

Victor Marchetti "Going Public"

Marchetti is the highest-ranking member of the C.I.A. ever to go public, an official of the executive suite, and participant in daily staff meetings chaired by C.I.A. Director Helms. His credibility has not seriously been challenged.

Marchetti has revealed a good many important points about the situation in Indochina in a series of published interviews in the last few months. He has confirmed that William Colby is the number three man in the C.I.A., that he has used the title of deputy ambassador as a cover, and that his real role has been that of the highest-ranking C.I.A. official in the Indochina theater; he has revealed that Helms spends little time on the "intelligence estimate" portion of his role, and that his real interest is political and military warfare at home and abroad; and that C.I.A. station chiefs have far more power than the American ambassadors to Laos and Cambodia.

The Urgency of Marchetti's Message

But what is most disturbing of all is Marchetti's main point:

He says that he resigned from the C.I.A. in protest against its growing surveillance and infiltration of domestic groups, and the arrogance, capriciousness, and limited abilities of many top C.I.A. officials who nonetheless continue to consolidate their power at home and abroad.

Two recent events have increased the urgency of Marchetti's message:

(1) Richard Helms has been appointed chief of all "intelligence" operations, signaling his triumph in a complicated bureaucratic struggle with the C.I.A. and increased power for the agency.
(2) The Senate has just rejected a Symington sponsored amendment to limit funds available for "intelligence" purposes.

The C.I.A. may well come to be a more visible government here at home, even as it continues to become our main war-making agency abroad in the decade to come. □

Table 1

CASUALTIES ADMITTED BY THE CIA

YEAR	CIA OPERATION PHOENIX (State Department)		CIVILIAN CASUALTIES FROM "V.C. TERROR"* (Dept. of Defense)	
	Killed	Captured	Assassinated	Abducted
1968	2,259	11,288	5,389	8,759
1969	6,187	8,515	6,202	6,289
1970	8,191	6,405	5,947	6,931
May 1971	3,650	2,770	2,234	3,259
TOTALS 1968 to May 1971	20,287	28,978	19,772	25,238
	"Neutralized": 49,265[1]		Terrorized: 45,110	

*Most Americans who have lived in South Vietnam dismiss these figures as highly inflated propaganda. See for example The Unheard Voices by Don Luce (Cornell University Press, 1969). We include them here to illustrate that CIA terroristic attacks far outnumber even those "V.C. attacks" claimed by the American Embassy.

[1]Ambassador Colby, Senate Foreign Relations Committee Hearing, 1970: "The Viet Cong infrastructure has not been severely hurt — in short the V.C. infrastructure is still there."

Table 2

YEAR	CIVILIAN CASUALTIES SO. VIET NAM Senate Refugee Comm. Estimate	ORDNANCE EXPENDED BY U.S. FORCES IN TONS - Dept. of Defense	ORDNANCE EXPENDED N.L.F.-N.V. (Dept. of Defense Public Affairs)
1966	150,000	1,093,000	Unavailable
1967	175,000	2,139,000	App. 5,500
1968	300,000	2,933,000	App. 6,500
1969	232,000	2,790,000	App. 5,500
1970	137,000	2,158,979	Unavailable
May 1971	40,000 App.	785,000	Unavailable
TOTAL 1966 to May 1971	1,034,000[1]	11,998,000	36,000[2] (Projecting from 1967-1969)

[1]Carl Strock, after one and a half years in South Viet Nam with the American Friends Service Committee, estimated "99 and a little more" percent of all civilian casualties to be the responsibility of the U.S. and A.R.V.N. forces. In 1971 the Senate Refugee Committee indicated "most of the casualties are caused and people made refugees by American and Allied military activity." (Staff interview, April 3, 1971, The New York Times.)

[2]At the height of the Tet offensive, the N.L.F. and N.V. forces utilized approximately 27 tons of ordnance daily. This figure represents the tonnage of one B-52 bombing strike. There were 20,500 B-52 strikes in 1968, and there will be approximately 12,000 this year. In 1966 the 27,000 pounds of U.S. dud bombs was more or less five times the total ordnance employed by the N.L.F. and D.R.V.

WHO SHOT PRESIDENT KENNEDY—

or Fact and Fable in History

Gareth Jenkins
Cambridge School of Weston
Weston, Mass.

"I do not know who killed Kennedy nor their motives, etc. But I think I have shown satisfactorily from physical evidence . . . that Oswald alone could not have shot President Kennedy. . . . There was a conspiracy to the extent that his accomplice(s) remain undiscovered."

Nov. 22, 1971 was the eighth anniversary of the assassination of President John F. Kennedy in Dallas, Texas. What follows here are some observations on the treatment of that event by the special investigatory commission set up by the then-new President Lyndon B. Johnson (the "Warren Commission"). I will concentrate on the implausibility of the "facts" assembled by that commission to support their contention that a single man, Lee Harvey Oswald, was solely responsible for Kennedy's death. It is my counter-contention that the bare physical evidence published by the commission itself, fragmentary as it is, does not support the commission's main findings in the least. On the contrary, this article shows — using the Commission's own cited evidence — that at least two gun men — Oswald possibly being one of them — cut Kennedy down in a hail of bullets on Nov. 22, 1963. The other person (or persons) involved are still at large.

First, let me express a note on the documentation in this article. The Warren Commission published its one-volume, 888-page report on Sept. 23, 1964, and published a short time later a 26-volume compendium of hearings, depositions, and exhibits accepted in evidence before the commission. Citations to the report itself are denoted by the initials WR (Warren Report) and the page number, thus: (WR435), citations to the 26 volumes of hearings are denoted by Roman numerals; as an example; (XXX,114) denotes Volume 25, page 114 of Hearings/Exhibits. See the bibliography at the end of this article for citations from other sources.

Summary

A capsule summary of the main events and official findings according to the Warren Commission report runs like this.

President Kennedy, on a political fence-mending trip in Texas in late Nov. 1963, was scheduled to address an open-air rally at the Trade Mart in Dallas on Nov. 22. His arrival was to be in the grand manner, with an open-car motorcade through the city to precede the speech. Kennedy, his wife Jacqueline, (now Mrs. Aristotle Onassis), Governor John Connally (now Secretary of the Treasury), his wife, and two Secret Service agents (one driving) were the occupants of the lead car in the noontime parade. The crowds were heavy and enthusiastic, with hundreds taking pictures (of great importance later on for the investigation) all along the parade route.

At the corner of Elm and Houston Streets in Dallas, somewhat past the densest crowds and the city center, the motorcade approached a tall building known as the Texas School Book Depository (TSBD), which housed firms dealing in book distribution and other firms in other lines of business.

At 12:30 p.m. CST Kennedy's car had just passed this building, moving at about 10 mph, when several shots rang out. The first shot hit President Kennedy in the upper back (or neck) and, according to the Warren Commission, passed completely through him at the neck to hit Gov. Connally (seated on a jump seat directly in front of Kennedy) in the mid-back.

This first shot broke Connally's fifth rib — right side — and passed out of his body to the front also, where it fractured his right wrist and lodged finally in his left mid-thigh.

The second shot fired at the motorcade (all shots were later said to have come from the sixth floor of the TSBD) was a probable miss. In any case a bullet did hit the sidewalk near President Kennedy's car, throwing fragments which slightly wounded a bystander, James T. Tague, on the cheek.

The third shot hit President Kennedy in the head, inflicting a mortal wound, from which he died 30 minutes later.

In the ensuing melee and pandemonium, speculation, rumors, and conflicting eye-witness reports of many kinds circulated. No suspect, armed or otherwise, was detained on the spot, though several hobos in a nearby railroad stockyard were picked up for questioning.

About an hour later a Dallas police officer, J. D. Tippit, was shot to death in the Dallas Oak Cliff district, resulting in a huge dragnet that bagged Lee Harvey Oswald in a movie theater at 1:45 p.m. Oswald was booked at 2 p.m., and shortly thereafter charged with the murders of both Officer Tippit and President Kennedy. A rifle, thought to be the assassination weapon, had been found on the sixth floor of the TSBD: it was established later

on that it in fact belonged to Oswald. Oswald was interrogated through Friday afternoon (the 22nd) and Saturday (no transcript of these discussions was kept). During this time he maintained his innocence; he even declared, at a tumultuous midnight "news conference" on Saturday the 23rd that he was a "patsy".

On Sunday morning, Nov. 24th, Oswald was to have been moved to a more secure jail (the Dallas city jail having been deluged with death threats against Oswald). The transfer was to be covered on live TV — at least Oswald's departure from the city jail through a below-ground garage. Oswald appeared in the company of several marshals in this garage at about 10:20 a.m. Sunday, walking to the armored-car transfer vehicle. Whereupon, those of us who were watching TV that morning were treated to the ultimate in live-action melodrama: Oswald was shot to death, on camera, by Jack Ruby, a Dallas strip-joint operator who had, somehow, gotten into the heavily-guarded area (WR 1-21 passim). (I saw this happen.)

Facts

Well, what are the facts? What actually is left behind from this reported chain of events that is tangible, measurable, physical evidence?

Here I wish to concentrate on Kennedy's death alone, setting aside Oswald's guilt or innocence, Tippit's murder, Ruby's role, etc.

Narrowing the present inquiry in this way we will examine the following:

the elapsed time of the President's assassination;

the rifle purportedly used;

the number of shots fired;

the wounds suffered by Kennedy and Connally;

ballistics evidence linking the TSBD rifle to the shooting; and

the Warren Commission's tests and reconstructions of the event and the inadequacies thereof.

Elapsed Time

As mentioned earlier, the parade route was lined with spectators, many taking photographs. At least three persons at the assassination site were taking motion-picture film from home-movie type cameras. Only one of these films has been widely seen, however, that of Mr. Abraham Zapruder, which was sold to Life magazine.

The entire assassination sequence is contained on Zapruder's film reprinted serially, frame-by-frame, in XXVIII,1-80. The films of two other movie-makers, Muchmore and Nix were not published by the commission.

What is critical for this inquiry is the fact that any motion picture camera exposes a certain number of still frames per second, which when run in sequence at the exposure speed create the movement seen on a screen. Zapruder's camera, after FBI testing, was found to expose film when fully wound (as his was) at 18.3 frames per second (WR, 49: V, 160-1). Not more than 105 frames, perhaps as few as 90, show the impact of all the shots hitting Kennedy and Connally. In other words, simple arithmetic shows that the entire shooting of the two men took between 4.9 and 5.6 seconds.

