SCIENCE & TECHNOLOGY
December, 1970
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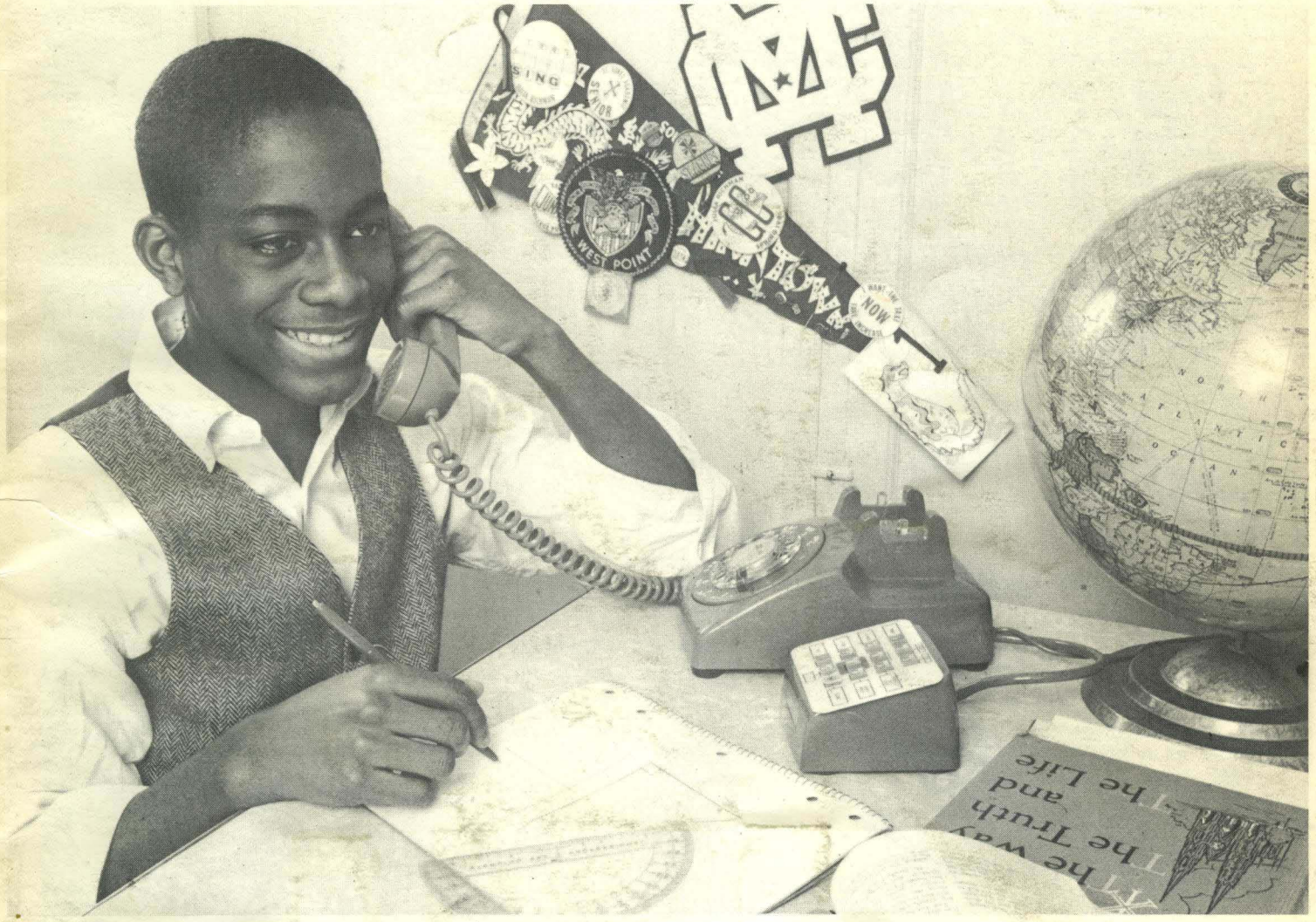
computers and automation

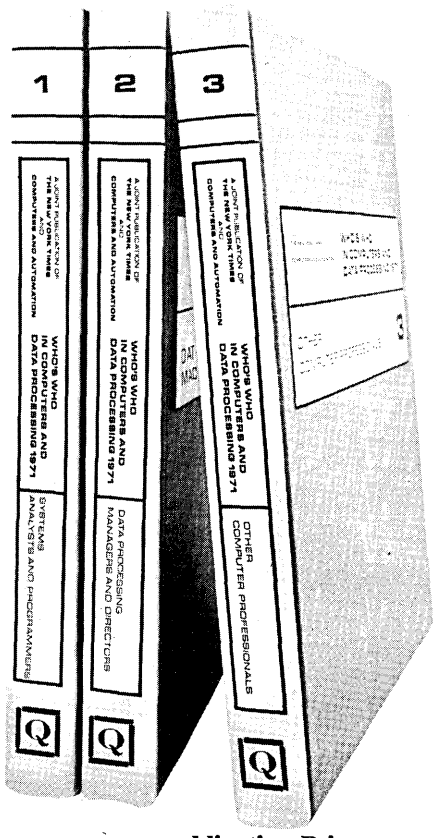


Homework Calculation by Remote Computer

The New York Times and
Computers and Automation
announce a practical guide to
the most elusive components in computers and data processing...

PEOPLE

Who they are...
What they do...
Where they do it...



Until now, it has been well-nigh impossible to keep track of the thousands of highly skilled professionals engaged in the world's fastest growing profession.

The painstaking task required to inventory the qualifications and backgrounds of the 15,000 most necessary professionals in every branch of the computer field has now been accomplished. The oldest magazine in the field, *Computers and Automation,* and the information retrieval services of *The New York Times* have pooled their resources to produce the Fifth Edition of

WHO'S WHO IN COMPUTERS AND DATA PROCESSING

This is the most extensive register of computer professionals ever published — the first of its kind in seven years. It is arranged for your convenience in three volumes:

1. *Systems Analysts and Programmers*
2. *Data Processing Managers and Directors*
3. *Other Computer Professionals* (from professors of computer science to attorneys versed in the computer field)

Each of the more than 15,000 specialists is covered by a separate capsule biography detailing: *Birth Date ... Education ... Year Entered Computer Field ... Title ... Honors ... Memberships ... Special Skills* (from applications to logic to sales) ...

PLUS both home and business addresses. For example:

CHAPIN, Ned / consultant / born: 1927 / educ: PhD, IIT; MBA, Univ of Chicago /

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C8

Introducing datapro 70.

Use it once and you'll know why we call it the EDP buyer's bible.

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Let's face it. The electronic data processing industry is experiencing an unparalleled explosion. In capabilites, in applications, and in products and services offered to people like you.

There are more hardware devices on the market today than yesterday. And there'll be a whole lot more tomorrow. New proprietary software packages are being introduced every day. New equipment manufacturers and software companies are springing up wherever you look. What this means to you, as the buyer of EDP equipment, is that choosing what's best for your purpose isn't easy.

Not by a long shot.

DATAPRO 70 can help you. A lot. Look at it this way: doesn't it make sense that a highly skilled, experienced team of totally objective EDP experts can help evaluate what's best for you and make your buying decisions easier? And more practical? A staff of top-flight equipment and software analysts is hard to come by these days. Especially at a cost of less than three hundred dollars a year. But that's exactly what you get in *Datapro 70.*

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Datapro 70 itself consists of five major sections. Each provides in-depth coverage of an important aspect of the computer market. And each can stand on its own as a complete reference in itself.

SUPPLIERS. This section describes the companies you deal with. Informative, detailed profiles of the firms that produce and market EDP hardware and software. Their stability, their dependability, their history. Plus their sales, earnings, growth, product lines, marketing organizations, key employees, officers, etc.

COMPUTERS. The reports in this section are concise evaluations of individual computer systems. The Characteristics section of each report gives you the details of the central processor, storage units, I/O devices, communications controllers, software facilities, prices, contract terms, etc. The Management Summary tells you the key features and drawbacks of each computer and helps you decide whether it's the right choice for your applications.

PERIPHERALS. This section covers the characteristics and capabilities of a wide range of hardware devices used in connection with computers—both on-line and off-line. You get comprehensive reports on communication terminals, data recorders, display units, data sets, etc. You'll find it easy to spot the equipment that can cut your data processing costs and raise your throughput.

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FEATURE REPORTS. Here you'll find penetrating surveys and analyses of key aspects of EDP hardware, software, and applications. The reports in this section are clarified through extensive use of illustrations and comparison charts. You'll get valuable guidance on data communications, input preparation, computer selection, and other important topics.

Compare. You'll Buy Datapro 70.

You can see why we call *Datapro 70* the EDP buyers's bible. It's just that. It's all you need to know.

So don't talk to another hardware or software salesman. Not until you have *Datapro 70* at hand to guide you through the maze of competing products and conflicting claims.

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datapro research corporation

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computers and automation

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December, 1970

Editorial Offices **Berkeley Enterprises, Inc.**
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The magazine of the design, applications, and implications of information processing systems.

Front Cover Picture

Joseph Feaster, of Mater Christi High School in Astoria, Queens, L.I., is using a touch-tone telephone calculator to assist him with some of his homework. The computer, which is 50 miles north in Yorktown Heights, N.Y., provides instant voice answers to problems that he has entered via the keyboard. Joe is one of six high school students taking part in a home calculator study undertaken by the Catholic Schools, Diocese of Brooklyn, and IBM. See "The Little Red Schoolhouse and the Big Black Box", by Brother Austin David, beginning on page 15.

Departments

Key

[A] — Article
[C] — Monthly Column
[E] — Editorial
[F] — Readers' Forum

Starting Before The Race Begins

There is no doubt that:

- Computers can be applied to every subject under the sun;
- Computers have not yet been applied to every subject under the sun;
- As soon as one person perceives how to apply computers to a new subject, he has a headstart over all other persons who have not yet perceived it; and
- He has an opportunity knocking at his doorstep.

This is not to say that it will ever be easy, financially rewarding, or practical to apply computers (either by new hardware or new software) to a new subject. For example, in the early 1950's it was commonly predicted that computers would be used to translate from one natural language to another; and many people tried to work out ways of automatically translating, say, from Russian to English by computer. Finally, after some dozen years of effort, and little substantial progress, a definitive report by a committee of the National Research Council headed by John R. Pierce showed that after a very large investment in effort and money, the amount of progress had been very small, the demand for such translation was very low, the supply of human interpreters and translators was much more than adequate, and the surge of follow-the-crowd attention in this field was quite unjustified.

One exception disproves a universal rule. But in the case of a general rule, if there are 30 instances in favor, for every instance against, the general rule is often quite acceptable. The general rule is that the person who observes something new in the way of a feasible possibility definitely has a headstart.

Now there are a number of new fields for the development of computer techniques and the application of computers that have recently become visible. In these fields it seems very likely that new products and services will earn money and bring rewards to the innovators.

Among the hardware improvements which are quite visible at this time are: better computer peripherals and interfaces; new communication networks for digital data; large-scale integrated circuits; optical character recognition; computer graphics. All of these have been recognized as new areas for achievements.

Besides new products and services of the hardware kind, there are products and services of the software kind, which use the power of computers to make knowledge accessible that otherwise would be relatively inaccessible.

This kind includes such a facility as a legal data base. For example, a law firm that constructs a good computerized index to the laws, regulations, and cases of, say, the State of Pennsylvania, has many salable byproducts if the firm makes its data base available commercially.

What attitude should a magazine like *Computers and Automation* take about the changes and applications of computers:

- Discuss only those which have already occurred? ("Be practical")
- Discuss as well those which can reasonably be expected soon – in the next year or several years? ("Be innovative")
- Discuss also those which can eventually occur – even if they are undoubtedly years and years away? ("Be visionary")

The only sensible position that a magazine like ours can take is:

Be all three – practical – innovative – visionary – in reasonable proportions.

Everybody talks about practical developments and applications; they are seldom controversial. Many people talk about innovative applications; they are often controversial. Few people talk freely about visionary applications; they are almost always controversial. Yet, visionary applications – with new ideas and far-seeing imagination – may spark the insight which allows someone to start before the race begins – and to greatly benefit mankind as well.

If the pages of our magazine can increase practical knowledge, stimulate innovation, and make the visionary future clearer, that will help our audience of computer professionals – whom we always want to think of as "information engineers".

Especially do we need to do this in the "uncomfortable" areas of knowledge and problems – where solutions that people have lived with for many years are not right, are repressive, are cruel, or produce hatred among quite a few Americans and large numbers of persons in other countries. Every establishment, every vested interest, makes itself comfortable with mythical solutions – often myths that are the harder to counteract because they contain many elements of truth.

Computers should and will be applied by progressive computer professionals to show up myths – such as the myths that cover up political conspiracies, and the inequities of so-called justice – for the cruel and harmful nonsense that they are. It is part of our editorial task to help in the application of computers to this area of accomplishment, even if doing so at this time may appear "visionary," and is certainly controversial.

Edmund C. Berkeley

EDITOR

C.a

READERS' FORUM

MARTIN LUTHER KING MEMORIAL PRIZE CONTEST –THIRD YEAR

(Please post this notice)

Computers and Automation has received an anonymous gift and announces the annual Martin Luther King Memorial Prize, of $300, to be awarded each year 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 1971 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 closing date for the receipt of manuscripts this year is April 30, 1971, in the office of ***Computers and Automation,*** 815 Washington St., Newtonville, Mass. 02160.

The winning article, if any, will be published in the July 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.

"Many people fear nothing more terribly than to take a position which stands out sharply and clearly from the prevailing opinion. The tendency of most is to adopt a view that is so ambiguous that it will include everything and so popular that it will include everybody. . . . Not a few men who cherish noble ideals hide them under a bushel for fear of being called different."

"Wherever unjust laws exist, people on the basis of conscience have a right to disobey those laws."

"There is nothing that expressed massive civil disobedience any more than the Boston Tea Party, and yet we give this to our young people and our students as a part of the great tradition of our nation. So I think we are in good company when we break unjust laws, and I think that those who are willing to do it and accept the penalty are those who are a part of the saving of the nation."

> – From *"I Have a Dream" – The Quotations of Martin Luther King, Jr.,* compiled and edited by Lotte Haskins, Grosset and Dunlap, New York, 1968.
>
> Reverend Martin Luther King, Jr., was awarded the Nobel Peace Prize in 1964, when he was age 35.
>
> He was in jail in the United States more than 60 times.
>
> He was assassinated in Memphis, Tennessee, April 4, 1968.

THE DVORAK SIMPLIFIED TYPING KEYBOARD

I. From Bob McCauley, President
Motivational Communications Corp.
134 W. Pleasant Lake Road
St. Paul, Minn. 55110

Our company is engaged in educational endeavors. Last year we "discovered" the Dvorak Simplified Keyboard for typewriters and have been experimenting with its use in grade school education. The Dvorak keyboard has the keys arranged to maximize efficiency. This is accomplished by such techniques as placing the most frequently used letters (A,O,E,U,I,D,H,T,N,S) on what is called the home row of the keyboard, and in general arranging the keys so as to cause most consecutive strokes to occur from opposite hands. This hand alternation is important because it allows one hand to move for position while the other is typing.

The row above the home row contains ?,.PYFGCRL in that sequence. The row below the home row contains ;QJKXBWVZ in that sequence. The top row contains figures in the sequence 7531902468. Other characters of course are also present. We shall be glad to send a copy of the keyboard to any inquirer.

The results of our experiments have in our opinion been fantastic. We have had children as young as 7 years learn the keyboard in less than 2 weeks. After about a month of practice (at one hour per day) these children have attained rates close to what one would expect from 2nd year college typing students (40 to 50 words per minute, net).

It has occurred to us that this keyboard would possibly be of great use to the computer industry, from the standpoint of both efficiency and access to larger work-population groups.

Could you publish this letter and see if anybody is interested in experimenting with this keyboard in the computer industry?

II. From the Editor

Among the questions that could well be investigated are these:

1. What is the comparison of similar, well-motivated, training of young children using the standard keyboard?

2. How difficult is it for an adult who has learned the standard keyboard, to learn the Dvorak keyboard?

3. What kinds of adults relearn easily and what kinds cannot?

4. After such a person has "relearned" the Dvorak keyboard, can he or she confidently expect a substantial gain in typing speed – as, for example, typing 30% faster?