The Rifle

Shortly after the assassination a rifle was found in the TSBD on the 6th floor. It was a 6.5mm Mannlicher-Carcano rifle with a 2.5X power Japanese telescopic sight mounted. The Carcano was the main infantry rifle used by the Italian Army from 1896 to 1945, its design being unchanged in that period. It is a powerful and accurate weapon which is readily and cheaply available in gun shops or by mail-order (I bought one myself in a hardware store in 1966 for $9.95).

Testing of the alleged assassination rifle by National Rifle Association experts showed that, in firing the rifle, the minimum time between rounds, necessitated by manual operation of the rifle's rather long bolt action, is 2.3 seconds (III,407). This 2.3 seconds is only bolt operation time and does not include aiming, which adds, in my estimation, at least 0.5 second to the complete round-to-round firing time.

It is impossible to aim this weapon while operating the bolt, as it slides back 4-plus inches into the face of the shooter if his cheek is held to the rifle's stock.

Number of Shots

Next to the Carcano rifle in the TSBD three empty shell cases were found by the police. It is entirely possible that more shots were fired. But (1) it has been established already that this rifle could not be fired faster than approximately 2.5-2.6 seconds between rounds; with a stopwatch running from the first round at least 5.0-5.2 seconds were required to get off two additional rounds. (2) The Zapruder film shows the entire event, that is, the inflicting of all the wounds as taking 4.9-5.6 seconds.

It is immaterial to this discussion whether more wild shots were fired before or after the events shown in this 5-odd second span. Those who argue that Oswald did somehow fire 4 or more shots have to explain why other empty shell cases were not found.

Wounds

Kennedy and Connally are both visibly and seriously wounded within the first 1.5 seconds of the actual assassination sequence on Zapruder's film. Kennedy was wounded first in the upper back at a spot 5½ inches below the top of his shirt collar and about 2 inches to the right of center, as is measurable in a straightforward way by looking at the holes in his shirt and suitcoat (exhibit picture, XVII,25). Evidence of this location for the back hit Kennedy sustained is reinforced by the pathologists' markings on a routine autopsy form made the night of Nov. 22 in Bethesda, Md., at a naval hospital to which Kennedy's body had been flown. (Pathologist's sketch, XVII,45).

The commission later said in its report that this bullet had entered the nape of Kennedy's neck [disregarding the location of the holes in his clothes] and passed through Kennedy completely, hitting at his necktie knot, thence into Connally sitting ahead of him. Since there is a one-plus second lag in Ken-

nedy's and Connally's reaction times (both visible on Zapruder's film), the commission said Connally had a "delayed reaction" to his wound (WR,112-3). However, Connally himself said that he heard the first shot clearly and was turning to see what was happening (all visible on Zapruder's film) before he was struck. Since bullets travel faster than sound this account by Connally is reasonable: otherwise he would have felt the hit before hearing it.

In any event a small hole in Kennedy's neck adjacent to his tie knot, which was much enlarged by a desperate tracheotomy performed at the Dallas Parkland Hospital by surgeons trying to keep the President alive, was construed by the commission as the exit hole for the above bullet which hit Kennedy in the back. This bullet, by the commission's hypothesis, then hit Connally in the mid-back, breaking his fifth rib, exiting from his chest in front to fracture the right wrist before stopping finally in his left thigh. The bullet in passing through Connally left a trail of fragments in both his chest and wrist areas.

The crucial question here is, could one bullet have done all the things claimed for it? Since both men were wounded within 1.5 seconds of each other, it is physically quite impossible for both of them to have been hit by separate shots from the Carcano rifle described above, whose minimum round-to-round time is 2.5 seconds. Therefore, they had to have been hit by one bullet if the single-assassin version of this event was to be upheld. If one shot didn't do it all, then there were at least two assassins.

Commission Exhibit 399, the Magic Bullet

While President Kennedy and Gov. Connally were being treated at the Dallas hospital, a bullet slug, Commission Exhibit #339(XVII,49) was found on one of the stretchers used to carry the men into emergency surgery. This slug is virtually whole, that is, it is neither dented, distorted, crumbled, or reduced significantly from its manufactured weight (160 grains new, 156.4 when discovered).

There are exactly three possibilities:

(1) This bullet lodged in Kennedy's body and fell out during closed-chest massage performed on him in surgery, in which case it did not hit Connally as above, and therefore there were two assassins.
(2) This bullet did pass through both men, as the commission expects us to believe, in which case we have extraordinary and very real difficulties in explaining how it came out in its pristine condition after leaving a trail of fragments, and shattering two heavy bones in Gov. Connally.
(3) A conspirator planted this slug at Parkland Hospital in an effort to implicate the owner of the Carcano! It was established beyond doubt that this slug, Commission Exhibit #399, did come from the Carcano rifle found at the TSBD (see below).

The autopsy findings on Kennedy's death were reported in the initial FBI investigations (FBI agents were present throughout on this occasion (II,131)) as showing that the shot that hit Kennedy in the back did not pass through his body, but lodged in his back after penetrating less than two inches.

The commission's mammoth hearing/exhibits include things like Jack Ruby's mother's dental records (XXII,394-5) and what amount to Lee Oswald's 7th grade school report cards (XXII,558-9). However, the commission declined to publish this report! Its important details however can be found in facsimile in Epstein, pp. 184 and 198.

The commission claims the President was wounded in a different spot than that indicated by the holes in his clothes and that the bullet passed all the way through, but provides no evidence in support of this claim other than sketches done by a naval medical corpsman who never saw the body (Comm. Exhibits #s 385,386; XVI,977). Perhaps this point of entry for the first shot was changed to provide a straight-line trajectory between Kennedy and Connally that would dispose of the difficulty raised immediately below in this article (see (3) below). Further difficulties and doubts arise about this autopsy when we learn that the notes taken by the autopsy pathologist, Naval Commander Humes, had been burned (XVII,48).

The physical evidence to this point alone has us in a cul-de-sac:

(1) There is no physical evidence at all to support the back hit on Kennedy entering the nape of his neck.
(2) Even if this is granted, and the bullet slug passed through him as claimed, it could not possibly have then also hit Connally, fractured two bones and left a trail of fragments and emerged from it all unscathed as it was discovered on the stretcher at Parkland Hospital.
(3) The bullet slug could not, by anybody's arguments, have hit Kennedy where the holes in the shirt and coat are, then curved upwards to exit at his tie knot, then plunged downwards violently to hit Connally as would be required by the commission's hypothesis. Bullets do not trace such gyrating trajectories unless they are ricocheting. No bony structures in Kennedy were hit aside from his head (WR,543; XVI,983).

Where then did the small front wound near Kennedy's tie knot come from? Autopsy surgeons suggest that it came from the exploding impact of the shot which struck Kennedy's head, which threw over 40 fragments in all directions. One of these fragments passed out of Kennedy's head in a depressed forward trajectory making a small 4-5mm diameter hole (FBI report of Jan., 1964; facsimile in Epstein, 198-9). Indeed, the surgeons from Parkland Hospital interrogated by the commission said that the front neck wound might have been an exit hole for a virtually whole bullet, but only if the bullet in effect fell out of Kennedy with no energy left to hit Connally (VI,55). Any bullet passing out of a body at high velocity will make a larger exit than entry hole owing to the mushrooming, snowball effect of tissue being forced ahead and to the side of the passing slug. The hole in Kennedy's front neck was, however, smaller than the 6.5mm dia. of the Carcano's slugs (XVI,976).

Ballistics

All modern firearms with "rifled" barrels — i.e., manufactured with spiral ridges in their barrels which spin the passing slug and stabilize its flight — are unique in that every weapon makes a slightly different pattern of impressions from its ridges on the passing slugs. The science of taking the "fingerprints" (so to speak) of a gun by micro-photographic analysis is called ballistics. The bullet found in Parkland Hospital on the stretcher was beyond any

doubt fired from the Carcano rifle, which purportedly belonged to Oswald. No other slugs were recovered intact, though many fragments were found in Connally, and on the floor of the Kennedy car, and on the street. The commission said these fragments were "consistent" with being fired from the Carcano rifle, a claim I will accept even though such fragments do not ordinarily provide absolute ballistics identification of a rifle used.

The fragments are, however, patently inconsistent with the commission's own Exhibit #399, the whole bullet found on the stretcher, which, on the commission's own analysis, must have been the one from which all these fragments emerged. For, if this bullet did not hit Connally, then Oswald did not have time to get off the second shot whose impact on Connally is recorded on the Zapruder film. Further, if the second shot did hit one of the two men, then how do we account for the wounding of the bystander with the presumed stray second shot? Indeed, bullet #399 was said by the hospital orderlies who had found it to have come from Kennedy's stretcher, but the commission later said they were mistaken and that it had come from Connally's stretcher.

The explanation I offer which reasonably accounts for the discovery and condition of bullet #399 is

(1) that in fact it lodged in Kennedy's back, as the initial autopsy reports first showed (it would appear that, in effect, the official autopsy report was later altered in a manner not well explained);
(2) that it hit in the spot indicated by the hole in Kennedy's clothes;
(3) that it penetrated "less than a finger length" in the soft back tissues that would not damage a bullet as the FBI report suggested (Epstein, 196);
(4) that it fell out of Kennedy onto his stretcher during closed chest massage performed by the doctors at Parkland who were in fact using this method to try to revive Kennedy's heart action (WR,538).

These statements are well documented; but the official version is both incredible and undocumented.

If my explanation of bullet #399 is correct, then Kennedy and Connally could not both have been shot by the same man. They were wounded too close in time for this to be in any way conceivable.

There is an argument that Oswald, in his extremity of fear, desperation, and rage, performed a superhuman feat of mechanical manipulation in his use of the Carcano rifle. In regard to this argument, (1) there is no evidence for such a claim but imagination, and some counter-evidence as to Oswald's marksmanship capability (see below) and (2) such explanations allow anybody to explain anything any way they see fit. It is a fudge-factor explanation.

Reconstructions and Tests

The Warren Commission ran numerous tests of the rifle, and tried to duplicate wounds sustained by Kennedy and Connally in test carcasses, etc., to lend support to its thesis that Oswald did it all himself.

I wish to point out the following:

(1) The telescopic sight on the Carcano rifle was improperly mounted and had to be remounted and realigned by a machinist before this weapon would shoot straight for test purposes (III,443-5).
(2) The commission had three riflemen attempt to duplicate Oswald's gunplay. They fired from a thirty-foot-high tower at fixed targets 18 inches on a side 180 to 265 feet distant, with a repaired rifle, with as much time as they wanted for the first shot and with no trees obscuring vision anywhere on the test range. These three riflemen, I must add, were all rated as masters by the National Rifle Association; that is, they are qualified for the most exacting Olympic competition and are crack shots.

Oswald, on the other hand, was sixty feet from the ground in his supposed perch in the TSBD, had the same distance to shoot through, but at a moving target (granting it was moving fairly slowly and almost entirely away from him with little lateral movement), with a faultily aligned scope, and no time at all to deliberate on the first shot as his alleged vantage point to the target was obscured by a large oak tree until 0.5 seconds before he let loose the first round and Kennedy was struck. Further, Oswald was rated by his former Marine Corps commander as a "rather poor shot" while on military duty in that service (WR,191; VIII,304ff).

What were the test results? All three master riflemen were able to hit their (fixed) targets with the same regularity as Oswald, but only one of the three equalled Oswald's alleged speed. (III,445). We are not told whether the three hit their silhouette targets in the actual target area or not — they merely had to put bullets into the advantageously large squares that included both a white background and the black head-upper body silhouette (III,445-6).

I wish to conclude my article by emphasizing that I am nursing no devil theory of history. I do not know who killed Kennedy nor their motives, etc. But I think I have shown satisfactorily from physical evidence - the number and types of wounds, the time elapsed, ballistics evidence involving bullet #399 and the types of wounds it is compatible with - that:

> Oswald alone could not have shot President Kennedy.

I suggest that there was a conspiracy to the extent that his accomplice(s) remain undiscovered. I am convinced that the entire case should be reopened for a properly-handled, full-scale investigation. □

Bibliography of books used and recommended to anyone interested in pursuing this matter:

1. Report, President's Commission on the Assassination of President Kennedy (Washington, Govt. Printing Off.,1964). Citation in the article to this hardbound edition. Paper editions available.
2. Hearings before the President's Commission on the Assassination of President Kennedy, 25 vols. (Washington, Govt. Printing Off., 1964).
3. Epstein, Edward J., Inquest: The Warren Commission and the Establishment of Truth (Viking Press, New York, N.Y., 1966); paper edition available.
4. Meagher, Sylvia, Accessories After the Fact: The Warren Commission, the Authorities, and the Report (Bobbs-Merrill Co., Inc., New York, N.Y., 1967).
5. Lane, Mark, Rush to Judgment (Holt, Rinehart and Winston, New York, N.Y., 1966); paper edition available.
6. Thompson, Josiah, Six Seconds in Dallas (Bernard Geis Associates, New York, N.Y., 1967). □

COMPUTERS, CIPHERS, AND CRYPTOGRAPHY

"The ability of the computer to generate keys and perform numerous operations without error at high speeds makes it one of the most important cryptographic devices ever invented."

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Regarding the truncated alphabets which you discussed in "Communication and Ciphers, with a Hexadecimal Alphabet and Variations" by O. N. Minot, E. C. Berkeley, and Neil Macdonald, "Computers and Automation", September 1971, p. 36 ff:

Of course, my hexadecimal alphabet was aimed at making a fairly simply readable and writable reduced alphabet, which will work with a 16-key typewriter, a 4-channel tape, and a 4-bit code.

The use in coding is certainly intriguing, as you point out so thoroughly. Your alphabet is far better for coding and machine reading from the standpoint of nonambiguity, for one thing. Of course, much of the ambiguity of mine disappears with intelligent human reading.

I also had in mind some ideas about the efficiency of communication. You point out that Z is used about 1/100 as much as E in most communication, which constitutes a cost to all communicators who must reserve a character for Z. This can be further explored from the viewpoints of efficiency and cryptography. I also had in mind the possible efficiencies of fitting an alphabet to the binary-octal-hexadecimal technology — tapes, cores, logic circuits, etc. This had led me to design a rather efficient 32 character alphabet or rather a "alphanumerobet", for display purposes. Inquiries to us are welcome.

It is most gratifying that your publication keeps as part of its format and policy the encouragement of such informal communication.

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It is true that the use of machines to produce ciphers and to perform enciphering and deciphering produces a new level of complexity. The use of computers provides a powerful tool for cryptanalysis. But they would not be used for something as trivial as a substitution cipher!

The weak point of any substitution cipher is the frequency with which certain letters appear. Decrypting the first paragraph of Table 4 in the article "Communications and Ciphers" shows this.

First of all a count of the frequency of the letters shows a high proportion of J, P, V, and B; sixteen letters are missing completely. This points out the main characteristic of the "Macdonald Decimal Alphabet". Decrypting begins by substituting the most frequent combinations (PV, JP, JV, BJ) by selected unused characters (z, y, x, s). This identifies the first letter (C), the penultimate letter (G), and the letter K as true substitutions. (Replacing the double characters with a single one shows that a simple substitution cipher remains the same even if two characters replace one; and it is easier for me to solve it this way.) Other combinations of letters are similarly replaced: FJ by a, PJ by d, JJ by e, PP by h, BF by i, BB by l, PB by m, VB by o, FB by r, FF by t, and VJ by u. In doing this a few of the previous replacements will have to be changed. This results in the classic simple substitution cipher.

Once again a frequency count is made. The letters c, g, z occur 16 to 19 times; the letters k, x, q occur 11 to 13 times; the letters s, y, a, h occur 7 to 9 times, etc. The frequency tables show the three most common letters as E, T, A; the next three are O, I, N, etc. Substitution now begins on a trial and error basis but with educated guesses. One help in doing this is a table of common English digrams. For example, kx occurs five times in the cipher. It probably stands for a combination of O, I, or N. A common digram is IN, so this substitution is made and turns out right. The common occurrence of gg in the cipher causes its replacement by EE. This results in q being replaced by O and c, z by A, T. The occurrence of a between the known letters T and E results in its replacement by H. By now its possible to guess at words and the solution comes quickly.

One other shortcoming of this cipher is its inefficiency: a plaintext of 159 letters causes a cipher of 253 letters. This would not occur with more advanced ciphers such as the Playfair or the Vigenere.

The book "Cryptanalysis" by H. F. Gaines (reprinted by Dover Publ., New York) is a good introduction to the subject. It covers everything down to around the end of World War I. For example, page 102 of the Dover edition (1956) covers a cipher in which one letter is transformed into two. This cipher uses ten letters of the alphabet so numbers could be used as well (packed two to a byte?).

This is the first article in the literature on computers and programming that I have seen dealing explicitly with ciphers.

Subjects such as list processing and random number generators have uses in cryptography.

Ciphers such as the Vigenere depend on a key for enciphering and deciphering. The periodic use of the key offers a starting point for decrypting. But a random number generator can create a key as long as the message.

List processing can be defined as the manipulation of symbols instead of numeric data. Decrypting a simple substitution cipher is an example. A cryptanalyst with a terminal-oriented list processor could decrypt it within minutes after it was entered.

Ciphers are being mentioned lately because of their use in guarding stored data. Anyone contemplating this should stay away from a simple substitution cipher and at least adopt a polyalphabetic cipher like the Vigenere.

After that, the programs that encipher the data will have to be really guarded!

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I was very pleased to read the article on communication and ciphers in the September issue of Computers and Automation. This is an interesting field and one in which computers can and do find a great deal of use. I hope to see more articles on this subject. Relative to your comment on the use of ciphering systems such as the Minot Hexadecimal Alphabet or the Macdonald Decimal Alphabet, let me offer the following comments.

1) Both are essentially of the simple substitution class of ciphers; i.e., one symbol (or one pair) corresponds to one and always the same letter in the plain text. Such a cipher is of course vulnerable to attack from the standpoint of a frequency count, particularly if the text is long.

2) The use of a limited number of symbols implies that some plain text letters must be represented by at least pairs of letters. Analysis of the frequency of contact should in principle sort out those ciphers that should occur as pairs.

Both of these problems can of course be easily overcome by the liberal use of nulls and by a transposition of the cipher text to destroy the proper contingence of the cipher letters.

Relative to other systems here are some examples that may be of interest to you. You may judge for yourself the similarities and differences between them and the MDA, for instance.

Basic Checkerboard

The alphabet is written into a 5 x 5 block with coordinates for row and column used to specify the cells. This may involve the use of 5, 10, or many different indices as follows:

	A	E	I	O	U
A	A	B	C	D	E
E	F	G	H	I	K
I	L	M	N	O	P
Q	Q	R	S	T	U
U	V	W	X	Y	Z

Block 1

	C	J	D	V	Q
L	A	B	C	D	E
Z	F	G	H	I	K
R	L	M	N	O	P
E	Q	R	S	T	U
P	V	W	X	Y	Z

Block 2

	D	H	K	U	L
	F	M	S	Y	B
A	A	B	C	D	E
G	F	G	H	I	K
N	L	M	N	O	P
T	Q	R	S	T	U
Z	V	W	X	Y	Z

Block 3

Using these blocks, the word CIPHER becomes

Block 1: AIEOIUEIAUOE

Block 2: LDZVRQZDLQEJ

Block 3: ASGUNBGSALTH

or AKGYNLGKABTM

German ADFGX Cipher

A very successful version of the checkerboard type of system was the German ADFGX cipher used in World War I. It used the five letters ADFGX as in block 1 above, then wrote the resulting cipher in a rectangular array which was taken out of the block by columns according to a numerical key.

Soviet Espionage Cipher

Perhaps the most similar system to the MDA is one used by the Russian spy rings that operated in Switzerland and Japan during World War II. It is an adaptation of the Nihilist Substitution System used during the period of the Czars. The letters were placed in a checkerboard with single numerical coordinates for the most frequent letters and double ones for the others as follows:

	0	1	2	3	4	5	6	7	8	9
	E	T	A	O	N	I	R	S		
8	B	C	D	F	G	H	J	K	L	M
9	P	Q	U	V	W	X	Y	Z	.	/

with . and / used to indicate a break and a numeric, respectively. Using this block, CIPHER becomes 81 5 90 85 0 6.

The MDA system by analogy would be handled in a similar manner using a block of the following form.