5. It should be possible to provide at relatively small cost an electrical or electronic "overlay" for the keys of an electric typewriter which would have these properties: (a) the Dvorak keyboard would be impulsed; but (b) the impulse from each key struck would be rerouted electrically to exactly the same mechanical lever as at present, and so no mechanical changes whatever in the standard electrical typewriter would be required. In this way any electric typewriter could at very small cost be used from time to time either with a Dvorak keyboard or with a standard keyboard. □

ANTITRUST ACTION INITIATED

VIP Systems Corp.
1145 19th St. NW
Washington, D.C. 20036

As a supplier of text-processing time-sharing services with offices in six cities, we have initiated antitrust action against the IBM Corporation and its subsidiary the Service Bureau Corporation, charging conspiracy to monopolize the markets for computers and automatic typewriters through the sale of teleprocessing services by unfair means.

In a motion filed on October 19 in the United States District Court for the District of Columbia, we ask for damages under the antitrust laws and we seek to enjoin IBM from engaging directly or through subsidiaries in the business of selling computer time-sharing services and remote-access computing services.

This motion has grown out of a continuing dispute between IBM and us over the text-processing time-sharing business, which we entered in 1966, and which IBM entered through its former Information Marketing Division later the same year.

In the fall of 1968 IBM moved the Information Marketing Division to the Service Bureau Corporation. At that time the Information Marketing Division was offering both a text editing service, DATATEXT, and a computational service, CALL 360/BASIC, on a nationwide basis through computer centers in Philadelphia, Cleveland, and Los Angeles. In July of 1969 SBC announced abandonment of the DATATEXT service leaving us the only then-operational alternative time-sharing service for their customers.

In our court action we allege that IBM prevented us from properly servicing our own established customers and the former DATATEXT customers by deliberately providing faulty service during the period from September 1969 to April 1970.

The complaint alleges in part: "Prior to the transfer of DATATEXT to the Service Bureau Corporation, IBM offered and sold its electronic text-editing services at prices which were below those justified or required by market reasons and conditions and which were below cost." The complaint notes that this pricing policy continued after the transfer of DATATEXT to SBC.

The complaint alleges: "The intent and purpose of IBM and the Service Bureau Corporation in setting an artificially-low price level for electronic text-editing services were to drive VIP out of business, to prevent VIP, while in business from enlarging its share of the computer time-sharing market, to keep other firms out of the electronic text-editing business, and to promote the monopolization by IBM of the marketing of computers and automatic typewriters. The sellers of computer services compete for customers with the sellers and lessors of computers and automatic typewriters, and the users of computer services are potential purchasers and lessees of computers, particularly computers made by the company whose machines supplied the users with computer services. Accordingly, it was to the interest of IBM to control and monopolize the field of electronic text-editing services even if it sold such services at less than cost." □

Announcement regarding the
FIFTH EDITION of
WHO'S WHO IN COMPUTERS AND DATA PROCESSING
being published jointly with the New York Times:

Over 15,000 capsule biographies of computer professionals are included in this edition – more than ever before.

All the photo-offset master copy for printing is at the printer; and the three volumes of this edition (over 600 pages in total) are expected to be off the presses in December.

We appreciate the patience with which a great many orderers of copies in advance have awaited publication.

We are glad that in this case the waiting has helped change our original hope of "over 10,000" entrants into a reality of "over 15,000" entrants.

Edmund C. Berkeley
Editor-in-Chief
Who's Who in Computers and Data Processing

CANADIAN COMPUTER CENSUS, 1970

George Fierheller
President, Canadian Information Processing Society
P. O. Box 484
Waterloo, Ont., Canada

Details of the 1970 Canadian Computer Census have been released.

The total number of computers installed in Canada as of May 1, 1970 has reached 2,700 – 663 more than were installed one year earlier. This is by far the largest increase between any two years since the start of the census in 1964. The largest previous increase was between 1968 and 1969 with 424 new computers being installed.

The leading manufacturer in terms of number of computers and equivalent rental value is still IBM with 1,257 computers installed. The equivalent rental value of the IBM equipment, however, declined from 70.8% of the Canadian market to 66.9%.

Digital Equipment Corporation remained in the number two position in terms of number of computers installed although it ranked seventh in equivalent rental value. Burroughs Corporation replaced Honeywell as the third ranking supplier in terms of number of computers although Honeywell remains third in terms of value. Hewlett-Packard was reported separately for the first time and ranked ninth in installed computers. Univac ranked second in equivalent rental value.

The largest increase in the number of computers used in any industry was in manufacturing, where the number of computers used increased from 406 to 667. Government installations showed a relatively small increase, from 259 to 287 installed.

The Canadian Computer Census as published contains a listing of every computer installed and shows the city and the organization where installed (but not the address), and a number of details regarding the computer.

This compendium of computer information is only one of the services provided by CIPS, which is the largest organization of professionals in the data processing field in Canada. The CIPS has nearly 2,000 members in thirteen sections from Halifax to Vancouver. □

"EDP FACILITIES MANAGEMENT: ABDICATION OR SALVATION" – COMMENT

Terry L. Mason
6666 Chetwood
Houston, Texas 77036

The article by Douglas Parnell, Jr. in the October issue, "EDP Facilities Management: Abdication or Salvation," dismisses the services provided by hardware vendors as

being an "expense item, and often thought of as expensive bookkeeping" and it leads one to conclude that facilities management presents the most advantageous pathway to profit maximization. I submit that all of the contributions made by hardware vendors in the last twenty years cannot be finally reduced to the production of giant bookkeeping machines whose cost outweigh their general usefulness. In addition, I cannot concede that facilities management is the best avenue to profit maximization because to do so implies that it is impossible for firms to provide themselves with competently run data processing facilities.

Mr. Parnell cites "people problems" among the problems faced by data processing decision makers. He uses high turnover rate among data processing professionals as a plus for facilities management vs. company-operated installations. He presents the "pros" as disloyal "complicators" who frequently change employers for such reasons as ". . . immediate gain, a greater challenge, or increased opportunity . . .". I believe these are substantive reasons for any type of employee to seek outward mobility.

Furthermore, in reading the introduction under Mr. Parnell's photograph, one is given the impression that he has had at least four different jobs in the last fifteen years. Is Mr. Parnell also one of these odious, disloyal employees? I would also point out that the type of "loyalty" he espouses is effectively anachronistic in the highly mobile, ever-changing charisma that comprises the fabric of modern economies.

The article also leaves one unable to ascertain how facilities management has solved the people problems which numerous other data processing managers have addressed themselves to without much success. How does facilities management marshall all of the people possessed of critical skills to solve pressing data processing problems? Does facilities management solve the problems alluded to: ". . . high costs, inadequate software, people shortage, ineffective management . . ." or does it merely provide management an expensive "whipping boy"?

The article also tells us that facilities management is not for everyone and states that manufacturing concerns generally tend not to use facilities management. It continues in saying that the various service industries are the main beneficiaries of facilities management in that banks, insurance companies, medical concerns, etc., have failed to make full use of data processing's profit-making propensities. It is puzzling that businessmen engaged in manufacturing endeavors should be possessed of more acumen in data-processing applications that enhance profits than are their colleagues in the service industries.

In this comparison of facilities management vs. company-operated installations, in which Mr. Parnell acknowledges himself as prejudiced in favor of facilities management, he seems to predicate his persuasion on the supposed incompetence of users; both in data processing employees and in middle and upper management in regard to computer affairs. While there is some waste and mismanagement in almost any installation, I don't believe that motivated management cannot overcome it. In addition, it is not obvious to me that hardware vendors are incapable or unresponsive in assisting in the solution of these problems.

The problems of ". . . high cost, inadequate software, people shortage, ineffective management . . ." are all direct or indirect people problems; and in the long-run facilities management will not solve people problems. The answer lies in the increased support by the EDP industry of EDP instruction in colleges, universities, and elsewhere and in the creation of professionally regulated trade schools for training competent entry level employees. Concurrent with this academic support, organizations such as DPMA and ACM should face their responsibilities to society and seek to lay down certain professional guidelines for the information practitioner to adhere to in his day-to-day activities. In this way the field of data processing can alleviate these people problems and raise itself to the level of a true profession. □

"SYSTEMS TEST" — COMMENT

I. From Mrs. P. L. Nichols,
Project Supervisor, Computer Services Division
Ontario Hydro
620 University Ave.
Toronto, Ont., Canada

The article entitled "Systems Test" in the September issue of Computers and Automation is an insult to the intelligence of your readers. I have been in the computer business for over eight years, and I have never yet seen a computer system installed without going through a comprehensive "system test" encompassing those activities outlined in this article. One can't help but conclude that the author has had very little experience in implementing computer systems.

II. From the Editor

We just do not believe that all of our 120,000 readers (estimated according to our last readership study, to be over 8 times the number of our subscribers, 15,000) are in the fortunate condition of Mrs. Nichols: finding that all of the computer systems they have been concerned with are installed in the thorough way described in the article entitled "Systems Test". According to a famous study by McKinsey and Co., about two thirds of all computer installations have fallen considerably short of maximum usefulness to their organizations.

Besides, there are always newer people entering any field, and they need tutorial articles; they need definitions, explanations, illustrations, on a simpler level than suits the experts. Articles to suit them are also needed in *Computers and Automation,* and in other magazines.

Finally, no reader of our magazine is ever required to have his intelligence insulted — all he has to do is to skip that article! □

SOME VIEWS ABOUT "COMPUTERS AND AUTOMATION"

I. J. F. Thibault, Owner
Seeda Co.
903 Jefferson Road South
Rockledge, Florida 32955

Upon receipt of your current issue, I feel your concern over the demise of Robert F. Kennedy is for naught, in my opinion; therefore, I won't accept any future issues.

You call yourselves "The magazine of the design, applications, and implications of information processing systems" – take your quote more seriously!!!

II. Donald Kaye, President
Columbia Employment Agency
342 Madison Ave.
New York, N.Y.

I have been reading your magazine for many years and am pleased to tell you that I think it is the most thoughtful, mature and alert publication in the field.

As for your editorials, each one is a gem. I think they all ought to be put together in book form and published.

III. Carl F. R. Weiman
Department of Computer and Information Science
The Ohio State University
2024 Neil Ave.
Columbus, Ohio 43210

Thank you for the July issue of *Computers and Automation*. I am really impressed with the depth, breadth, and polish of your publication. A refreshing change from the company trash that [computer company, name omitted by editor] puts out. The social impacts of the computer field which are virtually ignored by other journals are handled intelligently, without impairing the other departments. I would like to accept your suggestion that I subscribe. Enclosed is a check for $18.50. Could you start with the August issue? Enclosed is a letter to Richard Sprague, also for your reading. Could you send it on to him? Meanwhile, best of luck in continuing a fine job, and I shall be looking forward to receiving *Computers and Automation*.

IV. Foster Morrison
Box 2012
Rockville, Md. 20852

The August 1970 issue of C & A was another sorry example of a technical publication being used for a political forum, or worse yet, for propaganda. Soviet publications are satisfied with a hackneyed cliche about the wonderfulness of it all – their "system", stuck in at the end of the introductory paragraph.

But only in your publication have we had unveiled the new paranoia of the Left ("racism killed Kennedy"), which even outdoes the paranoia of the Right ("communism killed Kennedy"). I guess this is just a prelude to the paranoia of the Middle, which has always been good at showing the "extremes" what violence is all about.

All your magazine is doing is contributing to our present condition of having everybody in politics, nobody working, and still no decent leadership on any level of any endeavor.

V. Donald B. Janes
SP7, U.S. Army
Hdqtrs, 3rd U.S. Army (WOGZAA)
Ft. McPherson, Ga. 30330

I respectfully request that my address be changed from its present one in Vietnam to where I am finally going after completion of this tour of duty.

I wish to take this time to express my gratitude towards your magazine as it has enabled me to keep abreast of developments in both hardware and data processing philosophy that have occurred since I departed the United States. Your magazine was read by the entire department, and was the basis of many discussions of the various disciplines of the computer field.

VI. Jonathan E. Adler
121 Museum St.
Somerville, Mass. 02143

Your editorial "The House is on Fire", in the February, 1970 issue, was particularly interesting. It hinted at a fallacy of equivocation often made by social scientists. By using the term objectivity as synonymous with neutrality, the scientist hopes to remove himself from the consequences of his experiments.

But since we are moral human beings, we are duty bound to examine the implications of our work, and we must take responsibility for its application. Your editorial, I believe, rightly emphasized the dangers of moral myopia. □

Announcement regarding
THE 1970 COMPUTER DIRECTORY AND BUYERS GUIDE
the midyear Issue of "Computers and Automation" being published this year jointly with the New York Times:

A portion of the directory is being typeset by computer: the Roster of Organizations, the Roster of Products and Services (the Buyers' Guide) and the six geographic rosters. Because of these changes in the production process, the directory this year will be published late. The expected publication date is now December.

We deeply regret the lateness.

We shall make sure that the same causes will not operate next year; and we plan and intend that the 1971 Computer Directory will be published at "midyear."

Edmund C. Berkeley
Editor
Computers and Automation

THE STANDARD POINT LOCATION CODE

Office of Technical Information
National Bureau of Standards
Washington, D.C. 20234
Center for Computer Sciences and Technology

The Board of Directors of the Transportation Data Coordinating Committee (TDCC) has endorsed the adoption and use of a Standard Point Location Code (SPLC) and has recommended that it become the uniform geographic point identification code throughout the transportation and distribution community.

The Standard Point Location Code was developed as a joint project of the American Trucking Association and the Association of American Railroads with the assistance of the Transportation Division, Bureau of the Census. The first version of the SPLC appeared in 1966 and was revised to the current version in 1968. The SPLC also appears in the Freight Station Accounting Directory of the Association of American Railroads; and beginning on April 24, 1970, the SPLC has appeared in the computerized National Rate Basis Tariff. To date, more than 350 major manufacturers and transportation carriers (meaning railroads, truckers, airlines, and inland waterways) have subscribed to and are using the SPLC. Within the next year the standard is expected to be fully implemented by the transportation community.

The definition criteria for the inclusion of a point in the SPLC list is that it be any named political subdivision of the United States, Canada, or Mexico, or any recognized named traffic location used by the transportation community. The Transportation Data Coordination Committee acts as a central coordinator for the assignment of codes to new points and also maintains the SPLC from the standpoint of validity and currency.

The SPLC is a six-digit code composed of three sets of paired numbers. The United States is divided into regions numbered "1" on the East Coast, to "8" on the West; "0" is reserved for Canada and "9" for Mexico. Each region is further subdivided into States, or parts of States. In turn, the States are divided into county units. The SPLC code yields region and state identification, county identification, and a particular point within the county. The first two digits (high order) of the code identify a State, a State section, or a territory. The third and fourth digits identify a county (or its equivalent) or section thereof. The fifth and sixth digits identify a point. Each county or portion of a county is capable of being divided into as many as 100 points.

Over 100,000 points have been identified and coded. This number, compared to other coding schemes, is by far the most complete in its coverage. The ZIP Code used by the Post Office Department to identify post offices includes some 40,000 entities; and the list developed by the General Services Administration for use in accounting systems for Federal property contains some 20,000 places.

Recently, files have been constructed that associate longitude and latitude for the places identified in the SPLC. These files are used to determine airline distances between points and for other statistical purposes.