	B	F	J	P	V	C	G	K	Q	W
						A	E	I	O	U
B	B	C	D							1
F	F	G	H							2
J	J	K	L	M	N					3
P	P	Q	R	S	T					4
V	V	W	X	Y	Z					5
	1	2	3	4	5	6	7	8	9	0

Again, plain text CIPHER becomes B F K P B F J G P J. If we substitute numerics for the letter coordinates, the cipher text becomes 1 2 8 4 1 2 3 7 4 3.

The Russian system went one step further than the simple substitution and added a random key which made the cipher unbreakable. Using this technique with the MDA with numerical coordinates and a random number key which is added, CIPHER becomes

1 2 8 4 1	2 3 7 4 3 cipher text
6 1 0 5 2	4 9 7 1 1 random key
7 3 8 9 3	6 2 4 5 4 final text

The ability of the computer to generate keys and perform numerous operations without error at high speeds makes it one of the most important cryptographic devices ever invented. □

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ber 20, 1971, it should also be obligated to respond by that date. Without the inclusion of its responses, no compilations can be made.

IT IS SO ORDERED.

5. Deponents' Various Motions Requesting Payment of Expenses

Deponents have moved the court for an order compelling IBM to bear the expense associated with the production and compilation of information and data responsive to the Rule 31 Order. The court is aware that it has the discretion to order the parties seeking discovery to pay the expenses caused thereby. However, the court does not deem it appropriate at this time to assess IBM the expenses incurred by some 2,700 deponents responding to the Order.

6. Protective Order

Rule 26 (c) of the Federal Rules of Civil Procedure empowers the court to make a wide variety of orders for the protection of parties and deponents in the discovery process. The non-party deponents that have recently appeared before the court have demonstrated a need for a more restrictive protective order than the one entered January 24, 1970, which applied to the parties in this litigation. Cf. United States v. United Fruit Co., 410 F.2d 553, 557 (5th Cir. 1969). As discussed above, the information requested is sufficiently relevant to the issues in this litigation that the court is requiring responses, and the protective order is appropriate to shield respondents from misuse of their responses.

It is the court's intention that the protective order herein will apply to all deponents responding to the Rule 31 Order. Some of the restrictions requested by deponents are unduly broad. An unduly broad protective order not only subjects the parties to possible sanction, but it imposes burdens upon their preparation of their case, hinders the efforts to analyze and present data and imposes severe limits upon the freedom or ability of their executives and employees to carry out their business affairs without being sujbect to threat of suit for wrongful use of confidential information.

It does not seem feasible to limit the disclosure of "confidential" information only to the attorneys involved in the litigation nor to retained outside experts. Few attorneys are knowledgeable enough to digest and analyze the substantial technical and statistical data to be submitted in response to the census. Therefore, it is clear that IBM's counsel should be permitted to discuss this data with designated company personnel. The information involved is of a nature which inherently requires discussion with expert personnel and those intimately familiar with the computer industry, to be meaningful. Examination and evaluation by expert IBM, Greyhound and Control Data personnel is necessary if the data is to have any meaningful significance to counsel in preparation of their defense. Cf. United States v. Lever Bros. Co., supra at 257.

The court is of the opinion that any public information provided in response to the Rule 31 order would not be afforded confidential treatment and would not be within the scope of the protective order.

10. "Non-party Deponents' Motions to Vacate Rule 31 Order are Hereby Denied", Court Order

Having heard arguments with respect to the need for a more restrictive protective order than now in existence with respect to answers submitted pursuant to the court's order for the taking of depositions under Rule 31 of the Federal Rules of Civil Procedure dated September 20, 1971, the court hereby orders and directs that:

(1) Answers by deponents to any and all of the questions accompanying the Rule 31 Order, including documents or other writings given in response to those questions shall, in the first instance be available only for examination by counsel, by a limited number of employees engaged in working on the litigation, and outside experts, the names of the employees and experts to be designated in writing by counsel for IBM, Greyhound and C.D.C. and furnished to the objectors listed above in this pretrial order No. 9 and any other main frame manufacturers and filed with the clerk of court forthwith.

(2) Any deponent submitting answers pursuant to the Order shall designate the answers to which the protective order is to apply.

(3) All answers received by the clerk of court under coverage of this protective order shall be segregated from all other records and shall not be disclosed by the clerk to any one other than those designated in the court's order of September 20, 1971.

(4) The distribution of the answers received pursuant to the order of September 20, 1971, shall be limited as follows:

(a) IBM shall make the said answers available only to its counsel and to not more than 15 of its non-clerical employees who are employed full-time on the current litigation, and, further, IBM shall establish a procedure whereby no employee working full-time on the litigation shall be transferred to any other position within IBM except upon 15 days notice to those objectors listed above in this pretrial order No. 9 and upon review and determination by the Vice President and General Counsel of IBM that such transfer will in no way jeopardize the interests of any person supplying answers pursuant to the Rule 31 order. CDC and Greyhound shall comply with this paragraph but with a limitation of 10 non-clerical employees even though not full-time employed in the litigation.

(b) Any of the parties may make the said answers available to such outside experts as they deem reasonably necessary, provided that any such expert shall first agree in writing to be bound by the Protective Order, as hereby amended, and not to use any information shown to them in the course of said expert's business or for any business purpose of said expert.

(5) No confidential answer or any portion thereof shall be used by the respective parties or on behalf of any parties to this action for business or competitive purposes or for any purpose whatever other than for the preparation and trial of this action. Expert employee and non-employee advisers shall each sign an affidavit to this effect prior to obtaining access to any confidential answers.

(6) If, at the time of trial, counsel for any of the parties intends to introduce into evidence any answer made pursuant to the Order of September 20, 1971, and covered by the Protective Order,

(Continued on next page)

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he shall so inform this court as far in advance as possible and this court will take such steps as it shall deem reasonably necessary to preserve the confidentiality of such answer.

(7) All depositions taken in this litigation shall be subject to the Protective Order, as hereby amended, provided that the deposition witness and his counsel shall be entitled to examine any such answer made pursuant to the Order of September 20, 1971, as shall be shown to them for the purpose of eliciting testimony from such witness, on the condition that such witness and counsel shall agree in writing to be bound by the provisions of the Protective Order.

(8) Upon final termination of this action, including all appeals, outside counsel for the respective parties shall assemble and return all confidential answers produced under the Order and shall destroy all copies of confidential answers in their possession. Outside counsel for the respective parties shall be entitled to retain all memoranda embodying information derived from any such confidential answers, but without source identification, and such memoranda shall be used only for the purpose of preserving a file on this case and shall not, without written permission be disclosed to any other person.

(9) Any personnel obtaining access to information covered by this protective order shall not make copies, or reveal the contents of the documents, or use the information for any purpose other than for the preparation and trial of this litigation.

(10) Any deponent who desires, may in its answers or by separate writing to counsel for the parties, bring itself within and be covered by the provisions of this protective order.

DATED: November 12, 1971.

Philip Neville
United States District Judge

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SHARE AND THE MULTIPLY CARRY BUG

Herb Bright
Computation Planning, Inc.
5401 Westbard Ave.
Washington, D.C. 20016

It was a dark and stormy night. There was to be a SHARE meeting in a week or so, and a very strange letter had come to me (at WB (Westinghouse Bettis Laboratory)) for SSD processing. (I was SHARE Secretary at the time.)

MURA, that strange organization that had the tapeless 704 with the CRT display, reported a hardware problem:

> "When MPY (fixed-point multiply) was executed with operands such that there were unusually long carries during one or more of the add-cycles in the multiply, the result was a very wrong number. In fact, it seemed to be a random string of bits. IBM did not feel that a problem existed."

I went over the letter carefully with Lou Ondis. He wrote a short routine to multiply a couple of constants that would yield some long carries. Wrong answer! We blackboarded it, tried it on both octal and decimal desk calculators ... there was no question but that the 704 had erred. Further, it erred differently each time we tried.

Our head customer engineer (CE), one of the best, checked the machine and pronounced it normal ... but he agreed the numbers were wrong. A telephone call to CE Heaven yielded only the intelligence that, as quoted by MURA, "No problem exists."

Lou and I decided to put SHARE to the test. He dolled up his program a bit (made it loop and print wrong answers when they occurred) and produced it in the form of a single binary card. We reproduced a couple of dozen copies and mailed them to a couple of dozen SHARE installations that I trusted with the request that they try it at once and report at the next week's SHARE meeting.

Came meeting time, I called for responses at the opening plenary session. A total of 12 members reported tests. 4 had consistently got the right answer, 3 had got wrong answers occasionally, and 5 were solid bad — wrong all the time and usually different each time. It did indeed look as though there was a problem.

Don Pendery, bless his heart, rose up for IBM without calling IBM Poughkeepsie and stated flatly that IBM would investigate the matter immediately and would fix it as soon as possible. That did happen. An Engineering Change fix was in the field within a couple of weeks.

The explanation, it seems, is that, with 704's containing some subassemblies that were at the slow end of the speed tolerance range, timing for carry propagation was marginal for the 35-bit fixed point magnitude, although it was O.K. for the 27-bit floating-point fraction part; with such a machine, where there happened to be an unusually long carry in an MPY, it might not ripple all the way before the machine strode on. SHARE HAD PASSED THE TEST.

*MURA gained early fame in SHARE as a result of their SHARE-distributed routine, "Reflexive 704", which caused a 704 to simulate a 407 running at half speed.

ACROSS THE EDITOR'S DESK
Computing and Data Processing Newsletter

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APPLICATIONS

OPERATION CLEAN SWEEP — A CITY'S WAR ON GRIME

James P. Alexander, Director
Department of Environmental Services
Government of the District of Columbia
Washington, D.C. 20004

Faced with moving a quarter million tons of trash a year off District streets, a land pollution index and a computer have been enlisted to help the city's war on grime. Both the index and computer are part of phase II of Operation Clean Sweep, a city-wide program designed to give District residents clean streets and, at the same time, a new sense of community pride and spirit.

The land index is like an air or water pollution index, only it's designed to measure the accumulation of filth on streets and alert the Department to problem areas in the city. Department inspectors match every street against a series of photographs that set cleanliness standards. If a street doesn't measure up, it's reported to the Department so immediate action can be taken. The action may include re-scheduling a sanitation truck and crew from one part of the city to another.

The Department is currently using an IBM System/360 Model 50 to help keep track of the 83 trucks that travel the 165 routes and stop at 135,000 trash pick-up points each week. Using a computer program called VSP for Vehicle Scheduling Program, the Department can simulate changes in any route and, as a result, tell what will happen to service in other areas of the city before the route is changed.

There are also plans to use the computer for day-to-day reports on the amount of trash collected in each area of the city. From the report, the Department will be able to spot problem areas and make changes on a 24 hour basis.

It costs the city $38,000 a year for a truck and crew. The computer is an important tool in making sure all of them are used as efficiently as possible. The computer is also saving manpower for the District by cutting the time it used to take to re-configure a route by hand, from 15 days to only one.

POINCIANA, NEW FLORIDA CITY, BEING PLANNED WITH AID OF COMPUTER

McDonnell Douglas Automation Co.
St. Louis, Mo. 63166

A completely planned city for 250,000 people under development near Orlando, Florida, is being subdivided and platted with the computerized service of McDonnell Douglas Automation Company in St. Louis. Known as Poinciana, the city is taking shape on a 47,300-acre tract of land (on the fringes of Walt Disney World) owned and under development by GAC Properties, Inc., a unit of GAC Corporation. Poinciana will be a complete community with schools, churches and industrial parks.

Poinciana eventually will contain about 60,000 lots. The computerized service entails both sizing the acreage to produce the maximum number of lots per acre and platting the sized lots on linen sheets for recording by the county engineer as official documents. GAC Properties and its engineering consulting firms first provide McDonnell's land development staff with an engineered concept plan of each subdivision, or neighborhood, along with maximum and minimum lot specifications. This information is then processed on an IBM Model 85 computer and an incremental line plotter in St. Louis, which produces a final plat and a complete description of all parcels and streets.

This description includes: (1) coordinates of all points, (2) complete curve data, (3) complete parcel data on all lots, streets and tracts, (4) distances and bearings of all line segments and (5) the area and acreages of each lot listed by sheet number, block number and lot number. This data also is printed in tabular form for use by the engineer and surveyor in laying out sewer and utility lines after the streets have been laid out.

PONTIAC DEALERS USE COMPUTER TO TRACK CAR PRODUCTION FOR CONSUMERS

William F. Grimshaw
General Electric News Bureau
6 East 43 St., 8th Floor
New York, N.Y. 10017

Pontiac dealers across the U.S. recently inaugurated an industry "breakthrough" — computer-controlled delivery for all 1972 new car orders from

customers. GM's Pontiac Motor Division, by linking with General Electric's Information Services Division have, in effect, created a single nation-wide data processing-data communications system out of an array of large-scale GE and IBM processors.

The idea is to enable customers to know exactly when they can drive away in their 1972 Pontiac — and with on-the-hour accuracy, something the industry could not do before. According to Pontiac, dealers will be keeping computer-track of the status of each customer's new car order all the way through Pontiac's production system. And if a "tie-up" is discovered, immediate corrective delivery action can be taken.

The new program is made possible by GE's new INTERPROCESSING (a GE servicemark) computer service that links its computer information network in Cleveland to Pontiac's computer in Pontiac, Mich. The GE system provides a data collection and processing link to teletype-like terminals in Pontiac's zone and dealer offices across the country.

During the night, the Pontiac's computer compiles the status of every car in the order-production-distribution cycle. Early each morning it sends this information by phone to GE's computer network. Throughout the day, sales personnel in Pontiac's zone and dealer offices use their terminals, which are connected to telephones, to determine from the GE computer system the status of various car orders.

DISTRICT'S SUPERIOR COURT USES COMPUTER TO KEEP TRACK OF 100,000 CRIMINAL CASES

Joseph M. Burton, Clerk
Superior Court of the District of Columbia
Washington, D.C. 20001

The Superior Court of the District of Columbia has turned to a computer to help keep track of more than 100,000 criminal cases including the defendants, witnesses, lawyers and judges that are involved in each one of them. This court docketing system helps speed the flow of justice by giving lawyers, judges and court administrators up-to-the-minute reports on criminal cases and by helping them better plan for the use of their time.

Under a manual system, it's difficult for an attorney or judge to find the current status of all cases that he's involved in. Handwritten records are kept in ledgers that must be searched by a file clerk for up-to-date information. It's also difficult for a judge or attorney to project his workload for more than a week at a time.

With the new system, the current status of any case along with the names of the lawyer, defendant and judge can be located by the computer in less than five seconds. Stored in Superior Court's IBM System/360 Model 40 is information on the 105,000 criminal cases — traffic, misdemeanors, and felonies — filed with the court since January, 1971. Connected to the computer are four IBM 2260 video displays. Information on any case can be quickly checked by typing the case number or the name of the defendant, lawyer or judge on the unit's keyboard.

Chief Judge Harold H. Greene said the docketing system is part of a total data processing program that, when fully developed, will provide the court with one of the most advanced judicial information systems in the nation.

EDUCATION NEWS

NEW JERSEY CORRECTIONAL INSTITUTION PIONEERS DATA PROCESSING EDUCATION FOR INMATES

G. Thompson Durand
State of New Jersey
Department of Institutions and Agencies
State Office Building
Trenton, N.J. 08625

A complete program in data processing education is being given at the Yardville Youth Reception and Correction Center in Trenton, N.J. The program aims at dramatically increasing the inmates rate of rehabilitation by offering them a chance to get into a field with a future. The desire to enter the course has been high, since the inmates feel it is both a mental challenge and a chance at a career with a high potential.

The project, now in its second full year, was initiated by the Manpower Development and Training Office of the New Jersey Department of Education and is federally funded. It is the first at any correctional institution in the U.S. to incorporate a fully-developed curriculum, a full-time staff of instructors, and a computer — an IBM 1130 — dedicated solely to teaching.

The training is divided into three phases, each progressively more difficult, in which inmates advance through the skills of keypunching, computer operations and computer programming. Each phase lasts four months and provides 420 hours of classroom and laboratory instruction (six hours a day, five days a week).

During the first year of the program, 60 inmates started the course. One-third of the group finished the first phase; one-third, the second; and the remaining 20 completed all three phases. This year, 40 inmates are expected to complete the full curriculum. They are selected for the course on the basis of aptitude and desire, and must also be high school graduates or have passed equivalency tests.

After one year of operation on an experimental basis, how well has the program at Yardville worked?

The New Jersey state civil service examination in data processing is one yardstick. To date, results are available only for those inmates who took tests for keypunch and computer operator. Among 15 who took the keypunch test, 14 passed. And on the computer operator test, seven of 10 were successful.

FACULTY LOANS TO BLACK COLLEGES

E. Nanas
IBM Corporation
Old Orchard Rd.
Armonk, N.Y. 10504

A new program of business support to black colleges — the transfusion of teaching talent from corporation to campus — has been undertaken by IBM Corporation in cooperation with officials of public and private black colleges.

Eighteen scientists, engineers and other volunteers from IBM's professional staff, on paid leaves from their regular jobs, are spending the current

academic year teaching at 18 different black colleges in the South. (Robert E. Lee, an electronics engineer from IBM's laboratory in Burlington, Vt., is shown in the picture, second from left, as he instructs Tuskegee Institute electronics students in the use of the laboratory oscilloscope.) Each participating college identified skill and curriculum needs last spring. These were matched with the abilities and experience of IBM volunteers and interviews were conducted on campus so that both school officials and volunteers could be reasonably assured of a good match.

The volunteers are teaching undergraduate and graduate courses in physics, mathematics, business, chemistry, computer science and engineering. The departments to which they are assigned generally have fewer than a half-dozen staff members. In many instances, the courses they are teaching are being offered for the first time. The impact of the volunteers on the campus often extends beyond the classroom. In addition to teaching, most of the volunteers are helping to develop new curricula, setting up new labs, conducting faculty seminars and working on interdepartmental study programs.

ORGANIZATION NEWS

SPERRY RAND AND RCA SIGN FINAL AGREEMENT

D. F. Kyle
Sperry Rand Corporation
1290 Avenue of the Americas
New York, N.Y. 10019

Sperry Rand Corporation and RCA Corporation signed a final agreement on December 17, 1971 under which Sperry Rand acquired RCA's customer base in general purpose computers. Under terms of the agreement, Sperry Rand's Univac Division, as of January 1, is providing software and hardware maintenance and systems support to RCA's former computer customers in the United States, Canada and Mexico. These include more than 500 users with more than 1,000 computers installed.

The agreement was signed by J. Frank Forster, Sperry Rand chairman and chief executive officer, and Anthony L. Conrad, president and chief operating officer of RCA. It results from RCA's decision to withdraw from the computer business September 17, 1971, and an agreement in principle on November 19, 1971, for Sperry Rand to purchase parts of the business. The agreement called for Sperry Rand to make initial cash payment of $70 million on January 7, followed by additional shared revenue contingency payments estimated at between $30 million and $60 million over the next five years.

About 2,5000 RCA computer personnel will be joining the Univac organization to insure continuity of service to the RCA customers.

"DEBUGGING SYSTEM" FOR COMPUTERS PATENTED BY GOODYEAR TIRE & RUBBER

The Goodyear Tire and Rubber Co.
Akron, Ohio 44316

A "debugging" system for computers that locates errors in a fraction of the time required by older methods has been patented by The Goodyear Tire & Rubber Co., Akron, Ohio. Its inventor, Robert S. Enabnit, who directs Goodyear's electronics research, said that when a computer programming error occurs, the error itself is fed back into the computer. The computer then automatically backtracks to the source of the error for easy identification and correction by the programmer. As described in the patent papers, the invention "relates to a method and circuitry for debugging of on-line programmable digital computers."

RESEARCH FRONTIER

TINY LAMPS THAT GLOW FOR 100 YEARS

Western Electric Company, Inc.
195 Broadway
New York, N.Y. 10007

When people ask Wilson Chen what he does for a living, he tells them, "I grow lamps."

Wearing a white smock and a gauze cap, Chen doesn't look much like a farmer. In fact, he's a senior engineer at Western Electric's Reading (Pa.) Plant. Instead of planting seeds, he uses chemicals; instead of sun and rain, he relies on carefully controlled heat and pressure; and instead of a hothouse, he works in a laboratory that's as clean as a hospital operating room. His harvest is small, delicate and very valuable.

Chen grows an unusual chemical compound called gallium phosphide. It's a solid, transparent material that resembles amber. When a small electric current is passed through a suitably prepared crystal, the gallium phosphide gives off a bright red or green light with almost no heat — a light that should have an average life of 100 years.