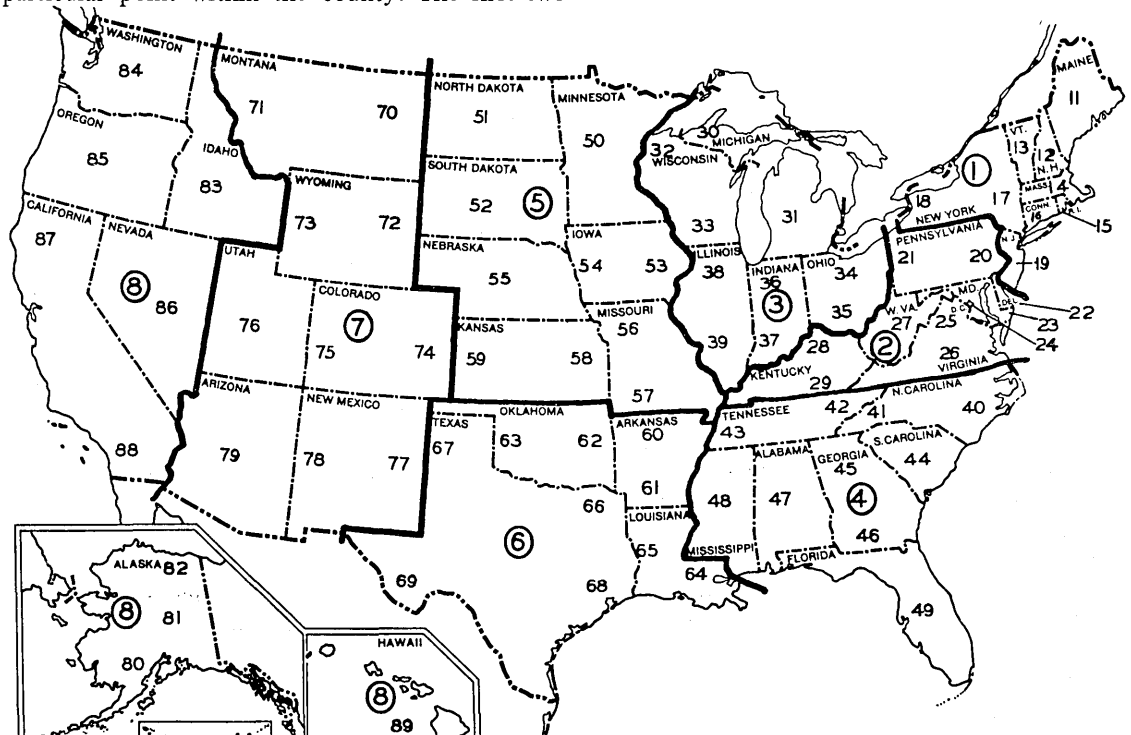
Copies of the Standard Point Location Code books and also magnetic tapes that include SPLC information are available from the National Motor Freight Traffic Association, Tariff Research Section, 1616 P Street, NW, Washington, D. C. 20036. The Code book, which lists the places alphabetically by State (see Table 1), is available for $25. Reduced rates are in effect for additional copies when ordered in multiples. The magnetic tape, which is 7-track, binary coded decimal, 556 bits per inch, is available for $50. The tapes are loaned to the subscriber and are returned to the National Motor Freight Traffic Association after they have been duplicated. □

Table 1

STANDARD POINT LOCATION CODE

-- SAMPLE -- MARYLAND

Point	County	SPLC
Jasontown	Carroll	2327 19
Jefferson	Frederick	2333 85
Jefferson Heights	Washington	2334 67
Jenkins	Baltimore	2321 89
Jennings	Garrett	2338 22
Jerusalem	Harford	2315 49
Jessup (Jessups)	Howard	2363 89



THE LITTLE RED SCHOOL HOUSE AND THE BIG BLACK BOX

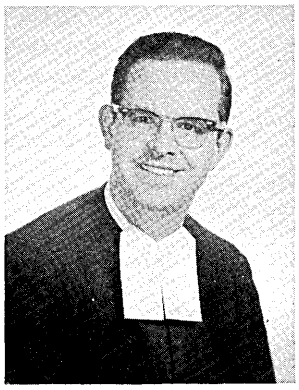
Brother Austin David, FSC
Archdiocese of New York
650 Grand Concourse
Bronx, N.Y. 10451

"Many of the problems of our society could be answered through education, but we seem to have a great deal of difficulty mastering our own power and potential."

As each day passes by, some new and ingenious piece of technology is developed which in some way influences the pattern of man's life on earth. Many of these technological developments add to man's growth, but others inhibit and destroy that growth. The trick for man is to see to it that the technology serves to improve man rather than to destroy him.

A Noticeable Impact

For many centuries now, our educational process has remained quite constant with the teacher-pupil relationship well defined. But as one reads through the educational journals today, one sees that even in the staid and traditional structure of education, technology is beginning to appear. For some educators this is a traumatic experience; for others it is the natural progression caused by man's development. Whichever camp the educator finds himself in, there is little question that technology is beginning to have a noticeable impact on education. With all of the technology available and with its very clear impact on the learning process, the educator asks the obvious question: "How can these tools be integrated into the educational structure?"



Brother Austin David is the Director of Educational Data Systems for the Archdiocese of New York. For the past twelve years, he has been a teacher and administrator in various school systems. He holds an M.A.T. degree in Physics from Brown University, and is presently a Ph.D. candidate in Physics Education at New York University.

Brother David is president of the newly formed society, SAPE (Society for Automation in Professional Education), and was elected "Data Educator of 1969" by the Society of Data Educators. He is also a member of the American Association for the Advancement of Science, the National Science Teachers Association, and the Association of Educational Data Systems.

A Home Calculator

In 1966, the Catholic Schools in the Diocese of Brooklyn, with technical assistance from the International Business Machines Corporation, planned a study that would test the use of the computer as a calculator in a student's home. The push-buttons on the touch-tone telephone[1] were used by the student to communicate with a computer. Responses from the computer came over the telephone from a voice response unit that was under the control of the computer. Through simple coding techniques the telephone's twelve pushbuttons were used to add, subtract, multiply, divide and extract square roots. The student would use the buttons of the telephone much as the buttons on a calculator, but the answer, instead of being printed on a paper tape, came in voice form over the telephone. Words, stored on voice tracks of the voice response unit, were assembled by the computer and sent over the telephone to the student in his home.

Voice Response Found Acceptable

Besides the answers to the problems entered by the student, the computer voice response system also carried

[1] Registered trademark of the Bell System.

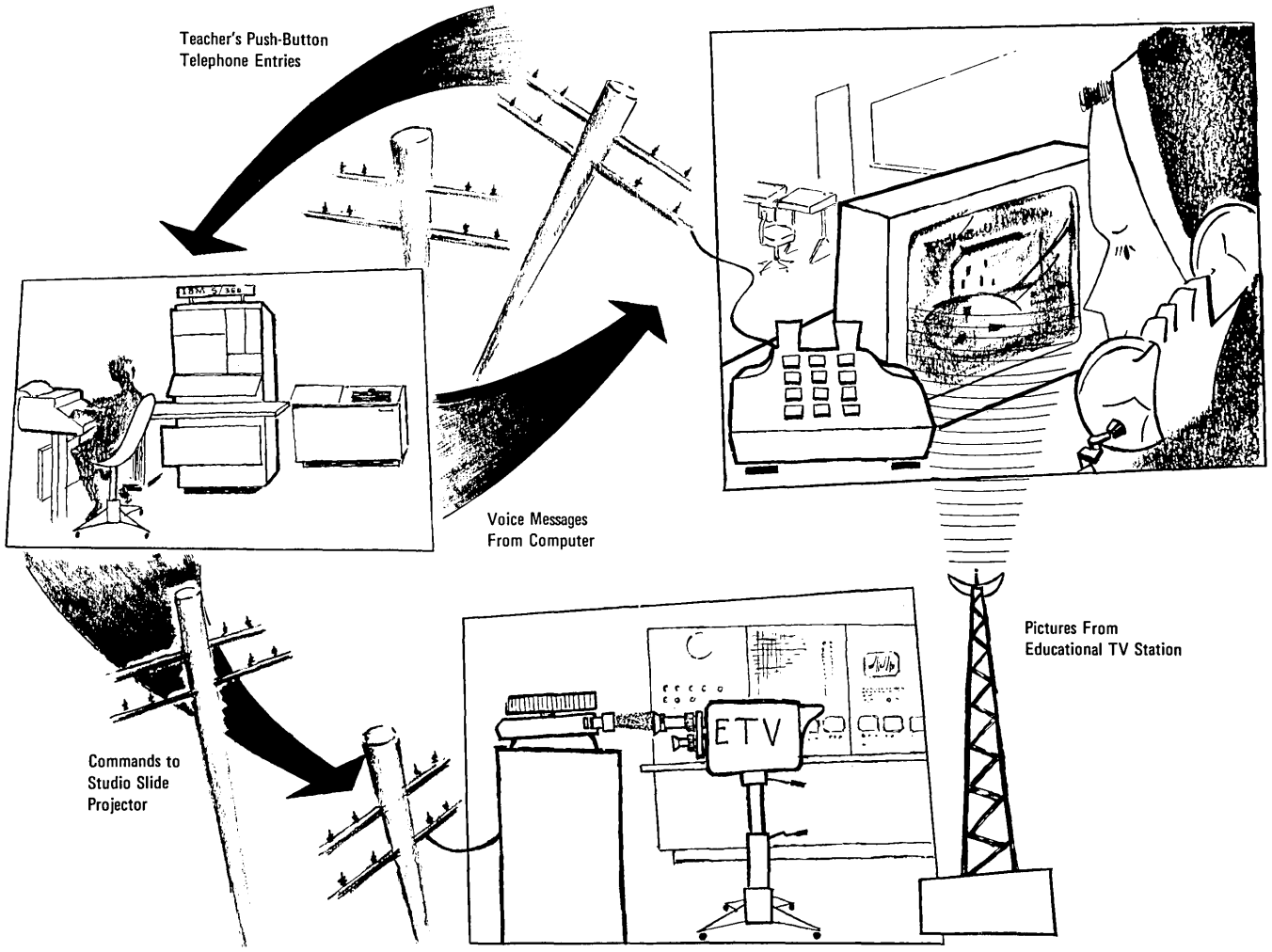


Figure 1. The Flow of Information

This schematic drawing illustrates the flow of audio and audio-video information in the educational television experiment conducted by the Catholic Schools of the Diocese of Brooklyn with the technical assistance of IBM Corp.

instructional messages that would be given to a student if the student attempted to perform an invalid mathematical operation (e.g., two decimal points in a number, division by zero, etc.). As a result of this study, it was found that the pushbuttons of the telephone provided an excellent tool for student control over the computer system. It was also found that many of the parents, brothers, sisters, and friends of the six students in the study learned to use the calculator, and that the voice response from a computer was an acceptable form of response for the users of the system.[2]

The photo on the front cover of this issue shows the type of terminal used in the student's home, and shows very clearly the simplicity and convenience of this configuration. The acceptability of computer-controlled voice response in the home was clearly shown by the reactions of those who participated in the study. Also, the fact that it was quite easy to learn to use the touch-tone telephone as a terminal to control a remotely located computer, pointed quite clearly to the possibility of using this type of equipment in a more extensive educational environment.

[2] Brother Austin David, "Homework Goes on Line", *Business Automation*, Automation Educator, January, 1967.

Adding Visuals

If the computer could be used to control a voice response unit, then it seemed quite possible it could also be used to control visuals that could be displayed on the student's television set. It should be pointed out here that the Catholic Schools of the Diocese of Brooklyn have four channels of 2500 MHz closed circuit instructional television, and those in charge were quite interested in determining ways that would lead to optimal and effective use of this ITV system. Therefore it was only logical for such a question to arise. After a good deal of discussion with school authorities and the technical staff of the ITV center and IBM engineers, it was decided that it would be possible to use the computer to link together the closed circuit ITV and voice response via telephone lines.

Teaching Teachers

With the basic technical problems defined and the solutions identified, plans for the educational experiment were made. It was decided that we would use the telephone ITV computer system to instruct teachers about computers.

To do this the educational and testing materials were developed by the author and Dr. Richard E. Granda, IBM staff psychologist. The course developed was entitled "The World of Computers". It consisted of eight half-hour telecasts to be viewed by those participating in the experiment. An additional two hours of instructional material was prepared for each telecast to be stored in the voice response units of the computer system. This material was used by the teacher to learn more about the topics covered in the basic telecasts.

The "Experimenters"

The best way to understand what was attempted in the experiment is to review the steps involved in the procedure of implementation. In September 1967, 119 teachers were selected from volunteers, and these were divided into seven groups of seventeen. There were 90 religious teachers and 29 lay teachers; 88 being females and 31 being males; 77 were Religious Sisters and 13 were Religious Brothers. The groups were comparable in terms of age, teaching experience and educational background, with a very large spectrum of major subjects represented. The average age of participants was 38.8 years, with a range from 22 to 74 years. Grade levels taught were K through college. The average classroom experience was 15 years, with a range from 1 to 52 years. All participants in the experiment were pretested for their knowledge of computers. A seventy-eight item multiple choice test was administered to determine this.

"It was found that many of the parents, brothers, sisters, and friends of the six students in the study learned to use the calculator."

How Groups Were Divided

For the sake of convenience, we will refer to those participants who used the computer in the additional learning phase as the "on line" groups. Those who participated in the experiment but did not use the computer were in the "off line" groups. First let us review the participation of the four "on line" groups. These will be referred to as A, B, C, and D. Members of these groups viewed a weekly telecast in the series "The World of Computers". These telecasts were broadcast every half-hour, five times an evening, Monday through Thursday. After the teacher participating in the experiment viewed the telecast, he would then place a telephone call to the computer located 50 miles north of New York City in Yorktown Heights.

Procedure for Group A

Each participant used the computer in one of four ways, depending on the experimental group of which he was a member. Those in group A called the computer, entered their identification number on the keyboard of the telephone and then were asked fifteen or so multiple choice questions by the computer about the telecast just viewed. The correctness or incorrectness of their response was indicated by the voice response unit of the computer system. At the end of the test phase, the computer reviewed the incorrect responses and indicated the address of those messages that contained additional information about the items incorrectly answered.

"With the use of a special 'keyed buffer', many viewers at different locations could receive different slides that could be mated to appropriate voice messages which came over the telephone."

In the next phase, the teacher was free to search through the additional instructional material stored in the voice response system for a period of 20 minutes. Following this, the computer again tested the teacher to determine if there was any improvement in the pretest score after additional information was given by the computer voice response system. All responses of the teacher consisted of pushing the buttons on the telephone keyboard and the computer responded by transmitting voice answers over the telephone. The voice messages were anywhere from ½ minute to 2¾ minutes in length, and were stored as entire sentences or paragraphs in the voice response units. This is in contrast to most common voice response units, which store single words. Each message was identified in an outline by a three digit code and each message ended with suggestions for further detailed information about the topic or with the address of information related to the topic. (See Figure 1.)

Procedure for Group B

Participants in group B did exactly as those in group A. They viewed the telecast, were tested by the computer, spent 20 minutes searching through the additional materials, and were retested by the computer. The only exception was that in the additional learning phase the computer not only gave information over the telephone but it also displayed, on TV, selected slides stored in the ITV studies in downtown Brooklyn. These slides were coordinated with the voice messages and there could be several slides associated with a given voice message. These would automatically be selected by the computer to appear on the TV set of the teacher.

Thus, the participants in group B received voice messages over the telephone, which were reinforced by visuals coming over closed circuit ITV. In order to demonstrate that a single TV channel could serve several users simultaneously with different slide visuals, IBM engineers built a special device called a "keyed buffer". This device recorded the picture that was broadcast for only a fraction of a second and held this picture on the viewer's screen after the transmitter had stopped sending the picture signal. Viewers watching the same channel without the "keyed buffer" only saw the picture flash on and off the screen. A musical tone was broadcast along with the slide indicated to the "keyed buffer" that the picture was to be held on the TV set until a new picture was transmitted.

"At the end of the test phase, the computer reviewed the incorrect responses and indicated the address of those messages that contained additional information about the items incorrectly answered."