The new light is important because it's compatible with solid-state circuits. And it was developed for the same reasons that electron tubes have been replaced with solid-state components such as transistors and diodes: low power consumption, small size, fast switching speed, little heat emission, long life, extreme reliability and low cost.

Using these new lamps in a format that forms letters or numbers, a telephone of the future could have a readout panel that would allow a caller to dial a code when he comes home, and see the phone numbers of the people who called while he was out; dial a bank and see his balance; or call a computer, put in a problem and see the answer immediately.

The tiny crystal device, called a light-emitting diode, resulted after years of research and development by Bell Laboratories scientists and Western Electric engineers. This new lamp will be used in future telephones, switchboards, private branch exchanges, electronic switching systems, and display boards. The first use by the Bell System in a consumer product is in a new compact, solid-state Speakerphone currently undergoing field tests.

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Olivetti Corporation of America, New York, N.Y.	EMBRATEL (Empresa Brasilera de Telecomunicacoes), Brasil	14,900 teleprinters for expanding the telex services for the entire country; includes direct connections with neighboring countries, and via satellite, with entire world	$33+ million
Control Data Corporation Minneapolis, Minn.	Union Bank of Switzerland (UBS), Zurich	Multi-computer system; first step in re-styling Bank's operations; centered about 2 CYBER 70 model 73 systems, service will be available in any branch no matter how far removed	$12.3 million
Digital Equipment Corp. Maynard, Mass.	Digitek Corp. Marina Del Rey, Calif.	Ten DECsystem-1040's for use in batch and on-line services to customers	$4+ million
Honeywell Inc., Wellesley Hills, Mass.	State of New Hampshire	Equipment and maintenance of a Honeywell Series 6000 computer which will service all agencies of state government in support of integrated management information systems	$3.6 million
Fairchild Systems Technology Division, Sunnyvale, Calif.	Oklahoma City Air Materiel Area, Tinker Air Force Base, Okla.	Development and production of systems to be used in testing of ground support equipment for the Joint Services A-7 aircraft	$2.5 million
Honeywell Inc., Wellesley Hills, Mass.	Andresens Bank A/S; Wilh. Wilhelmsen; and Time-Sharing A/S Oslo, Norway	A Honeywell Series 6030 system for joint use; commercial services range from local batch to conversational time-sharing; bank use will include on-line banking	$2+ million
National Cash Register Dayton, Ohio	Union Bank of Switzerland (UBS), Zurich	NCR 270-201 banking teller terminals and NCR 754 remote multiplexers; part of first installation phase in Bank's new system	$2 million
Victor Comptometer Corp. Computer Division, Chicago, Ill.	Employers Commercial Union Companies, Boston, Mass.	29 Victor Series 800 mini-computer systems for national insurance network	$1.6 million
ITT's Compagnie Generale de Constructions Telephoniques (C.G.C.T.)	Aeroflot, Moscow, U.S.S.R.	Electronic telegraph message switching system which will handle all telegraphic message transmission switching for Soviet civil aviation	$1.3 million
Image Systems, Inc. Culver City, Calif.	Eastern Airlines New York, N.Y.	Maintenance and servicing of 1,640 CARD® units at airline's regional reservations centers in U.S., San Juan and Montreal	$1 million
Westinghouse Electric Corp. Westinghouse Justice Institute Pittsburgh, Pa.	Miami Valley Council of Governments, Dayton, Ohio	Design of multipurpose information system to be integrated on regional basis to serve combined needs of police, judicial and correctional agencies in area surrounding Dayton (Ohio)	$400,000
Massachusetts Institute of Technology, Cambridge, Mass.	Council on Library Resources	One year support of an experimental, computer-operated technical library; Project Intrex (for information transfer experiments) could be prototype for information retrieval systems in libraries of future	$400,000
C. M. Leinwand Associates, Inc., Newton, Mass.	U.S. Office of Economic Opportunity, Washington, D.C.	Providing computer data management services in conjunction with a major project being undertaken by the O.E.O.	$332,542
The Council of the Great City Schools, Washington, D.C.	U.S. Office of Education Washington, D.C.	Implementing its Planning and Management Information System (PMIS); designed to be transferable; will become available to all 22 Council member city districts later	$300,000
GTE Sylvania Inc., Socio-Systems Products Organization, Mountain View, Calif.	District of Columbia Dept. of Highways and Traffic, Washington, D.C.	A computerized surveillance and control system to improve traffic flow in D.C.	$242,000
Los Angeles Unified School District, Calif.	U.S. Dept. of Health, Education, and Welfare, Washington, D.C.	Development of computer based management information system, called AIMS (Automated Instructional Materials Services) capable of providing administrators, teachers and students with central source of information for entire array of learning materials stocked by school district	$234,102
Computer Automation, Inc. Newport Beach, Calif.	(not identified because of proprietary nature of products)	100 NAKED MINI 8 computers that will operate and control new consumer-oriented devices; are being incorporated into coin-operated machines for general public use	$205,000
Control Data Corp. Minneapolis, Minn.	Pittsburgh Mercy Hospital Pittsburgh, Pa.	Long-term management agreement; CDC will provide total data processing services, on-site, for wide range of administrative and clinical functions	——
Synergistic Computer Systems, Inc., Orange, Calif.	J. F. Earp and Associates, Lakeland, Fla.	Installation of a complete SYNCOMP MICRO/1 Computer System to handle all phases of consulting engineering, subdivision map plotting, a management accounting system, as well as state-wide data communications	——
Lockheed Electronics Co., Inc., Los Angeles, Calif.	Iotron Corp. Bedford, Mass.	Fifty MAC 16 minicomputers for use as components of Iotron's automatic anticollision navigation system, DIGIPLOT®, for shipboard use	——

NEW INSTALLATIONS

OF	AT	FOR
Control Data 6400 system	Temple University Philadelphia, Pa.	Time-sharing applications to meet increased workload; will service remote terminals located in classrooms, labs and offices on campus, health science center and several off-campus locations
Honeywell Model 115/2 system	Union Discount Company of London Ltd., Cornhill, England	Replacing visible record machines used for all the company's accounting operations (system valued at $245,000)
Honeywell Model 6030 system	Banco de Vizcaya, Madrid, Spain	Complementing existing systems at both Bilbao headquarters and at Madrid to better serve commercial bank customers
	SEAT, Spain	Implementing planned national communications network; system will include 10 Series 50 computers as remote terminals and several hundred remote typewriter-like terminals
IBM System/3 Model 6	Pisano French Bread Baking Co. Redwood City, Calif.	Assistance in baking and delivering its 180 different products to restaurants and markets from San Francisco to Monterey.
IBM System/3 Model 10	Arizona Automobile Association Phoenix, Ariz.	Handling all club records, keeping track of types and causes of automobile breakdowns, maintaining running inventory of road maps and itineraries available at its service locations
	Town and Village Insurance Service, Inc., Columbus, Ohio	Calculating automobile insurance premiums (is programmed to automatically review all factors that affect an individual's insurance rates); also for premium billing of health and home-owners policies, and other financial control functions within agency
IBM System/360 Model 20	Sunbell Corp., Albuquerque, N.M.	Aiding Sioux moccasin-makers to keep in touch with Sunbell; applications include payroll, inventory, and sales forecasting
IBM System/370 Model 145	Cessna Aircraft Wichita, Kan.	All of Cessna's computing, including accounting, payroll, service parts inventory control, market forecasting and research, production planning, engineering, financial analysis, etc.
IBM System/370 Model 155	International Harvester Company Hinsdale, Ill.	Studying wide range of possible designs for loaders and backhoes; using 2250 display unit, designer may alter model until satisfied
IBM System/370 Model 165	Gulf Oil Corporation Pittsburgh, Pa.	Host computer to some 25 smaller systems in use at Gulf locations as far away as London
NCR Century 50	Morton Metalcraft Company Morton, Ill.	Production analyses, labor accounting, and payroll preparation
NCR Century 100	Harrison and Company Atlanta, Ga.	A variety of applications including the codification of state laws, preparation of invoices, inventory control and sales analysis
	International Commercial College Kaohsiung, South Taiwan	Advanced educational data processing
	Japan Air Lines Los Angeles, Calif.	Preparing purchase orders, writing shipping invoices, and paying suppliers; will soon be tied into JAL's inventory control operation in Tokyo
NCR Century 200	Municipality of Jersey City New Jersey	Nucleus of a fiscal modernization program; now consolidating data processing operations for city's water, sewer and real-estate tax collections; will eventually control disbursement of all city funds and produce each morning an updated balance of 40 different accounts, detailing all receipts, deposits and checks ready for mailing
NCR Century 300	Carlton Industries, Richmond, Va.	Expanding data processing operations, including preparing bills of lading for transmission and management reports
SYSTEMS 86	AAI Corporation Baltimore, Md.	A crew training simulator being developed for the new U.S. Navy EA-6B aircraft
UNIVAC 9200 system	Domestic and Foreign Missionary Society of the Protestant Episcopal Church, New York, N.Y.	A wide range of business applications including general accounting tasks, mailing list preparation, and parochial reports
UNIVAC 9200 II system	O. E. Stapley Company Phoenix, Ariz.	Inventory control and general accounting
UNIVAC 9300 system	Braden Industries Broken Arrow, Okla.	Improving production control procedures, inventory control and accounting operations
UNIVAC 9400 system	Central Oklahoma Economic Development District (COEDD), Shawnee, Okla.	Expediting accounting operations in some 19 hospitals located in rural areas in Oklahoma
	George Transfer and Rigging Co. Baltimore, Md.	Real time communications covering 28 dispatching terminals in 11 states and the District of Columbia; also, payroll processing, general accounting, equipment reports and sales analysis in batch processing mode; replaces smaller 9300 system
Xerox Sigma 3 system	Pacific Northwest Bell Telephone Co., Seattle, Wash.	Monitoring traffic volume and quality of service in switching offices in Washington, Oregon and Idaho to instantly detect abnormalities in service; when fully implemented, up to 150 offices will be on-line and will be able to request special reports at any time for printout on a remote terminal

MONTHLY COMPUTER CENSUS

Neil Macdonald
Survey Editor
COMPUTERS AND AUTOMATION

The following is a summary made by COMPUTERS AND AUTOMATION of reports and estimates of the number of general purpose electronic digital computers manufactured and installed, or to be manufactured and on order. These figures are mailed to individual computer manufacturers from time to time for their information and review, and for any updating or comments they may care to provide. Please note the variation in dates and reliability of the information. Several important manufacturers refuse to give out, confirm, or comment on any figures.

Our census seeks to include all digital computers manufactured anywhere. We invite all manufacturers located anywhere to submit information for this census. We invite all our readers to submit information that would help make these figures as accurate and complete as possible.

Part I of the Monthly Computer Census contains reports for United States manufacturers. Part II contains reports for manufacturers outside of the United States. The two parts are published in alternate months.

The following abbreviations apply:

(A) -- authoritative figures, derived essentially from information sent by the manufacturer directly to COMPUTERS AND AUTOMATION
C -- figure is combined in a total
(D) -- acknowledgment is given to DP Focus, Marlboro, Mass., for their help in estimating many of these figures
E -- figure estimated by COMPUTERS AND AUTOMATION
(N) -- manufacturer refuses to give any figures on number of installations or of orders, and refuses to comment in any way on those numbers stated here
(R) -- figures derived all or in part from information released indirectly by the manufacturer, or from reports by other sources likely to be informed
(S) -- sale only, and sale (not rental) price is stated
X -- no longer in production
- -- information not obtained at press time

SUMMARY AS OF JANUARY 15, 1972

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)		NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Part II. Manufacturers Outside United States								
A/S Norsk Data Elektronikk	NORD 1	8/68	2.0		0	60	60	29
Oslo, Norway	NORD-2B	8/69	4.0	(S)	0	11	11	11
(A) (Jan. 1972)	NORD-5	-	-		0	0	0	1
A/S Regnecentralen	GIER	12/60	2.3-7.5		0	40	40	0
Copenhagen, Denmark	RC 4000	6/67	3.0-20.0		0	19	19	3
(A) (Jan. 1972)								
Elbit Computers Ltd.	Elbit-100	10/67	4.9	(S)	-	-	225	50
Haifa, Israel								
(A) (Feb. 1971)								
GEC-AEI Automation Ltd.	Series 90-2/10/20							
New Parks, Leicester, England	25/30/40/300	1/66	-		-	-	13	X
(R)	S-Two	3/68	-		-	-	1	X
(Jan. 1969)	130	12/64	-		-	-	2	X
	330	3/64	-		-	-	9	X
	959	-/65	-		-	-	1	X
	1010	12/61	-		-	-	8	X
	1040	7/63	-		-	-	1	X
	CON/PAC 4020	-	-		-	-	0	X
	CON/PAC 4040	5/66	-		-	-	9	-
	CON/PAC 4060	12/66	-		-	-	5	-
International Computers, Ltd. (ICL)	Atlas 1 & 2	1/62	65.0		0	6	6	X
London, England	Deuce	4/55	-		0	7	7	X
(A)	KDF 6-10	9/61	10-36		0	58	58	X
(Jan. 1972)	KDN 2	4/63	-		0	1	1	X
	Leo 1, 2, 3	-/53	10-24		0	59	59	X
	Mercury	-/57	-		0	13	13	X
	Orion 1 & 2	1/63	20.0		0	17	17	X
	Pegasus	4/55	-		0	30	30	X
	Sirius	-/61	-		0	22	22	X
	503	-/64	-		0	16	16	X
	803 A, B, C	12/60	-		0	83	83	X
	1100/1	-/60	5.0		0	22	22	X
	1200/1/2	-/55	3.9		0	68	68	X
	1300/1 /2	-/62	4.0		0	196	196	X
	1500	7/62	6.0		0	110	110	X
	2400	12/61	23.0		0	4	4	X
	1900-1909	12/64	3-54		2	2200	2202	-
	Elliott 4120/4130	10/65	2.4-11.4		0	160	160	-
	System 4-30 to 4-75	10/67	5.2-54		0	400	400	-
Japanese Mfrs.	(Mfrs. of various models include: Nippon Electric Co., Fujitsu,							
(N) (Sept. 1970)	Hitachi, Ltd., Toshiba, Oki Electric Industry Co., and Mitsubishi						Total:	Total:
	Electric Corp.)						4150 E	800 E
Marconi Co., Ltd.	Myriad I	3/66	£36.0-£66.0	(S)	0	37	37	9
Chelmsford, Essex, England	Myriad II	10/67	£22.0-£42.5	(S)	0	17	17	12
(A) (Jan. 1970)								
N.V. Philips Electrologica	P1000	8/68	7.2-35.8		-	-	60	40
Apeldoorn, The Netherlands	P9200	3/68	-		-	-	300	50
(A)	P9200 t.s.	3/70	-		-	-	4	2
(Jan. 1972)	P800	9/70	-		-	-	40	45
	ELX1	5/58	12.0		-	-	22	-
	ELX2/8	3/65	6-21		-	-	27	-
	DS714	-/67	-		-	-	27	8
	PR8000	1/66	-		-	-	23	-
Redifon Limited	R2000	7/70	-		0	12	12	6
Crawley, Sussex, England								
(A) (Dec. 1971)								
Saab-Scania Aktiebolag	D21	12/62	7.0		0	38	38	-
Linkoping, Sweden	D22	11/68	15.0		0	31	31	0
(A) (Oct. 1971)	D220	4/69	10.0		0	12	12	5
Selenia S.p.A.	G-16	7/69	10.9	(S)	0	72	72	31
Roma, Italy	GP-160		5.6		-	-	-	250
(A) (Nov. 1971)								

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Siemens	301	11/68	0.75	-	-	82	C
Munich, Germany	302	9/67	1.3	-	-	28	C
(A)	303	4/65	2.0	-	-	70	C
(July. 1971)	304	5/68	2.8	-	-	63	C
	305	11/67	4.5	-	-	93	C
	306	-	6.5	-	-	-	C
	2002	6/59	13.5	-	-	39	C
	3003	12/63	13.0	-	-	32	C
	4004/15/16	10/65	5.0	-	-	99	C
	4004/25/26	1/66	8.3	-	-	54	C
	4004/35	2/67	11.8	-	-	185	C
	4004/135	-	17.1	-	-	-	C
	4004/45	7/66	22.5	-	-	248	C
	4004/46	4/69	34.0	-	-	10	C
	4004/55	12/66	31.3	-	-	22	C
	4004/150	-	41.0	-	-	10	C
	4004/151	-	51.5	-	-	22	C
	404/3	-	1.9	-	-	-	C
	404/6	-	-	-	-	10	C
							Total: 298
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIE	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	URAL 11/14/16 and others	-	-	-	-	C	C
						Total: 6000 E	Total: 6000 E

C.a

PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 722: CLEANING UP?

"Would you like to get in on something good?" asked Sam as Tom entered the Computer Center.

"Not another get-rich-quick scheme, I hope," Tom replied.

"No, I think it's all on the level, and in any case it's a pretty small operation. But I thought it might be fun. Drab, the Super Detergent, has a contest with a picture in each box. Get a complete set of ten and you win a prize worth ten dollars."

"How many boxes do you think you'll have to buy to have a good chance of getting a complete set?"

"I don't know exactly. I'm writing a little program to simulate this. But I estimated that if I bought twenty boxes I'd have a very good chance of winning. Since it's two for 69 cents at the super market, this would mean less than $7.00. I figure it's a good deal."

Tom looked a little skeptical. "What if it's a racket and one picture occurs only once in a thousand boxes?"

"Well, I admit that would foul things up, but I'm assuming this is all very honest." Sam paused a moment, then continued, "How about it, do you want to go in on this with me? We could each buy ten boxes and split if we win."

"No, and I'd advise you not to try it. I don't think you stand much chance."

Is Tom right?

Solution to Problem 721: A Scheme of Sorts

If an n-bit vector V contains r 1's, occuring in positions $a_1, a_2, \ldots a_r$ (from the left), V will occupy position

$$1 + \sum_{k=1}^{r} \sum_{i=1}^{a_k} \binom{n-i}{r-k}$$ in the list.

Readers are invited to submit problems (and their solutions) for publication in this column to: Problem Editor, Computers and Automation, 815 Washington St., Newtonville, Mass. 02160.

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THE NEW YORK PUBLIC LIBRARY, Fifth Ave. and 42 St., New York, N.Y. 10018 / page 60

CALENDAR OF COMING EVENTS

Feb. 1-3, 1972: First International CAD/CAM Conference and Exhibits, Royal Coach Motor Hotel, Atlanta, Ga. / contact: Society of Manufacturing Engineers, Public Relations Dept., 20501 Ford Rd., Dearborn, Mich. 48128

Feb. 2-4, 1972: 1972 San Diego Biomedical Symposium, Sheraton Hotel, Harbor Island, San Diego, Calif. / contact: Norman R. Silverman, M.D., San Diego Biomedical Symposium, P.O. Box 965, San Diego, Calif. 92112

Feb. 14-15, 1972: ASM Written Communications Conference, Atlanta-American Hotel, Atlanta, Ga. / contact: John N. Gilbride, Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138

Mar. 6-8, 1972: 18th Annual Systems Management Conference, Americana Hotel, New York City, N. Y. / contact: Miss G. De Sapio, Conference Information Coordinator, American Management Association, Inc., AMA Bldg., 135 West 50th St., New York, N. Y. 10020

Mar. 7-10, 1972: Computer Graphics in Medicine, ACM SIGGRAPH Symposium, Point Park College, Pittsburgh, Pa. / contact: Dr. John D. Canter, Chmn., Point Park College, 201 Wood St., Pittsburgh, Pa. 15222

Mar. 8-9, 1972: Annual Spring Conference of the Association for Systems Management (Toronto Chapter), Royal York Hotel, Toronto, Ontario, Canada / contact: Mr. Donald T. Laughton, North American Life Assurance Co., 105 Adelaid St. West, Toronto 1, Ontario, Canada

Mar. 8-10, 1972: Fifth Annual Simulation Symposium, Tampa, Fla. / contact: Annual Simulation Symposium, P.O. Box 1155, Tampa, Fla. 33601

Mar. 13-14, 1972: ASM Organization Planning Conference, Pontchartrain Hotel, Detroit, Mich. / contact: John N. Gilbride, Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138

Mar. 20-23, 1972: IEEE International Convention & Exhibition, Coliseum & N. Y. Hilton Hotel, New York, N. Y. / contact: IEEE Headquarters, 345 E. 47th St., New York, N. Y. 10017