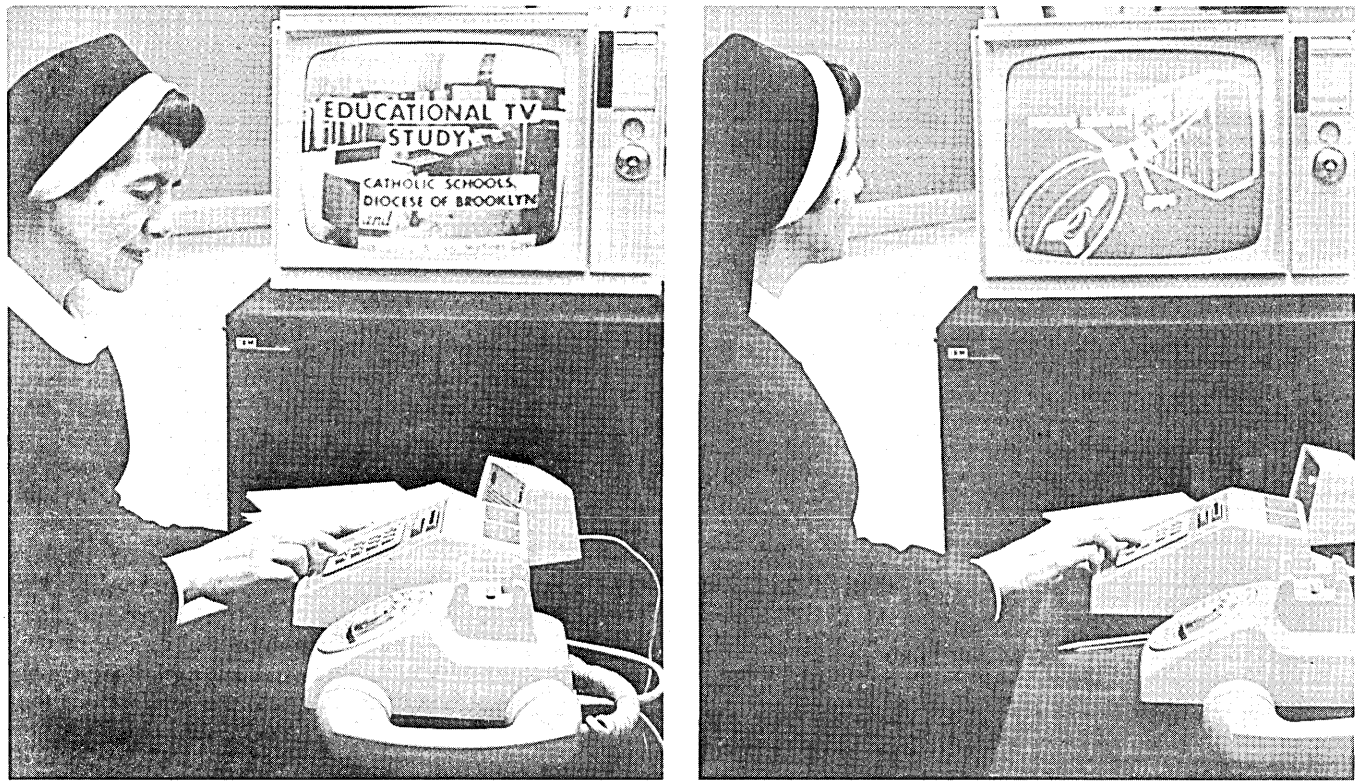


Figure 2. The Teacher Terminal

Sister Mary Rosaire is shown at the terminal used by the teachers in the experiment. At the left, she has just finished watching a lecture and requests further information from the system by pressing keys on her push-button telephone. The computer then sends back the proper recorded voice-message in response to the query. It also automatically selects a related still picture stored in a slide projector in nearby Brooklyn. The picture is then transmitted and appears on her television set while she listens to the corresponding voice-message over her speaker-telephone.

With such a device many viewers at different locations could receive different slides that could be mated to appropriate voice messages which came over the telephone. Thus the teachers in this group moved through the additional learning phase receiving voice messages over the telephone and pictures over the closed circuit TV.

Procedure for Group C

Participants in group C viewed the telecasts as those above, but they were not tested by the computer. They proceeded directly to the additional learning phase and were not tested at the conclusion of this phase either. They were free to search through the material in any fashion they chose. The computer response for this group was voice only via the telephone. The purpose of this group was to determine what effect testing by the computer would have on the search pattern of the teachers, as they moved through the additional information stored in the voice response unit of the computer system.

Procedure for Group D

Finally, in group D, the last of the "on line" groups, the teachers viewed the telecast and called the computer to be tested. However, after the test they did not go into the additional learning phase. Rather, they worked on a preselected crossword puzzle for 20 minutes and then called the computer to be retested in the same manner as groups A and B. This "placebo" task of filling out the crossword puzzle replaced the additional learning phase. The "placebo" is a task unrelated to the experiment but given to the participant to cause him to believe he is participating in an experimental procedure. It should be noted here that the computer was communicating with four teachers at the same time about different topics, since at any one time there was a member of each experimental group using the computer in the post-telecast phase.

The "Off Line" Participants

For the "off line" participants there were three groups. Group E viewed the main telecast and answered questions

Table 1
GROUPS AND THEIR PARTICIPATION

	EXPERIMENTAL GROUPS		*CONTROL GROUPS*				
TREATMENT	A	B	C	D	E	F	G
Experiment Pre-Test	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telecast	Yes	Yes	Yes	Yes	Yes	Yes	No
Test Computer Questions	Yes	Yes	No	Yes	No**	No	No
Additional Computer Material	Voice only	Voice and picture	Voice only	No	No	No	No
Retest Computer Questions	Yes	Yes	No	Yes	No	No	No
Experiment Post-Test	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***Pencil and Paper test taken by members of this group*

on a pencil and paper type test that was mailed to a central location. Group F simply watched the lessons on television and did not take the pencil and paper test. Finally, members of group G did not watch the TV lessons or participate in any learning phases of the experiment. They were our control group. Whatever they learned about computers during the course of the experiment was due to the exposure to ordinary background learning via reading, conversation, TV, etc. Table 1 summarizes the various experimental groups and techniques employed.

Activity of "On Line" Teachers

It should be pointed that the teacher in the "on line" group was not passive during the additional learning phase of the experiment. This was an interactive system wherein the teacher could use the buttons of the telephone to interrupt any message from the computer. Similarly, there were codes to make the computer repeat entire messages or parts of a message, or if the teacher chose, he could move on to a new topic if such was desirable. Also, if a teacher entered a wrong code and then realized the error, there was a special three digit code to cancel and correct that error. Invalid entries were automatically detected by the computer and a special message from the computer indicated the nature of the problem.

Thus, with a computer controlling a voice response unit a TV broadcast facility, the teacher sitting in the convenience of his home could follow a course about computers. Figure 2 shows the equipment configuration of the teacher terminal. Essentially then, if one can operate a telephone and a TV set, one can have an instructional tool of tremendous potential in his own living room.

At this point, we will look at what was done, and what the reactions of the teachers were to this educational tool. Also we will look at some items that should be of prime consideration for those looking to employ technology in the educational environment.

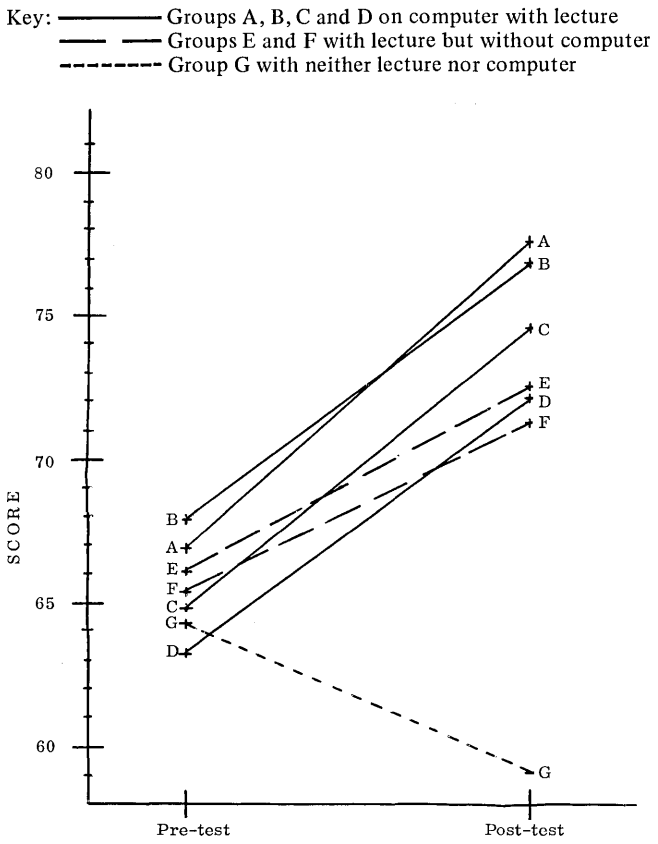
Test Scores

Table 2 is a graphic representation of the scores of the experiment pre-test and post-test. In general it can be seen that the greatest improvement was experienced by the "on line" groups (A, B, C and D). Members of groups E and F improved but not to the extent of those members of the "on line" groups. Finally, participants in group G showed a drop in score over the period of the experiment.

"Essentially, if one can operate a telephone and a TV set, one can have an instructional tool of tremendous potential in his own living room."

These tests indicated that there was long term learning as a result of using the computer-controlled system. Also, test and re-test results indicated that short term learning took place after each "learning experience", i.e., telecast, test, additional material and retest. Of course, further study would have to be made to determine how effective this sytem is as opposed to more the traditional instructional

Table 2
DIFFERENCE BETWEEN PRE-TEST AND POST-TEST GROUPS



methods, as well as other technological systems. This brings us to what is a very critical aspect of technology used for instruction.

Limitations of the Computer

Too often terms like "Computer-Assisted Instruction", "Computer Based Learning", etc. are coined and then used rather recklessly in such a way that the uninitiated get the very false impression that the computer will replace teachers or that it actually is teaching. This is misleading. The computer system is an information retrieval system that has the capability of storing and processing information. Quite honestly, a very large portion of what a teacher does in class is to give information and relate ideas and concepts (information packages). It is obviously within the capability of the available computer hardware as it exists today to perform such information processing tasks.

However, we cannot be misguided into claiming more for the computer than it can do, nor should we be misled into trying to have it mimic the teacher. We must rather use the computer within constraints of normal equipment availability and convenience. It is easier to teach a human to use a numeric code to identify an item or respond to an

"It was clear that the teachers were more than willing to recommend the use of technology as long as it did not interfere with their own classroom procedures."

inquiry from the computer, than to program the computer to accept an English language response from a human.

Teacher Reaction

The teachers participating in the experiment found that the system was very easy to use and that it had excellent potential in the educational environment. However, it was interesting to note that even though most of the teachers in the experiment felt that this would be ideal as a tool for independent study, library type research, homework assignments, etc., only 75% of the teachers felt that this technology could actually be used in the classroom.

Here again, we come up with a point that deserves some attention in future research employing technology. From the above reaction it is clear that the teachers were more than willing to recommend the use of technology as long as it did not interfere with their own classroom procedures. This was due to the fact that the technology was extraneous to their own learning experience, and thus did not fit into the pattern of their own classroom routine. If the technology were part of the teachers own learning experience then the teachers would make use of the technology in their teaching. The average teacher will teach the way he is taught. Hence, it appears that college and university education departments will need to establish computer technology as part of their teacher training before that technology will be widely used by teachers in their classrooms.

Defining Education

Also we have to be very cautious in this area. A machine can be programmed to do a job only if the job has been very clearly defined and well delineated. In education, we have a very ill-defined task which has perhaps as many definitions as there are practitioners, and this of course, is as it should be in a free society. This is why any use of technology has to face this definition problem head on, and realize that as long as the technology does its job presenting and processing information, it is going a long way towards assisting the teachers in the ultimate task of teaching. Perhaps, it may never be able to go any farther.

Any system that will ultimately be useful will be one which is convenient and inexpensive, and incorporates familiar and humanly acceptable media. Our experiment was an attempt to see if the everyday media of telephone and television could be linked together as a tool of education. It is very important to note that existing technology was capable of implementing such an instructional system. As one hears so much about the successes of "Sesame Street" with pre-school children and the success of advertising campaigns and the success of politicians with good TV images, one becomes acutely aware of the tremendous potential of the TV medium for conveying information and assisting in the processes of education.

Future Educational Systems

Perhaps tomorrow's home might have an education room that will allow the whole family to pursue those educational topics and fields that are of interest to them, or perhaps are needed for retraining, in the case of adults. Today's technology could easily bring it about before 1980. However, for all of its conceptual and technological simplicity, it is a staggeringly difficult choice for our society to make. Whether or not this is a better way to educate must be tested.

And if it is, then what is the best use of technology in education? The way to find the answer seems quite easy. Experiments with traditional and modern techniques can be used to determine what guidelines are critical for indicating the results which are to be expected from the educational process. But this is far more difficult than it appears. Quite logically, one would expect that there will be no one best method for using technology, but rather a combination of methods that will make up the optimal educational strategy. The greater question is: Will society see fit to spend the money and energy needed?

"... it is confusing to see how we are so little concerned by what goes into the minds of our children."

It is confusing to see how we are so little concerned by what goes into the minds of our children, while so much energy goes into the development of status symbols and lavish consumption. Many of the problems of our society could be answered through education, but we seem to have a great deal of difficulty mastering our own power and potential.

A Challenge for Man

Computers for use in education are as accessible as the nearest TV and telephone. Such a convenient tool makes education easily available to a very wide group of users. It has the potential to communicate information to enlighten man and improve society. The critical question is:

> Will we use such systems to improve mankind, or will we blunder on carelessly until the brilliance of our technological achievements eventually blinds us?

Although we know what answer we would like to have, no one of us can really predict what the final outcome will be.

Summary

In summary then, let us point out that we were able in our research to bring educational materials into the home to instruct. The entire TV-computer-telephone complex was under the complete control of the user. Informational paths through the educational material could be direct (made by computer based on user response) or non-direct (determined by the user).

Essentially, the system was developed to use modern communications media to give out and relate information in the educational process. Our statistical results indicate that the system did this. Whether or not this is the best use of such media must be further tested and examined. The most salient fact to be recognized is that we have available today all the tools needed to test this hypothesis. The question as to when we will be able to get the necessary funds and resources to pursue this path is a big one. There appear to be too many other uses for these media that take precedence over the use of such media for the enlightenment and education of the human mind. To date, it is obviously still more important to know how many extra horsepower a new car has than to know the results of our yearly slaughter on our highways. □

AUTOMATIC DATA PROCESSING IN THE DEPARTMENT OF DEFENSE

Gilbert W. Fitzhugh, and 15 more authors
Blue Ribbon Defense Panel, 1969-70
Department of Defense
Washington, D.C.

"The challenge which the Department of Defense continues to face is that of design and development of standard, Department-wide, ADP systems."

In July, 1970, a committee of distinguished Americans called the Blue Ribbon Defense Panel, which had been appointed by President Richard M. Nixon a year previously, published its report to the President and to the Secretary of Defense. This report gave an account of the studies that the committee had made of the Department of Defense, and expressed a number of important recommendations.

Following is the section of the report dealing with Automatic Data Processing. This section, like other sections, contains many interesting and important ideas, and is certain to have a significant impact on thinking and planning about automatic data processing not only in the Defense Department.

During the past decade the use of computers has expanded at an explosive rate. The computer has become a part of almost every facet of business and industrial life and its effectiveness has been universally accepted. Technological developments during this decade include time sharing, remote job entry,[1] storage allocation and data protection,[2] and high speed digital data transmission.

During the next decade, computer systems will undoubtedly continue to develop at a rapid rate. It is anticipated that the larger computer systems in 1980 will have as much as 100 times the capacity of the largest system today, and that the medium-scale computer, which is the backbone of the Defense Department's system today, will be substantially replaced by a combination of the new, larger computers and small, desk-type computers.

Another major change will result from telecommunications between computer and computer users. Indications are that most computers will be on-line with teleprocessing capability by 1980. At the present time, the majority of the Department's computers cannot be used in this mode.

The recent trend of unbundling[3] will affect the acquisition of automatic data processing (ADP) equipment as each

The Panel

Members of the Blue Ribbon Defense Panel

Gilbert W. Fitzhugh, Chairman
Dr. Martha E. Peterson
Mrs. Leona P. Thurman
William Blackie
George Champion
William P. Clements, Jr.
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Lewis F. Powell, Jr.
Dr. George J. Stigler
Claude Young

part of an ADP system will be available separately.

Another trend which will affect the acquisition of ADP equipment is that of the rising software cost. The present systems have about equal investments in hardware and software. By 1980, however, the software cost could be many times the hardware cost.

The Defense Department currently has approximately 2,800 computers (1,200 owned by the Department, the others leased) which are used for general purpose data processing. Thirty-six percent of these are considered to be incapable of performing efficiently by current standards. This inventory consists predominantly of small and medium-size computers with only 113 large second or third generation systems. In addition, it should be noted that a large number of computers are used to considerably less than their capacity.[4]

The majority of management attention, with respect to ADP in the Department of Defense, is directed toward justification, selection and acquisition of computers. Once the equipment has been acquired, the management of the computers is by the Department's component where the computer is installed.

The challenge which the Department continues to face is that of design and development of standard Department-wide ADP systems. The history of ADP development clearly shows the need for and benefit of, progressive standardization, at least for compatibility. Standard systems were first introduced at the Command level, and were followed by the development of Service-wide systems. Today's primary challenge is at the Department of Defense level.

For example, at the present time, the Army is developing a system which encompasses the Army Logistics Command function. The Air Force is currently working on an Advanced Logistics System, which performs the same functions as the Army system. The Navy is planning a redesign and updating of their Uniform Automatic Data Processing System, which supports their key logistics functions. Many of the modules of these systems perform almost identical functions, such as warehousing, shipping and receiving, inventory control, etc. Software programming for each of these is costly and each independent modernization step taken on the many separate programs involves unnecessary duplication and appears to lock in more tightly the incompatibilities of the various systems. This same observation applies to other functional areas, such as personnel management systems and base level management.

Recommendations

Recommendation V-4: The responsibility for defense automatic data processing should be under the staff supervision of the Assistant Secretary of Defense (Telecommunications). The Assistant Secretary of Defense (Telecommunications) should: (a) take the necessary steps to enable the Department to develop an in-house capability for ADP hardware systems and software systems design needed for proper management; (b) review proposed ADP activities and monitor and evaluate on-going activities with respect to effectiveness of the utilization of resources; (c) test, through model programs, the feasibility of computer services/centers which could standardize and centralize the ADP system by functions (such as the major Commands) and/or geographically, with the intent of determining both short-and-long-range ADP capability objectives; and (d) develop a training program for ADP specialists and a career plan for ADP personnel.

Recommendation V-5: The procedures governing the justification and selection of computers should be revised to require a statement of ADP equipment capability as opposed to specification of intended application of the equipment.

Hardware and Software System Design Capability

The Department is almost completely dependent on hardware manufacturers for systems design[5,6,7] for hardware and software. Those individuals within the Department who are competent in systems design are scattered among the various components of the Department and their efforts are directed primarily to other activities such as development of application programs or information systems. The lack of in-house systems design capability necessitates placing a substantial load of systems design work on potential vendors as a condition of responding to Requests for Proposals. This condition has a tendency to limit responses to the larger suppliers, and, even within this group, to those suppliers who assess their competitive position as being very high. The net effect inhibits competition for hardware procurements.

The lack of an in-house capability for hardware systems design deprives the Department of the potential for improved efficiency and lower costs to be obtained from selection among separately priced elements of a computer system available from commercial suppliers, including independent peripheral manufacturers. This lack of capability also prevents the Department from promoting a higher degree of separate pricing and increased competition through the development by manufacturers of hardware elements with a broader interface capability. The potential losses from this lack of in-house capability will increase as the unbundling trend in the private sector continues. It is becoming increasingly important for the Department to have a capability to develop interface standards. In the continued absence of such a capability, the Department will be unable to keep its ADP policy sufficiently flexible to anticipate and take advantage of continuing changes in the ADP field.

There is no significant software systems design capability in the Department. Such capability as exists is widely dispersed and focused on narrow spectrums, usually tied to specific applications. As a consequence, no effective mechanism exists for development of more flexible languages, compilers, executive monitors, data storage and retrieval software, operating systems, translators and liberation programs, etc. Current practice makes the Department highly dependent on hardware manufacturers for design of systems software. The manufacturers have no incentive to provide increased flexibility to the Department which might increase the Department's independence of the supplier's particular machine and increase Department-wide compatibility of ADP programs.

Justification and Selection of ADP Equipment

The justification and selection of computers by the

Department of Defense is controlled by procedures intended to assure that the computer is used for beneficial applications, and that the selection process provides the necessary capability at the lowest cost and promotes competition between vendors. The Assistant Secretary of Defense (Comptroller) and each of the Military Departments has prepared documents which establish these procedures.

Systems specifications basically consist of detailed information concerning the application which the computer will perform. This description can be as large as several thousand pages and includes each input-output and file description, estimates of the number of instructions in each program or sub-routine, the frequency of use of each sub-routine or program, the number of characters in each record, and the number of records in each file. The file descriptions also include whether the character is alpha numeric or numeric only.

If the computer is used for a new application, the effort required to complete the selection documents can be as large as the effort required to actually prepare the programs. The cost of this work is approximately the same as the actual cost of the equipment.

In addition to the descriptions of the inputs, outputs, and files, flow diagrams are required for each program or sub-routine. The descriptions are also used to determine whether a computer application should be approved. This system has not worked effectively and its use causes delays of two-to-three years in the procurement of the computer. In the past, the Department has even attempted to use this same procedure to obtain equipment to be used for research and development centers.

These descriptions are sent to the computer manufacturers and they then propose to provide equipment which will perform the work described and the Department often buys the lowest priced proposed system.

A major difficulty involved in the justification and selection process is the time required to complete the process and the difficulty of predicting the workload with sufficient accuracy to select the ADP system which most adequately meets the requirements over the life span of the equipment. The vast majority of estimates are lower than the actual workload by the time the system is operational, and this causes the system to be too small to perform all the required functions.

Perhaps the most serious flaw is that all this work is done to determine the best computer system for one particular process. If a broader approach were taken, an entirely different computer system might be able to accomplish that process and many others also on a more efficient basis at no increase in cost.

In many cases, the selection is made by personnel who have no first-hand knowledge of the workload, but depend entirely on the description of the applications.

This process has caused the Department some difficulties in the past, and in several cases the computer equipment selected by this process has been too small to carry the workload for even the first year. There is general agreement among Department personnel that the procedures are too complex and time consuming, and limit competition between vendors.

In an attempt to reduce the problems inherent in these system specifications, the Department, at times, has used other means of computer selection. The primary alternative has been the use of the benchmark. A benchmark is a typical computer workload, either selected from the present computer workload or generated from a knowledge of the type of work the new computer will perform. These benchmarks require less time and effort than the system specifications to prepare, but they also require substantial investments by potential vendors for programming, debugging, and machine time for running these benchmarks. Difficulties result from the failure of most benchmarks to truly represent the actual computer workload. The same problems of estimating the workload during the system life exist for this method as exist for the system specifications approach. In general, forecasting the future is difficult and most likely incorrect, and computer workload forecasts are no exception.

The elapsed time between the preparation of the first documentation describing a computer requirement and the installation of the equipment varies between a minimum of two years and a maximum of six or more years. This time is used in the preparation of the justification documents, the system specifications, soliciting bids from vendors, evaluating proposals from vendors, and obtaining equipment. Often it is necessary to repeat one or more of these steps.

The computer workload is a dynamic and changing requirement and often by the time the computer has been installed, the workload is much larger and significantly different from the one anticipated at the time the computer procurement began. The time required to change the documentation is almost as long as the initial preparation. Therefore, often the requirement is not updated during the procurement cycle and the system effectiveness may not be as high as it could have been. If the Department is to have effective and efficient computer support of its missions, the time delays in obtaining computer support must be greatly reduced.

The current procedures result in major inefficiencies within the Department. The long delay times in obtaining new or replacement equipment result in equipment being kept long beyond its useful life. The determination of useful life should be based on the cost of performing work on the equipment, not on the age of the equipment.

Another major effect of the present procedures is the installation of several small and medium scale computers in the same geographical area. There are several locations which have over 50 computers. These multiple computers can result in costs which are as much as five times larger than would be necessary if a few large computers were used in a shared time operating mode.

If the Department had a system design capability, as previously discussed, the requirement for equipment could be stated in terms of the equipment's performance characteristics, rather than the specific planned application. The justification would be of the system, not of the individual equipment acquisitions, and the system could include many specific applications by today's terms.

Overall Management

The basic problem is that the present organizational assignment of responsibilities for ADP policy formulation, management and operation is inadequate to insure the most efficient and economical use of ADP either Department-wide, or within a Military Department or Defense Agency. The organizational level of policy responsibility within the Office of the Secretary of Defense (OSD) for ADP is too low to insure that required and desirable policy changes are made and implemented consistently throughout the Depart-

ment. In addition, there is no single office charged with the responsibility for long-range planning to keep policy abreast of industry development, and to provide flexibility in Department policy to take advantage of evolving technological changes.

Neither is any office charged with the responsibility for periodic review of existing ADP installations and operations or for minimizing the total cost of computers. Reviews are now focused on requirement justification and procurements. A standard for measurement of total ADP costs does not exist today, nor does the means of compiling such total costs for a given ADP installation or operation.

Present assignment of policy responsibility for ADP in OSD takes inadequate cognizance of the close technical and cost relationship of communications and ADP management. As a consequence, the interface between ADP and communications is inadequate, and will become increasingly inadequate as digital communications technology increases.

No office is charged with the responsibility to insure that research and development on ADP done by the Military Services or Defense Agencies, or under contract with them, is beneficially utilized Department-wide.

In addition, with the major change anticipated in the next ten years with respect to teleprocessing and digital data transmission, the management functions of telecommunications and ADP should be combined.

Other Factors

The following factors and resulting conditions contribute to the current problem within the Department and could be substantially improved if overall management responsibility were consolidated, if the Department developed a system design capability, and the justification and selection procedures were revised.

1. Utilization rates (estimated to be 50-60%) of computers owned and leased by the Department of Defense are low compared to those of industry. Low utilization rates are primarily due to the following:

(a) The long lead-time for ADP procurements makes desirable the acquisition of growth capacity, but the specific applications orientation of requirements justification inhibits design for growth capacity. As a consequence, it is largely impossible to plan orderly matching of growth of requirements with growing capacity.

(b) Constraints on payment of overtime applied generally in the Department inhibit resort to longer shifts and increased utilization, since no mechanism exists to balance overtime costs against potential savings from increased utilization.

(c) Constraints on paying shift differentials, similar to those of paying overtime, inhibit the resort to three shift operations to increase utilization rates.

(d) Effective sharing between organizational elements is inhibited by existing regulations, which permit a facility owner to charge an external (Department) user only for direct charges and prevent the owner from charging rates based on total costs.

(e) Sharing is further inhibited by the orientation of procurement to specific applications. When a computer system is purchased for a specific application, it is likely to be the least costly for the specific application, and therefore, the least flexible for other applications. Consequently, sharing of the computer system is inhibited by the limitations of the computer system. This lack of flexibility of the system contributes to under-utilization.

2. There currently exist no standards for determining total costs of ADP service, within a given organizational element, a specific installation or Military Service, or Department-wide. Cost calculations do not now include cost of invested capital, depreciation estimates, elements of labor costs other than direct salaries, housing for installations, base support of computer personnel, air conditioning, etc. It is consequently very difficult to effectively make management decisions and trade-offs for existing and new applications.

3. The numbers of skilled technical professionals in the ADP field needed to plan, specify and design major applications are not available in the Department. The skilled technical ADP professionals available within the Department of Defense are scattered among several organizations within the various components of the Department. There do not appear to be adequate plans for obtaining or training these professionals in substantial numbers. In a rapidly changing technology such as ADP, personnel resources, in the absence of intensive training, tend to become obsolescent at the same rate as hardware resources, and a major effort is required to keep a staff current and competent.

In today's economy there are virtually no qualified ADP personnel who are unemployed. Large commercial organizations find that they must hire the basic talent, train it and specifically provide for keeping it current. The Department must determine the number and types of qualified ADP personnel it will need and provide the training resources necessary to assure their availability. □

Reference

Blue Ribbon Defense Panel / *Report to The President and the Secretary of Defense on the Department of Defense* / Department of Defense, Washington, DC 20301 / July 1, 1970, paperbound, 237 pages, $2.25

Notes

1. *Remote Job Entry:* The input or readout of data from locations geographically different than the computer, usually by telecommunication, and additionally, in the case of time sharing arrangements, the activation and deactivation of the program.

2. *Storage Allocation and Data Protection:* The predetermined and programmed use of tape or disk storage, usually in time sharing arrangements, where the activation and deactivation of the program and access to the tape or disk is protected by a unique signal, known only to the user.

3. *Unbundling:* The separation of system design, hardware, software, support, training and maintenance aspects into independently purchasable and manageable elements.

4. Inventory and usage data are reported by fiscal year to the General Services Administration (GSA), and included in their annual report on all Government ADP equipment.

5. *Systems Design – Hardware:* This activity includes the design of the overall computer hardware system. This design consists mainly of the selection among equipment available from commercial suppliers including independent peripheral manufacturers. This activity will establish the necessary interfaces required to interconnect the equipment available from different suppliers. It is not anticipated that the Department will design its own hardware.

6. *Systems Design – Software:* This activity includes the design of basic systems software; i.e., Compilers, Executive monitors, Data Storage and retrieval software, "liberation programs," etc. It does not include applications programs or information systems.

7. *In-House Capability:* In-House capability to perform a function or task does not necessarily mean that the work be totally performed by Department employees but that some of the Department's employees must be able to perform the task. Where work is contracted to outside sources, the Department must have sufficient depth to evaluate the work of the contractor and make selections among alternatives.

MACHINE LEARNING OF GAMES—Part 2

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"If a machine is to play any legal game in this class, it will have to be given the description of the board and descriptions of each winning and losing path."

In the first part of this article, published in last month's issue, we discussed some of the theory behind the machine learning of games. In this second part, we shall discuss the kind of machine language needed for efficient description and learning of forcing situations in terms of specific games.

Qubic

The first game of Tic-Tac-Toe variety that we consider is 4 x 4 x 4 Tic-Tac-Toe (sold by the trade name Qubic). The board consists of four plastic sheets stacked one on top of the other, spaced about an inch apart. Each plane is divided by lines into 16 squares – 4 rows and 4 columns (See Figure 1). Two players alternate placing chips on the squares. The first player to have four of his chips in a line (horizontally, vertically or diagonally on a sheet, as well as all its symmetrical equivalents under various rotations of the cube – together with the four diagonals through the body of the cube) wins the game.

Go-Moku

The other variation of Tic-Tac-Toe that is commonly played is one called Go-Moku in Japan (and by some American enthusiasts) and also called Five-Place Tic-Tac-Toe (sold under the trade names of Renjyu and Pegity). The variant we discuss here is played on a 13 x 13 plane board. The players alternate placing chips, and the first player to have five consecutive chips in a row (horizontal, vertical, or diagonal) wins.

The Shannon Network Games

The Shannon Network games are played quite differently. The board consists of an arbitrary network with two designate nodes. The players alternate, each placing chips on the arcs of the network. One player is called the "joiner" and the other the "cutter". The joiner wins if some lines covered by his chips join the designated points. The cutter wins if his chips are so placed that the joiner cannot win. (See Figure 2).

A rather picturesque version of a specific Shannon game is sold under the name of Bridg-it. The board is so designed that the cutter and joiner appear to have similar roles, each trying to build a series of bridges between opposite sides of a square board. The Network version and the board are shown in Figure 3.

What Makes Games "Similar"?

What makes all these games belong to the same class is the following set of common statements one can make about them.

1. In all of these games pieces are placed on the board one at a time and alternately by each player. All pieces belonging to either player are identical.
2. Pieces are neither moved on the board nor removed from the board once they are played.
3. There is a certain set of prespecified subsets of the board (called the "winning paths") such that whenever any winning path is completely filled by the first player, he wins. Similarly there is a set of "losing paths" of the board such that whenever any losing path is completely filled by the second player, he wins.

If a machine is to play any legal game in this class, it will have to be given the description of the board and descriptions of each winning and losing path. In Qubic and Go-Moku, the board consists of the set of all positions (64

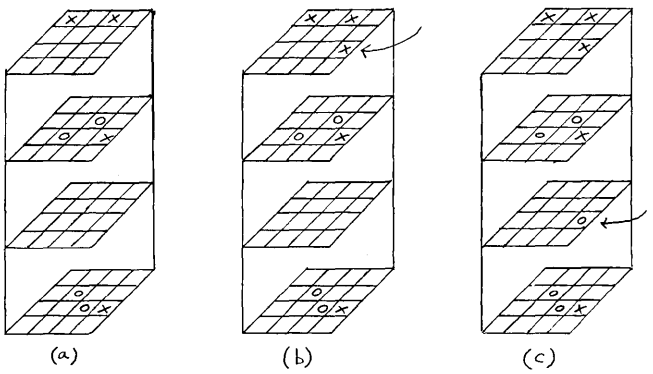


Figure 1

An example of W_7 in QUBIC (3-dimensional Tic-Tac-Toe). The present position is shown in (a). The move by X shown by the arrow in (b) is the wise move. The answer shown by the arrow in (c) carries the game to W_6. Any other answer carries the game to W_1.