Mar. 26-29, 1972: IEEE International Convention, Coliseum & N.Y. Hilton Hotel, New York, N.Y. / contact: J. H. Schumacher, IEEE, 345 E. 475th St., New York, N.Y. 10017

April 5-8, 1972: "Teaching Systems '72", International Congress, Berlin Congress Hall, Berlin, Germany / contact: AMK Berlin, Ausstellungs-Messe-Kongress-GmbH, Abt. Presse und Public Relations, D 1000 Berlin 19, Messedamm 22, Germany

April 9-12, 1972: International Business Forms Industries 19th Annual Meeting, El San Juan Hotel, San Juan, Puerto Rico / contact: International Business Forms Industries/PIA, 1730 North Lynn St., Arlington, Va. 22209

April 16-19, 1972: Meeting of National Federation of NCR Computer User Groups, National Cash Register Co., Dayton, Ohio / contact: Public Relations Dept., National Cash Register Co., Dayton, Ohio 45409

April 17-19, 1972: Ninth Annual Meeting and Technical Conference of the Numerical Control Society, Palmer House, Chicago, Ill. / contact: William H. White, Numerical Control Society, 44 Nassau St., Princeton, N. J. 08540

April 25-28, 1972: Conference on Computer Aided Design, Univ. of Southampton, Southampton, England / contact: IEE Office, Savoy Place, London W.C. 2, England

May 15-18, 1972: 5th Australian Computer Conference, Brisbane, Queensland, Australia / contact: A. W. Goldsworthy, Chmn., Australian Computer Society, Inc., Computer Center, Australian National Univ., P. O. Box 4, Canberra, A.C.T. 2600

May 15-18, 1972: Spring Joint Computer Conference, Convention Ctr., Atlantic City, N.J. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N.J. 07645

May 16-17, 1972: IIT Research Institute Second International Symposium on Industrial Robots, Chicago, Ill. / contact: K. G. Johnson, Symposium Chairman, IIT Research Institute, 10 West 35 St., Chicago, Ill. 60616

May 21-24, 1972: 7th Annual Mass Retailers' Convention and Product Exposition, Marriott Motor Hotel, Atlanta, Ga. / contact: MRI Headquarters, 570 Seventh Ave., New York, N. Y. 10018

May 21-24, 1972: 1972 International Systems Meeting, Fontainebleau Hotel, Miami Beach, Fla. / contact: R. B. McCaffrey, Assoc. for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138

May 23-25, 1972: Annual Society for Information Display International Symposium. Jack Tar Hotel, San Francisco, Calif. / contact: Mr. J. L. Simonds, Eastman Kodak Co., Rochester, N. Y. 14650

May 24-26, 1972: Second Annual Regulatory Information Systems Conference, Chase-Park Plaza Hotel, St. Louis, Mo. / contact: William R. Clark, Missouri Public Service Commission, Jefferson City, Mo. 65101

June 12-14, 1972: Conference on Computers in the Undergraduate Curricula, Sheraton-Biltmore Hotel and Georgia Institute of Technology, Atlanta, Ga. / contact: Computer Sciences Project, Southern Regional Education Board, 130 Sixth St., N.W., Atlanta, Ga. 30313

June 12-14, 1972: International Conference on Communications, Sheraton Hotel, Philadelphia, Pa. / contact: Stanley Zebrowitz, Philco-Ford Corp., 4700 Wissahickon Ave., Philadelphia, Pa. 19144

June 12-14, 1972: Third International Congress on Advances in Automated Analysis, New York Hilton Hotel, New York, N.Y. / contact: Dept. R 39, Technicon Instruments Corp., Tarrytown, N.Y. 10591

June 15-16, 1972: ACM SIG/CPR Tenth Annual Conference on Computer Personnel Research, Ontario Institute for Studies in Education, Univ. of Toronto. Toronto, Canada / contact: SIGCPR, c/o ACM, 1133 Ave. of the Americas, New York, N.Y. 10036

June 19-21, 1972: International Symposium on Fault-Tolerant Computing, Boston, Mass. / contact: John Kirkley, IEEE Computer Society, 8949 Reseda Blvd., Suite 202, Northridge, Calif. 91324

June 19-21, 1972: Ninth Annual Design Automation Workshop, Statler Hilton Hotel, Dallas, Tex. / contact: R. B. Hitchcock, IBM Watson Research Center, P.O. Box 218, Yorktown Heights, N.Y. 10598

June 27-30, 1972: DPMA 1972 International Data Processing Conference & Business Exposition, New York Hilton at Rockefeller Center, New York, N.Y. / contact: Richard H. Torp, (conference director), or Thomas W. Waters (exposition manager), Data Processing Management Association, 505 Busse Hwy., Park Ridge, Ill. 60068

July 3-6, 1972: First Conference on Management Science and Computer Applications in Developing Countries, Cairo Hilton, Cairo, U.A.R. / contact: Dr. Mostafa El Agizy or Dr. William H. Evers, IBM Corporation, Armonk, N.Y. 10504

Sept. 19-22, 1972: Western Electronic Show & Convention (WESCON), Los Angeles Convention Ctr., Los Angeles, Calif. / contact: WESCON, 3600 Wilshire Blvd., Los Angeles, Calif. 90005

Oct. 3-5, 1972: AFIPS and IPSJ USA-Japan Computer Conference, Tokyo, Japan / contact: Robert B. Steel, Informatics Inc., 21050 Vanowen St., Canoga Park, Calif. 91303

Oct. 8-11, 1972: International Conference on Systems, Man and Cybernetics, Shoreham Hotel, Washington, D.C. / contact: K. S. Nurendra, Yale Univ., 10 Hill House, New Haven, Conn. 06520

Nov. 1-3, 1972: Northeast Electronics Research & Engineering Meeting (NEREM), Boston, Mass. / contact: IEEE Boston Office, 31 Channing St., Newton, Mass. 02158

Nov. 9-10, 1972: Canadian Symposium on Communications, Queen Elizabeth Hotel, Montreal, Quebec, Canada / contact: IEEE Headquarters, Technical Conference Svcs., 345 E. 47th St., New York, N.Y. 10017

Nov. 13-16, 1972: Fall Joint Computer Conference, Convention Center, Las Vegas, Nev. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N.J. 07645

April 10-13, 1973 PROLAMAT '73, Second International Conference on Programming Languages for Numerically Controlled Machine Tools, Budapest, Hungary / contact: IFIP Prolamat, '73, P.O. Box 63, Budapest 112, Hungary

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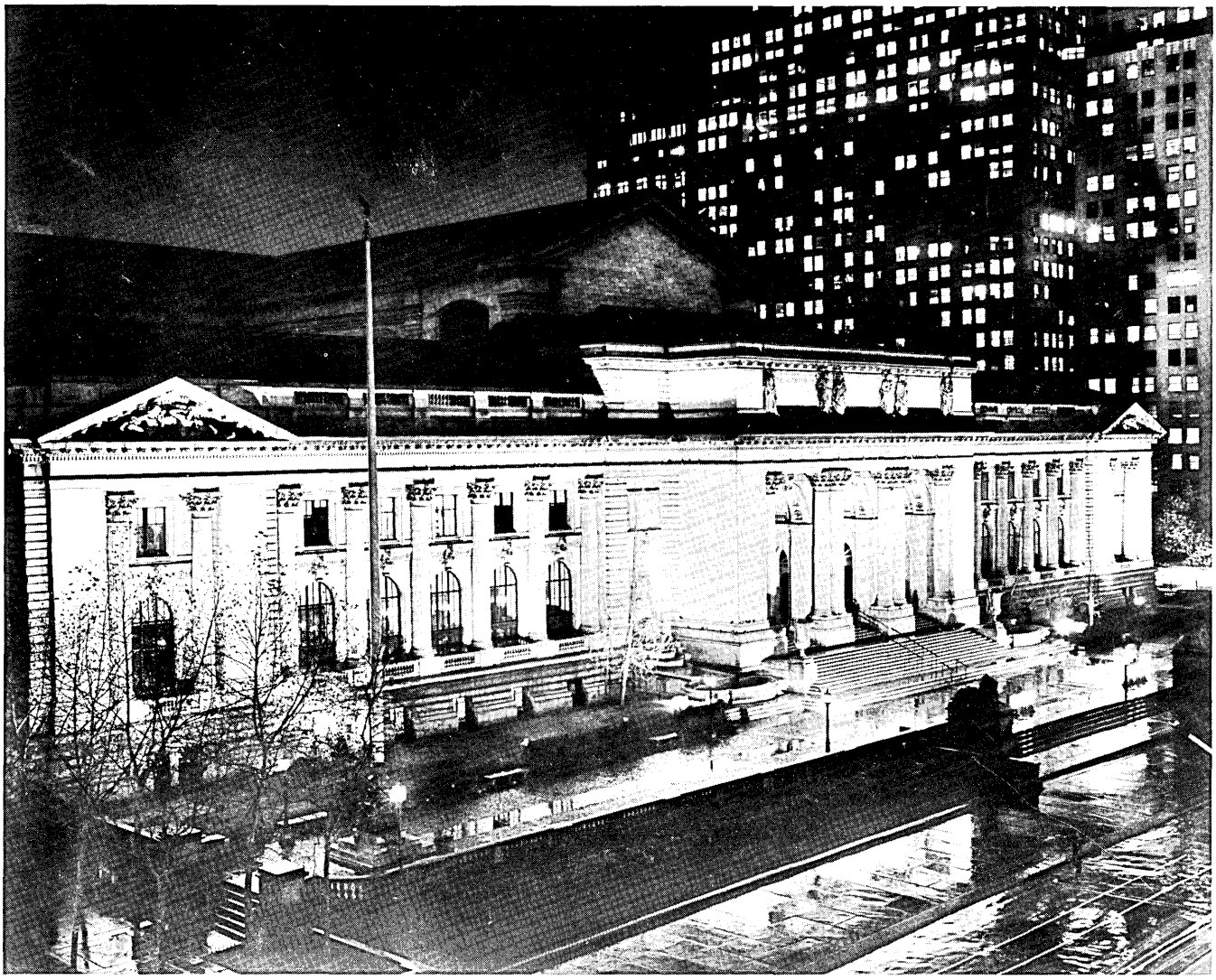

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