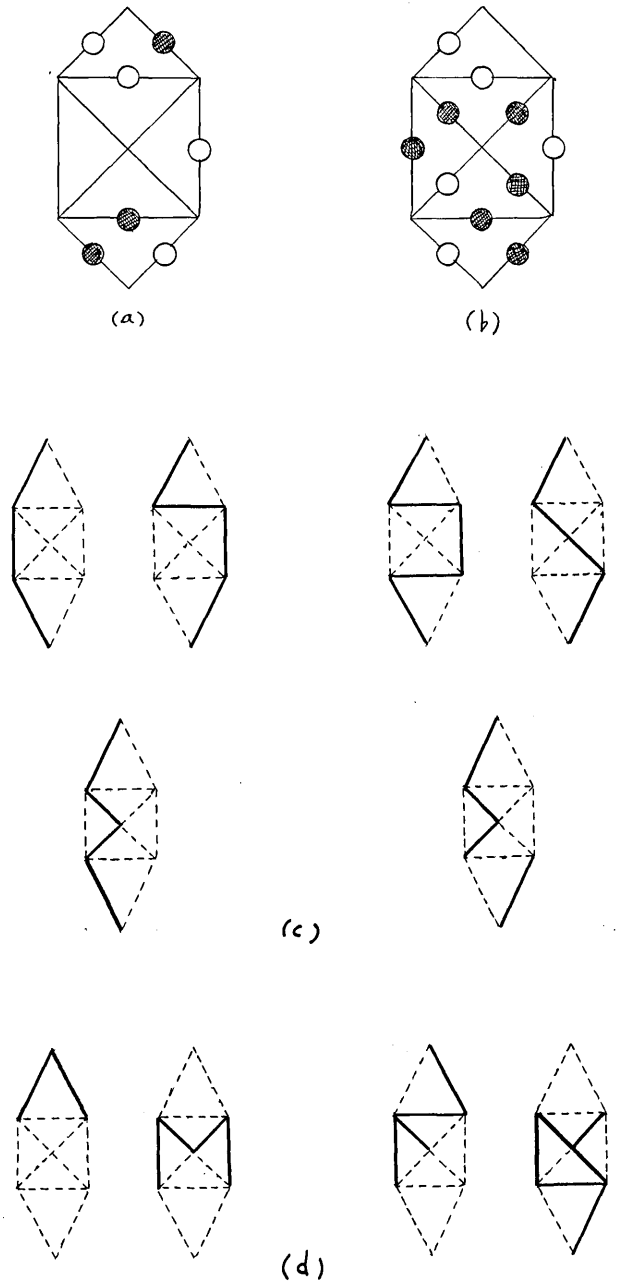


Figure 2

Two Shannon games played on a typical network. In (a) the joiner wins; in (b) the cutter wins. Some of the various joining paths are shown in (c); some of the cutting paths in (d).

in Qubic, 169 in Go-Moku). The winning and losing paths are the same consisting of 4-in-a-row in Qubic and 5-in-a-row in Go-Moku. In the network games the board is the set of all the arcs of the net. The winning paths consist in all the tie sets and the losing paths consist in all the cut sets. In HEX the set of all paths between one pair of opposite edges make up the winning paths and all the paths between the other pair of opposite edges make up the losing paths. Hence one can write a general program which will enable a machine, on being given the rules of any one of these games, to play the game legally. However, this is not a very interesting fact in itself.

The communality of this class of games is such, however, that the succinct descriptions of the forcing situations need only two more tests than are needed to specify the rules of the game. The machine should be capable not only of recognizing winning and losing paths, but should also be able to tell (1) that certain winning paths have certain empty cells in common, and (2) how many more cells need to be filled in a set of intersecting winning paths. Statements such as these can be simply combined to yield descriptions of the forcing situations.

An Example in Qubic

Let us take the Qubic position shown in Figure 4 as an example. In Figure 4, we see certain rows of squares on the board (a set of winning pahts) any of which completely filled, would constitute a win. Of these only line 1 has two blank spaces to be filled, lines 2, 3, 4, and 6 have three spaces to be filled while line 5 is completely blank. Lines 1, 2, and 5 meet at one common point and lines 4 and 5, 3 and 4, 2 and 3, and 5 and 4 meet at 4 other distinct points. The table below the diagram exhibits these facts.

There are a number of configurations on the board which would give rise to the same table as shown in Figure 4. However, in every case the player playing crosses could force a win by playing on the intersection of 1 and 2, then on the intersection of 2 and 3, then 3 and 4, then 4 and 5, and finally on 5 and 6.

If the table was available in the machine memory it could take cognizance of this table by playing an improved game. The game-independent playing strategy would, at its move, analyze a board configuration to see if there are a set of winning paths in the board which satisfy any of the

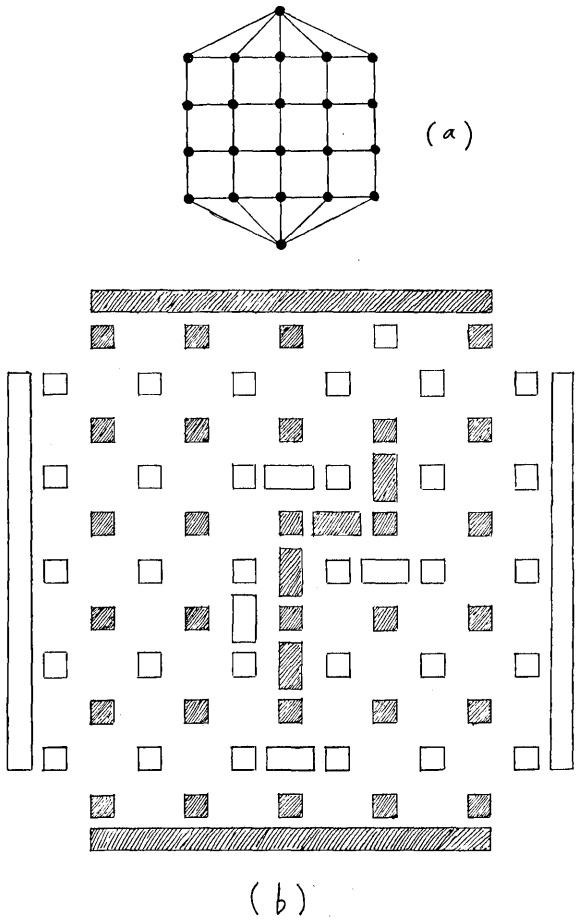
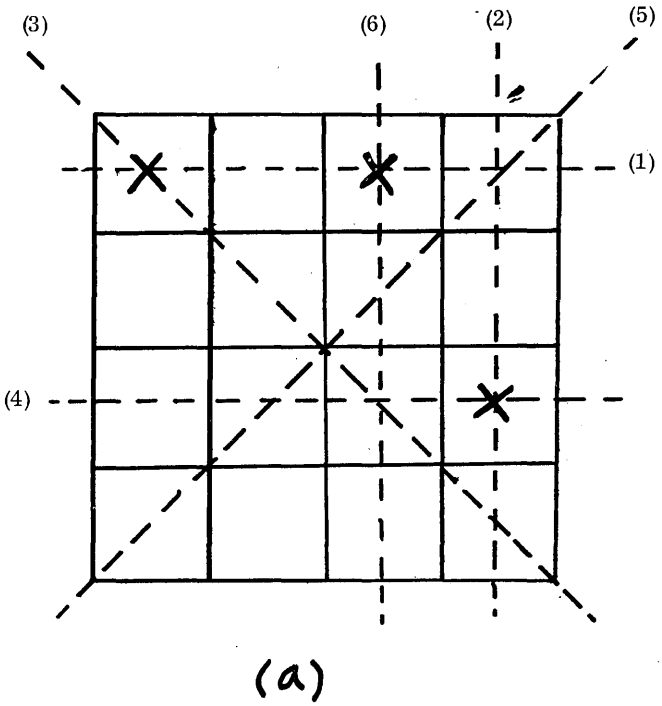


Figure 3

The game of Bridg-It (b) is essentially the same as the Shannon game shown in (a). The cutter does his "cutting" by throwing a bridge perpendicular to the joiner's proposed bridge.



Line No.	Empty Spaces	Node Configuration
1	2	125
2	3	23
3	3	346
4	3	45
5	4	56
6	3	

Figure 4

A description of a forcing position. The intersecting lines which make up a situation in W_6 in Qubic is shown in (a). The table is a formal description of the class of situations exhibiting the characteristics shown in (a).

descriptions of forcing situations available in the memory. If there are, it would make the forcing move indicated by the table. (Unless there was some mitigating circumstance related to the specific board configuration, like one of the opponents defences giving rise to an attack by the opponent. This special part of the playing program, though game-independent, is not clearly reflected in the description language.) If no description of forcing situations is satisfied, then the program tests to see if the configuration satisfies the description of a forcing situation by the opponent. If it does, it makes the move the opponent would have made, preventing a force by the opponent. If neither of the conditions accrue, it plays at random.

One of my colleagues, Mr. Ronald Citrenbaum, discovered (more or less by enumeration) that a set of configuration of pieces in a plane in the Qubic board are indeed forcing situations for some large types (up to 6 or 7). He developed a pre-programmed Qubic player which could play against humans with a large degree of success. However, it had no wherewithal for improving its own game. A learning algorithm was developed by Mr. Elliot Koffman based on a description language of his own design which is essentially exemplified by the table in Figure 4.

Learning from "Experience"

The game playing program developed by Mr. Koffman plays randomly at the beginning, not having any forcing situation described in its memory. When it is defeated (or accidentally wins) it analyzes the game as follows.

After a win by the opponent is detected, the program back-tracks on the game by removing the opponents last move. It then forms the description of the single winning path (a row in Qubic) which the opponent filled. This "one-row" description is stored in memory as a situation to be guarded against and to be created by oneself.

However, this trivial step in learning does not prevent losses. Soon the machine is beaten by a fork. When this happens the machine finds, on carrying out the analysis described in the above paragraph, that the description of this one row was already in memory; hence, the fact that the machine did not make a defensive move indicates that a defensive move was called for elsewhere. So it removes its previous move from the board to see if the resulting position (ignoring the row uncovered by the previous analysis) satisfied a description in memory called for that move. If this was the case, then the resulting position is compared to the descriptions in memory. If the description is not in memory, then it is stored, constructed in terms of the successive rows uncovered by the introspective procedure, together with the descriptions of the forcing situations the machine was trying to prevent by its last few plays. If the description was in memory, then the machine's previous move must have been made to prevent some other undesirable situation whose description was in the memory. Then the opponent's previous move is removed in retrospect. The process continues till a position occurs whose description is not in memory. The description is then memorized.

Mr. Koffman's program did not lose many games before it started beating Mr. Citrenbaum's program. The learning was especially facilitated by the fact that Mr. Citrenbaum's program set up some very deep forces irrespective of the opponents skill, and thus "showed its hand" pretty clearly to Mr. Koffman's program.

The learning and playing program applied to Bridg-it and Go-Moku has yielded some interesting games. At this point we were hampered by the fact that the games had to be played against humans and the learning through many games was a slow and tedious process. There was very little difficulty for Shannon games played with small networks. However, with longer networks and with HEX, there was a difficulty due to a circumstance we have not discussed so far.

Testing

Our description format makes very little demand on the memory and has great generalizing power. Also, the learning method is quite efficient with respect to the computer time (and hence with respect to dollars spent!). However, testing a situation to see if it fits a description is another matter.

A description gives statements regarding the existence of certain winning paths having certain interrelationships. To isolate these paths among all the possible paths (there are 76 in Qubic, 1100 in Go-Moku, and many more in the other games) needs a search which can be extremely time consuming in larger games although manageable in the smaller games. The various game-independent heuristics for this search that have been tried so far have yielded some success. But we have yet to find out how and whether the success continues. □

JOB HUNTING IN 1970

Dexter Black
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"I compare the situation to looking for a parking place downtown. You can drive around for what seems like forever, until you happen to be the one who is right there when somebody pulls out in front of you. The search will be longer when there are more cars looking, and fewer parking slots – but ultimately you will find something."

The Dismal Situation

Let's say you are a technically trained person, a college graduate in engineering or science with between two and 20 years experience. And you have been told by your firm that your services are no longer needed. If that is make believe, then skip this article. But for thousands of your colleagues, it's a devastating reality of life in 1970. The author is one of those to be laid off in mid-career. This article is a highly personal set of suggestions and observations to help others in the same boat.

The professional employment market today is so emphatically a buyer's paradise that I need not dwell on the situation. There are few jobs, many applicants, ferocious competition. I cannot claim to be an expert on how to overcome these problems. Although I have changed jobs in the past (three times in 12 years of professional experience), I have never before had to fight to find one. However, perhaps my case will help somebody else organize his own search. I hope so, and have only this as the reason for writing this article.

My field is operations research, with strong computer experience. I have an advanced degree, and have progressed quite successfully (until now) through a series of job assignments involving advanced technical work, and technical direction of other professionals in groups of up to a dozen. But earlier this year, I was told that my services would no longer be required, due to a cutback in the Department of Defense contract to my firm for the next fiscal year. The firm has a 90-day notice policy; but because of my seniority, I was given a special privilege: an extra month's notice. I had four months to find a job. After that, I would have to live and support my family on unemployment benefits, savings, loans, my wife's working income, or

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wages I might get from a temporary, non-technical job like clerking in a grocery.

Attitude Towards Searching

During a job search, it is hard to keep a positive attitude. After your letters of application have gone out and your phone calls made, there's nothing to do but wait. As each day's mail comes and no response arrives, your spirits dip lower, your morale sags further. At least mine did.

But you need to keep your spirits up, partly to keep from biting the heads off your wife and kids, partly to keep going in the search itself.

Keep in mind that there *are* some jobs available. There is some turnover. People get promotions. People retire. A few people die on the job. (Some of them are young. During my notice period, a 29-year-old programmer died of natural causes. When you feel sorry for yourself, think of those people, and their families. There are worse things than unemployment.) Also, most important, at some firms, contracts are renewed and augmented instead of being cut back. Admittedly they are few. In the vast complex of companies working on technical (primarily defense) contracts, certainly most are cutting back. But there is a fraction that are expanding, building up, and hiring.

I compare the situation to looking for a parking place downtown. You can drive around and around for what seems like forever. Occasionally, cars do pull away from the curb. You just have to keep looking until you happen to be the one who is right there when somebody pulls out just in front of you. The search will be longer when there are more cars looking, and fewer parking slots. But ultimately, you will find something.

Don't be idle. The job hunt may temporarily be at a dead end, where you can do nothing but wait. Then find another constructive activity. Have you ever thought you should write a book? Start now! Can your talents be used on an unpaid basis by anyone? How about a local environmental protection group? They will often welcome technically trained recruits, although they can only rarely pay. I contacted a local museum-based organization working in conservation. They were delighted to have me aboard as a volunteer. I assisted in preparation of a proposal for a NSF grant. They were all biological scientists; and they found the view of a physical scientist so different and stimulating that they wrote a slot for me into the proposal as a project participant. When and if the NSF approves the proposal and awards them the money, I'll expect an employment offer. (At this writing, that still appears to be several months off.)

You could learn a new field. Get a study guide and foundation texts from your local public library; set up a study schedule for yourself, a chapter or two a week, and make yourself follow it. Or you might go back to school. Anything – just don't lounge around the house and mope all day.

Have a positive attitude about yourself. You know you are good; don't forget it. Being fired is no sign of incompetence; not these days! (Except perhaps incompetence by your company's management in failing to bring in business. Lots of fine men are out in the cold today. Some of them have been executives at salaries of $50,000 and up. (They have their special problems; they've gotten used to such a comfortable standard of living they now can't afford to consider jobs at a "mere" 25K. I weep!) Sooner or later, you will find a new affiliation where your excellence will be recognized and rewarded. I hope it is sooner, but more than likely it will be later. In any event, the problem that must now occupy you is how to try to find it.

Specific Searching

Make your search as specific as you can. Use a rifle, not a shotgun. Don't bother sending out a broadside of résumés. Personnel staffs today are flooded with inquiries. You will be no more than one in a very large crowd.

Nobody else has exactly your background, your combination of education, experience, and interest. Sit down and write up a list of your assets. Now try to think of places where you in particular can fill a slot that your swarm of competition can't. Did you have a stint in the Military Police while in the service? There are police departments and courts looking for help in data processing systems; and you have the added advantage of law-enforcement experience besides your technical qualifications!

When I recommend a rifle over a shotgun, I mean a repeater, not a single shot. There should be several possible targets where you would fit especially well. Try them all, and keep trying to think of more. Most of them will not work out. Obviously, the one place you would fit best is in your old firm; and they haven't got the wherewithal to support you. Many others, who would dearly like to have you, can't support you either. But you will finally find one that can.

Professional Friends

Your résumé in the personnel office has practically no chance of getting you a job today. Anything you can do to make yourself distinctive, different, identifiable from the others in the horde is bound to help.

You have been around a while, and made friends with some people in the business. Now is the time to trade on those friendships. Ask your friends who still have jobs to pave a path for you. Since you are good, they can be perfectly sincere. Suppose one of your pals tells his boss, "Chief, I've got a buddy who is a real hot shot and he's available to work now. You don't have to hire him on the spot, but I think it would be a good idea for you to talk to him." Even if the Chief has no vacancies, you could get to meet him, know him by name and sight, and impress him with your talents. When the rare opening does occur, you're far ahead of somebody else with no identity except a piece of paper.

How about your classmates? Some of them must have responsible positions now, perhaps even in their own companies. You are already on a first-name basis with them; remind them that you're around.

A former colleague of mine in a previous job had left for government work, and was a bureau chief. I called him, explaining the situation. He answered, a bit wistfully, that he would be delighted to add someone like me to his staff – if he had a vacancy. He would try to negotiate a slot within his budget. He wasn't optimistic, but he would try. Even if he failed in that, I would be at the top of his list for the next opening that arose in his shop.

You have met people at seminars and professional meetings. Take inventory of all the contacts you have in the profession, old and new. Call them, and lay the situation on the line. That's what friends are for: to help each other. Some of them may brush you off. Don't fret; that's inevitable. But many of them won't; and you're that much further ahead.

Non-professional Friends

Of course, not all your friends are in the business where you are searching for employment. Some are lawyers, teachers, printers, or whatever. You know them because they are neighbors, or friends of your in-laws, who referred you to them when you moved to town a few years ago, or your children's teachers, or something like that. So they cannot directly lead you to a new job. But perhaps they know somebody who can. Your friend the lawyer: does his law firm include among its clients an electronics company? He might arrange to introduce you to a vice-president. Your friend the printer: does he put out a small weekly community newspaper? Perhaps he will let you take an early peek at the employment classified section.

A friend of mine, husband of a school friend of my wife, is in education. His employer is a training organization. He respects my problem-solving approach, and thought that operations research might have a role in enhancing education training methods. I agree, of course, but the question was, what did his company management think. They listened to his ideas enough to invite me in. I present some of my ideas. They found it a novel, interesting approach, and undertook some in-house soul-searching to see if they considered themselves ready for such innovations.

Ads

In the preceding section, I mentioned the classified ads. It goes without saying that you should subscribe to the major newspapers in your area, daily and Sunday, and comb the Help Wanted columns carefully. Several out-of-town papers have major nation-wide coverage in their employment ads. The Wall Street Journal and the Sunday New York Times financial section are the main ones, but the Sunday Washington Post is also worthwhile.

I don't think that there is much point in trying the ads in the magazines. Magazines are published monthly (semi-monthly in the case of Datamation) and their copy is put to bed substantially before publication date. That means, by the time you see the ad in print, the vacancy condition has existed for several weeks. And these days, good jobs just don't remain unfilled that long.

In most cities, the Sunday paper has the biggest help wanted section. But you cannot afford to omit the dailies. Some employers will advertise only once; these days that's enough to generate plenty of replies. I have responded to at least two "one-time-only" ads that ran on weekdays. But it is still true that the lion's share comes up on Sunday.

Although you read the ads carefully and regularly, you should answer very selectively. Remember the rifle, not the shotgun! Only go after the ones you realistically have a chance for. If the ad says experience with electronic switching systems and APL language, don't rationalize that AI radar is a form of electronics, and FORTRAN a computer language, so maybe you could qualify marginally if they don't get any responses with exactly the background they desire. In fact, this advertiser will get plenty of responses that are fully qualified, and perhaps overqualified. One interviewer candidly told me that his company's recruiting strategy today was to sift the applications down to the three most overqualified people (his words), and then invite them back for second interviews.

By limiting your replies to those where you fill the bill, you can prepare a personal, individually tailored answer to each one. You should submit a typed original of a letter (with or without a typed original of a résumé, depending on whether you cover in the letter all the things you want to get across. The letter should emphasize those aspects of your background that match the needs stated in the ad. How much more effective that will be than a Xeroxed résumé stuffed in an envelope! It is just because you are going to make each reply different and specific that you can't use a shotgun approach.

Personally, I'm lukewarm about firms that hide behind a box number in their ads. But these days, one can't afford to be too selective, and I have responded to some when I thought I met their criteria. One of these led to a long, probing interview with company management up to the division director level.

In giving specifics, you can tell about your prior work, your training, your special interests, and how they seem to match what the advertiser has asked for. But one item, invariably requested, you don't have to include. That is salary requirement (or salary history). The salary you require depends on a lot of things that you can't know about just from the ad: nature of the work; stability of the company; advancement prospects; location of the office; and certainly how hungry you are. You don't have to tell the advertiser anything more about salary than a broad range ("higher teens" or "mid-twenties") in your letter, although at the interview you must be prepared to be specific.

Commercial Agencies

Can the flesh peddlers help you? Very possibly. True, any firm with an opening need only advertise or spread a discrete rumor to be swamped with applicants. But some prefer not to be swamped, and will continue to deal with the commercial employment agencies, even at the penalty of their stiff fees.

You should choose your agency carefully. Some of them will do no more than ship out a ream of your résumés to everyone on their mailing list. Forget about that kind. Also forget about the ones with computerized search programs to match your record of experience with the employer's need. That's a fine-sounding gimmick. But your record is very individual, and no record format adapted for electronic information retrieval can really do justice to YOU.

To serve you effectively, an agency must offer personalized service. There will be paper work, of course. But part of their procedures will include an extended interview with you. They will also have close personal ties with the personnel people at the various employers they represent. It is this personal attention at both ends of the communication channel that enables them to find a good match, in good times or bad. (Of course, in bad times, it will take longer.)

How can you find the right agency? Well, employers know the ones that do conscientious, competent jobs. Ask the personnel people in your own ex-firm who they deal with and find good. That information is the least they owe you. The individual local office of an agency can differ a lot from another office of the same company in a different city; so don't rely solely on a general reputation.

I received one live lead from an agency. It required making an immediate decision (same day), relocating, and taking a substantial pay cut. I suppose any one, or even two of those factors might have been acceptable, but all three were too much, and I turned it down. But the incident does prove that some jobs are available, and some agencies can help in finding them.

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UNIVERSITY SCIENCE AND ENGINEERING IN TRANSITION

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"The future role of University research, faculty, and students will be to educate men and women to work effectively on large-scale, interdisciplinary, quantitative studies of problems, which can be described and treated by a systems approach."

The special view of a university seen by an engineer and scientist – that is my subject.

Universities throughout the world lay claim to the same basic tenets: that the purposes of a university are to preserve scholarship, advance knowledge, and serve the community. All universities attempt to achieve these aims by bringing together established scholars, the faculty, and students who are in the process of becoming scholars. How well are those of us in pure and applied science fulfilling the purposes of a university and at the same time responding to the needs of our rapidly changing society?

The Spell of Slogans

If science and engineering, or any other form of scholarship is to prosper, an atmosphere of reason and tolerance must prevail. It seems to many well-meaning people that sentiments such as these are irrelevant today – when each of us is so overwhelmed by the complexity and the tragedy of the problems of war, racial injustice, social inequality, and the deterioration of the physical environment. Few of us have been able to resist the temptation to think and talk about these matters in terms of grossly over-simplified concepts. Almost before we realize what has happened, study, careful thought, and reasoned argument are replaced by confrontation and the shouting of slogans. In a baccalaureate address to Harvard College James Conant said:

> slogans are both exciting and comforting, but they are also powerful opiates for the conscience . . . Some of mankind's most terrible misdeeds have been committed under the spell of certain magic words or phrases.

James Conant thought it necessary to sound this warning in 1934 when Nazi Germany was taking shape and people were disturbed by the complex pattern of events throughout the world which were then accelerating toward the Second World War. In Germany the universities crumbled under the pressure of the social and political events which preceded the rise of Hitler. The universities became political, and in so doing, they destroyed themselves.

The situation in Germany in the early 1930's is of course, very different from the one that exists in America today, but it is evident that the pressures from some quarters to transform the university into a political instru-

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British by birth, Dean Owen received his B. Eng. (1940), M. Eng. (1942) and PhD (1950) degrees from the University of Liverpool. He is an editor of the Physical Metallurgy Series in the Commonwealth Library of Technology, Pergamon Press, and a member of the Publications Committee of the Institute of Metals of the American Society for Metals. He is the author of more than 60 articles and papers in learned journals and periodicals. Most recently, he was keynote speaker at the International Conference on the Technology of Iron and Steel held in Tokyo, Japan, September 7-11, 1970.

Based on an address to the Summer Convocation, July, 1970, of Northwestern University.

ment are substantial. I believe that the most serious threat to the future of our universities is most likely to come, not from legislators in Washington, Springfield, or Cook County, or from bewildered and sometimes angry alumni, or from an unsympathetic general public, but from those faculty and students within our university community who work to convert our universities into a political unit.

It is hardly necessary for me to say that, of course, I am not advocating the suppression or removal of the political rights of any individual. Nor am I suggesting that our universities should ignore the enormous human, social, and physical problems of our modern society. On the contrary, I agree that our response to these problems has often been unimaginative, slow, and ineffective.

The Application of Science to Problem Solving

My particular concern is the application of science to the solution of problems. How do we provide our scientists and engineers with an education which is relevant to the needs of modern society? Can we, by our research in the universities, play a significant role in the attack on these problems? For centuries physical scientists have been involved in practical affairs. The professor of physics who cannot replace a fuse in his home is of recent origin. The application of science usually requires the solution of problems which are too complex to yield exact solutions by the direct application of rigorous and elegant analytical techniques. The complexity and diffuseness of the problem is even more troublesome in that area of applied science usually called engineering. The professional engineer is a solver of problems. He devotes his energies to attempting to find optimum solutions to extremely complex problems presented to him by the real or imagined needs of our modern society.

All scientists and engineers, of whatever description, share a basic belief in the necessity to express and analyze all problems in terms which are as exactly quantitative as possible. The development of high-speed digital computers during the last ten years has had an enormous influence on the work of the scientist and engineer, as it has on almost all other branches of learning. The engineer has been liberated from the tyranny of the rigorous analytical methods considered, mistakenly, to be so essential to pure science.

The Information Revolution

Now the engineer talks about grinding his problem through a computer to produce a solution (not *the* solution) by brute force. The purists may squirm, but the fact is that a whole generation of problems, which only a few years ago was completely outside of our competence to solve, is now being tackled with some success. We now have the capability to handle information on an unprecedented scale. Some have suggested that if the Industrial Revolution of more than 100 years ago was a technological revolution, the revolution we are now entering is an information revolution. We are in the early stages of this revolution.

The modern engineer came into being in the second half of the last century in response to man's need to live in cities and to travel over the surface of the globe. The early engineers designed and built sewers, bridges, railroads, and ships. As society became more complex, the problems which the engineers were asked to solve became more complex also. But always they were, and still are, problems involving the infinitely complex interactions between man and things.

Secret Research and Free Communication

Unfortunately, one of the needs of any society is to defend itself or, in some cases, to make war. It is regrettably true that in the post-Sputnik era, much – but by no means all – of the most advanced and sophisticated engineering has been concerned with the needs of the Defense Department or with prestige projects such as putting a man on the moon. The universities have been an essential part of this. They have educated Ph.D's in large numbers and carried out much basic research to underpin the complicated military technology. A substantial part of the financial support for graduate education and research in pure and applied science has been supplied by agencies of the Department of Defense.

It is remarkable that, in spite of the temptations and pressures inherent in this situation, this university, and many others, have refused at all times to undertake secret or classified research, military or industrial, on campus. They have held firmly to the belief that secret work is incompatible with the universities' duties to preserve scholarship and develop knowledge. An overwhelming majority of the faculty of the Technological Institute and the other science departments support this stand. We must preserve reason, tolerance, and free communication.

The Satisfaction of Non-Military Needs

During the last ten months or so, the post-Sputnik period has been brought to a close, and a profound change in the orientation of applied science and engineering has taken place. A massive movement of Federal resources away from military objectives and towards the satisfaction of non-military needs has occurred and is continuing. Industry has reflected the change and has started the transition to a largely civilian, consumer-product activity. This transition period promises to be one of extreme difficulty for our university schools of science and engineering. The primary question is: can we respond quickly and effectively to the changes in the large world? Can we re-think our educational methods and curricula, reorganize and re-direct our research, and transform our administration to effectively meet the challenges of the information revolution, the new consumer-oriented economy, and the rapidly changing social and economic systems in the country? Can we do all these things in the time available?

As the new director of the National Science Foundation pointed out recently, transitional periods are always difficult. The fact that this year the jobs available for new graduates in science and engineering are not so plentiful as they were in the recent past is certainly regrettable, but not yet intolerable. However, if we fail to develop relevant graduate programs, and the country fails to provide meaningful employment for an increased number of graduates, we will have recklessly discarded one of the most valuable resources the country possesses – the body of highly educated scientists who have established for us a world pre-eminence in science and engineering.

The Present Transition

The real nature and magnitude of the transition in which we are involved can be appreciated best by considering those areas of engineering and applied science which relate

directly to human behavior and the social and economic problems which beset us at the present time. Our students, undergraduate and graduate, demand that their work should be relevant to the needs of the modern world. Many faculty members feel unable to resist the demands that they direct their efforts toward some socially-relevant problem. The non-military agencies in Washington, N.I.H., H.E.W and even N.S.F., are developing many ingenious schemes for drawing universities into large research projects oriented toward the solution of a current social problem. The sudden and drastic change in direction and emphasis has caught the universities unprepared, and a little baffled. For the first time in many years, some engineers find themselves in a situation in which the decision makers are not overwhelmed by the single motive of profit maximization. This is an unfamiliar situation – although it is really a return to a state of affairs which existed more than a century ago when engineers first struggled to provide primitive sanitation in the growing cities, and Congress provided the means to establish land-grant colleges devoted to the encouragement of agricultural and mechanic arts.

Urban Problems

In the 1970's many engineers will be intimately involved in efforts to find solutions to many diverse urban problems such as:

the provision of adequate medical care (bioengineering and biophysics are particularly exciting and rapidly developing fields at the present time);
the location and design of hospitals and medical centers;
the allocation of men and equipment by law enforcement agencies;
the location and design of urban transportation systems;
the development of anti-pollution devices for automobiles;
the development of information systems for a variety of urban agencies;
the supply of water for an urban community.

The list could be extended for many pages. When we think about the future of engineering in these terms, it is clearly evident that the role of university research, faculty, and students, will be to educate men and women to work effectively on large-scale, interdisciplinary, quantitative studies of problems which can be described and treated by a systems approach.

Complex Networks of Relationships

Wherever we look in our urban society we see highly complex "networks of relationships between people and their cultural and physical environment." To cite an oversimplified example: To improve the quality of city living, large quantities of cheap electricity are needed. We improve the atmosphere in our immediate vicinity by installing electrically driven air-conditioners. To produce the electricity needed in the future and to avoid pollution of the air by the burning of fossil fuels, it might be a good idea to build atomic power stations. These need a lot of cooling water; so they are built on the shore of a lake, but the water returned to the lake is warm, perhaps 20° above the temperature of the lake, and the fish might die. To use the current phrase the ecology of the lake might be affected adversely. Cooling towers could be built and the temperature differential could be reduced to 1°, which might not be objectionable to the fish. But building cooling towers is a major constructional job and the completion of the power station may be delayed by two years at a time when there is a finite probability of an electricity black-out occurring. The towers would cost a lot of money to build, and the cost of the electricity would have to be increased. If the cost rises too steeply, we may not be able to afford to run our air-conditioners. And so on.

We are only at the start of the description of all the interrelated aspects of this problem. Clearly, it is not a problem with a unique solution. An optimum solution must be searched for ... a solution which will produced the minimum pollution of the air by combustion products or steam from condensing towers, and the largest amount of electricity at the cheapest price possible at the time and place it is needed most. Clearly, research on such problems can be effective only if it is carried out by a team containing biological and physical scientists, engineers, economists, lawyers, meteorologists, and even experts in aesthetics.

Quantitative Treatment

The problem must be treated quantitatively; we need to study it in terms of the number of degrees of temperature, the number of dollars, the quantity of electricity and the time of the year. It is fortunate, but perhaps not a coincidence, that at a time when the demand for solution of some of our large problems has reached an unprecedented level, mathematical techniques for handling them are developing rapidly and the essential tool, the high-speed computer, has been brought to a degree of sophistication which has far surpassed the expectations of a few years ago. The major uncertainty is whether or not we can educate and train graduates capable of participating effectively in the interdisciplinary teams.

"Interdisciplinarianism"

It is no longer sufficient for an individual to be expert in his special field. He must be able to interact with other specialists; and this requires some knowledge and appreciation of the other disciplines involved. Without the adoption of a single quantitative systems approach, such interaction, except on a very limited scale, would be impossible. Until recent years generalizations to the effect that graduates of science and engineering colleges are unable to read, while graduates of arts colleges cannot numerate, have been popular with speakers on occasions such as this. There was sufficient truth in such assertions to stimulate some educators to attempt reform. At Northwestern we are trying to educate engineers in an intellectual environment which puts their special subject in a proper relationship to social, economic and legal studies. Economists, sociologists, students of management and administration, geographers and others are utilizing quantitative mathematical methods to an ever-increasing extent. At a technical level we are moving quickly to provide many of our graduates with an education which will prepare them for effective work in interdisciplinary groups.

The Free Exchange of Ideas

There is another aspect of the educational problem which must receive our most urgent attention. How can we

ensure that our students pursue their studies in a cultural environment in which there is free and meaningful exchange of ideas between different disciplines and age groups? Can we transform ourselves into the "Community of Scholars" which we talked and wrote about two years ago?

Before the recent strike, we were a community only in a superficial sense. Any kind of communication between students and faculty was rare outside of the formal classroom. Attempts made to bring young and old together on social occasions too often resulted in stilted conversation interspersed with periods of embarrassment and silence. When the barricades went up, the conversational barriers disappeared. There was suddenly much to discuss, argue about, and even write to each other about. When classes resumed, some of the old reserve returned, but the return to the rigid formalities of earlier years will never be complete.

The New-University has brought with it renewed awareness that some students may benefit more from their part in the informal activities of the university than from dry knowledge handed out in carefully arranged packages at formal sessions. Stephen Leacock exaggerated, but pointed in the right direction, when he said:[1]

> "If I were founding a university, I would found first a smoking room; then when I had a little more money in hand, I would found a dormitory; then after that, or more probably with it, a decent reading room and a library. After that, if I still had more money that I couldn't use, I would hire a professor and get some text books."

Of course, Leacock had in mind smoking tobacco. He had not read the Surgeon General's Report.

The "Two Cultures"

There remains one absolute impediment to the realization of a true community. The scientist and engineer is educated to some degree, albeit inadequately, in the humanities; but attempts to interest the humanists in the physical and biological sciences have proved sterile. Half of our community think and write in a language, mathematics, in which the other half are illiterate. The situation is deteriorating rapidly.

A dramatic demonstration of the seriousness of the division between the two cultures occurred during the strike when a substantial number of students – and some faculty – revealed their fear of and hostility to science by forcing the closure of the Technological Institute and the Computing Center. Can there be any doubt that the hositility was born out of ignorance?

It is tragic that we recklessly expend our intellectual and emotional energies on rhetoric, slogan shouting, confrontations, and demonstrations when the problems of our society grow increasingly complex. We can move toward the solution of some of the problems only if our universities renew their traditional commitment to scholarship and service to the community. Only then will our university be a place "of light, of liberty and of learning."[2] I hope that each of you will view the future development of your university with understanding and rationally directed enthusiasm. □

[1] Stephen Leacock (1869-1944) *Oxford as I See It.*

[2] B. Disraeli, March 11, 1873.

(Continued from page 30)

Government Employment Agencies

I have one last suggestion. The federal government and the individual states operate employment services. These usually work in conjunction with the unemployment compensation offices; so if you want to collect your pitiful dole from the state, you must go through the motions of dealing with them. Actually, they can be of value for certain types of jobs. Most of their business is with domestic and clerical workers; very little with professionals like you and me. But there is one exception. That is government employment itself. Government jobs, on all levels, are announced in ways that I find rather inconspicuous. But they all do show up at the state-operated employment services. When new organizations are created, or new offices opened, jobs may be available at levels from GS-11 up to GS-14, 15, or even occasionally GS-16. Those are certainly not to be sneered at. Competition is fierce, of course. One job of this type that I applied for was delayed for months before being filled. Indeed, I don't yet know if it has been filled. As one of the qualified applicants, I was informed by a polite form letter that it would be a while before processing could be completed because there were over a hundred other qualified applicants, all of whom were being considered. The governmental agencies really are equal opportunity employers, and if you meet the minimum requirements, you'll get a fair shake.

One interview I had was with a newly formed agency working in drug control. They needed to set up a management information system for treatment records of addicts. It was a challenging, socially useful, and only slightly underpaid job, that I would never have heard of, much less have been interviewed for, except for the state employment service.

An Acceptable Offer

From the catalog of personal "successes" I have recounted above, you might think that my suggestions in this article have worked so well for me that I was flooded with offers, and took my pick of desirable jobs. Well, don't believe it! There were just seven positive responses of any description stemming from two or three dozen highly specific probes. Seven responses over four months – which means two to three weeks between them, on the average. And the extent of some of the positive reactions was simply that someone would like to help me out, but doubted if he could.

I can attest to the need for a positive attitude, and constructive activities to fill those long stretches of weeks waiting for some answer, day after day when the mailman brings only letters for "Occupant." But seven out of 30 is better than zero out of 200, the score of one of my friends in the same boat who sent out broadsides of his résumés.

And ultimately, the wonderful day came that one out of seven was transformed into an acceptable *offer*. It was for less money, somewhat duller work, and a less convenient location (although still in the same city) than the old job. But it was an honest-to-goodness, paid, permanent, professional level, respectable position. Patience, persistence, and ingenuity had finally paid off for me, as it will for you. I started my new job 13 days after the end of my four months notice, having been literally out-of-work only for a two-week "vacation". You may not be so lucky – your wait may be longer. But success will come, if you keep working at it. Good luck! You'll need it! But then, you will deserve it! □

REPORT FROM AUSTRALIA

Computer suppliers in Australia are intensifying their efforts to persuade education authorities to introduce time-sharing in schools.

Despite heavy marketing in the education area in recent years by General Electric and International Business Machines, no school in the country has yet installed a permanent time-sharing terminal.

Now the newly-formed information systems division of Honeywell, which combines the Honeywell and Australian General Electric computer operations, is making heavy concessions in order to penetrate this potentially large market.

The division has announced it is halving its normal hourly rates for "off peak" school use. Schools and technical colleges are being offered time-sharing facilities at a flat $A8 an hour plus program storage.

The only additional costs are the line and teleprinter charges imposed by the Australian Post Office. These remain unchanged at about $A85 a month.

General Electric thinking appears to lie behind the new approach, as G.E. spokesmen are pointing out that more than 100 schools and universities now use G.E. time-sharing facilities in the United States.

The new pricing policy should have a powerful appeal to education authorities which have generally become convinced of the need to develop computer education at the high school level and have at the same time been acquiring experience with the use of computers in the fields of administration and record-keeping.

The costs involved in making use of equipment have so far been the major factor in holding back progress in computer education.

The new low rates will be restricted to the hours between 6 p.m. and 6 a.m. This will help to smooth out time-sharing utilisation in which commercial subscribers tend to concentrate their usage in the daylight hours.

Australia's first computer leasing company, which has been in existence only two years, has decided to make a public issue of shares.

It is the Dier Computer Corporation Ltd., whose managing director, Mr. John B. Dier, failed in an attempt four years ago to obtain local backing for an Australian computer leasing venture.

The company was founded in 1968 with some backing from Bankers Trust Company, of New York.

However, early this year a consortium organised by Mr. Dier and a Sydney stockbroking firm purchased the Bankers Trust interest in a $A4.8 million refinancing scheme which had as its backers several of Australia's most established finance organisations.

The company has made impressive progress in a market which is unfamiliar with computer leasing methods. At the end of the first six months, the book value of leased equipment stood at $A1.17 million; by the end of 1969, the figure was $A3.43 million. It now owns or leases a portfolio of equipment worth a capital investment of $A4.3 million.

Dier Computer Corporation has followed a policy of leasing for five-year periods, with options for earlier termination, and of concentrating on IBM equipment.

Mr. Dier is a 37-years-old American with an IBM background. He was division manager with IBM Australia Ltd. from 1961 to 1964, before moving into computer consulting for three years.

A super-scale Control Data 6600 computer in Sydney processed jobs fed in to a remote terminal unit at Dunedin, New Zealand, and transmitted over a telecommunications route of nearly 3000 miles in a recent demonstration.

It was the first time a computer link of this kind had been established between Australia and New Zealand.

The Sydney computer is installed at a North Sydney data centre operated by the Data Services Division of Control Data Australia Pty. Ltd., Australian subsidiary of Control Data Corporation, of Minneapolis.

The remote terminal was installed in Dunedin to provide a demonstration of a computer utility's capabilities to delegates attending the three-day New Zealand computer conference late in August.

The Control Data utility is one of the first to be set up in Australia and began operation last November.

In the Sydney-Dunedin hook-up, processing jobs in punch card form were fed into a card reader, the information transmitted to the Sydney installation, and the results returned within a few minutes either over a T.V.-like display screen or a line printer at the Dunedin end.

Establishment of the link was a triumph for the co-ordination of efforts by Australian and New Zealand telecommunications authorities.

The 6600 was connected over an Australian Post Office line in Sydney to the Overseas Telecommunications Commission which linked the computer to Auckland by submarine cable. The N.Z. Post Office provided a link by landline and micro-wave to Dunedin, 970 miles to the south.

In effect, however, the computer and terminal were connected by a single dedicated line which transmitted data at the rate of 2400 bits a second.

The 6600 at present is serving terminals installed in Melbourne and Canberra, as well as several in the Sydney area.

The terminal, known as the MARC II (Multiple Access Remote Computing), consists of a cathode ray tube display and keyboard, a 300-cards-per-minute reader, and a 300-lines-per-minute printer.

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ACROSS THE EDITOR'S DESK

APPLICATIONS

CRIME ANALYSIS STUDIES USE SPECTRA 70 AT RCA's ADVANCED TECHNOLOGY LABORATORIES

A Spectra 70 computer normally used for research in advanced space and military systems is helping fight crime in Camden, N.J. The Spectra 70, at the RCA Advanced Technology Laboratories in Camden, is being used to analyze five categories of crimes committed in the city over the past twelve months — robbery, breaking and entering of homes, breaking and entering of non-residences, automobile thefts and theft of items from vehicles.

The evidence on each crime is being broken down according to location, time, day of week, item stolen and mode of operation. Details on both the victim and perpetrator also are being compiled and studied. Information on the offenses will continue to be programmed into the computer on both a weekly and monthly basis to chart crime patterns and forecast the times and areas in which violations are likely to occur.

Mayor Joseph M. Nardi, Jr., explained that the computer information enables the Police Department to concentrate its crime prevention efforts in certain areas at the time violations are predicted to take place. The computer data run off by the RCA Spectra 70 is displayed at the Crime Statistics Analysis Office at police headquarters. Here, platoon lieutenants are briefed on the high activity areas of different types of offenses. They in turn relay these findings to the officers under their jurisdiction and direct the preventive measures to be taken.

SMALL COMPUTER MONITORS AIRCRAFT PERFORMANCE FOR AIR CANADA

A small, computer-based tape playback system is helping Air Canada get detailed profiles of the flights of their McDonnell-Douglas DC-9 and long-bodied DC-8 aircraft. The computer, a PDP-8/L made by Digital Equipment Corporation of Maynard, Mass., is the heart of a system made by Leigh Instruments, Carleton Place, Ontario. The system plays back the tapes taken from the aircrafts' in-flight recorders.

The recorders monitor over 50 different signals, ranging from altitude, airspeed, and engine fuel flow to the position of the flight controls, the aircraft's heading, and its attitude. The incoming signals are recorded on a continuous loop of magnetic tape that can record for 106 hours. While these measurements are helpful in various ways, the in-flight recorder's main use is to give the airline information concerning a plane's performance before, and during, an accident.

The computer performs a scaling routine, that is, it converts data on the in-flight recorder tape from electrical signals to appropriate engineering units. Altitude, then, is displayed in thousands of feet, airspeed is displayed in knots or Mach number, and fuel flow is displayed in pounds per hour. In addition, the computer "demultiplexes" what is on the tape. For instance, if every 10th word in a monitoring cycle is a signal giving the airspeed, the user can ask the playback system, through the computer, to read out every 10th word. This way they get a continuous recording of the airspeed of the plane. The computer allows as many as eight different "demultiplexed" signals to be displayed on the playback system's eight-pen analog recorders — or, they can command the system to print out a digital readout of the recordings on a teletypewriter. The data can also be transcribed onto nine-track magnetic tape for use on a larger computer.

When combined with tapes that record radio transmissions and cockpit conversations, the in-flight recorder gives Air Canada personnel the ability to determine the status of an aircraft at any time in its flight, and the reaction of the flight crew to a given set of circumstances.

SIGNATURE VERIFICATION SYSTEM PERMITS STORAGE OF 10,000 DEPOSITOR SIGNATURES ON ONE FILM CARD

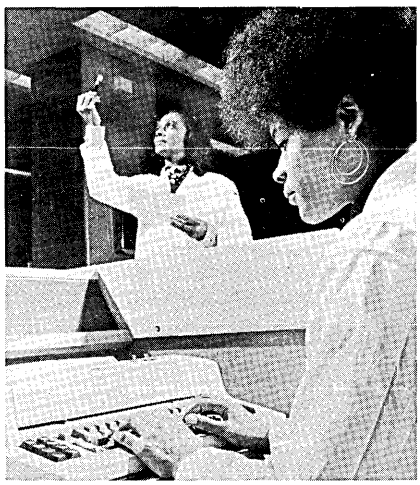
A new signature verification system, installed by Talman Federal Savings and Loan Association, Chicago, Ill., permits over 10,000 depositor signatures to be filed on a single film card about the size of a post card. The system, called PCMI©, requires only 13 of the 4" x 6" film cards to maintain the signatures of 125,000 Talman customers. PCMI replaces a conventional card file which was almost 100 times as bulky.

The new system, developed by The National Cash Register System, is based on a process of ultra image reduction. PCMI permits each depositor signature to be reduced to about the size of a pinhead. Thus the association's entire signature file can be contained to a small stack of transparencies no thicker than a deck of ordinary playing cards.

To verify a customer signature, a teller enters the passbook account number into his regular teller data terminal. Talman's computer center immediately flashes back the number of the film card on which the signature is filed, plus row and column location. The teller selects that film card from the file of 13 cards, places it on a PCMI viewer unit, and uses the row and column location to quickly pinpoint the signature being verified. The signature is projected on a screen in magnified form.

BLOOD BANK INFORMATION AND MANAGEMENT CONTROL SYSTEM (BIMACS)

At the Michael Reese Research Foundation and Blood Center (Chicago, Ill.), the Blood Bank Information and Management Control System (BIMACS) is helping keep 18 local hospitals supplied with fresh blood. Using the typewriter-like device shown below, staffers can determine instantly the status and location of



each of 1,500 units of fresh blood. Also stored in the system is information on quantities of each blood type, age of each unit, each hospital's supply and needs, and names of 81,000 donors.

The computer system, developed under a grant from the National Institute of Health, incorporates an IBM System/360 Model 25. The Center polls each hospital daily on its usage and needs. This data is entered directly into BIMACS via

a communications terminal to update the master file. The Blood Center's goal is maximum use of each unit which has a life span of 21 days. Ten percent of the 300,000 units drawn annually in Chicago become outdated. If replacements, which cost $35 a unit, could be cut in half, it would save the hospitals, collectively, $525,000.

Dr. Aaron M. Josephson, M.D., executive director, said the system is serving as a model for a proposed regional program that could involve several blood banks. Eventually, hospitals in the Chicago area served by the Blood Center will have terminals to enter data directly into the computer.

COMPUTERS HELP SHAPE FUTURE OF COMMERCIAL FISHING

A pair of IBM computers, at the National Marine Fisheries Service (Washington, D.C.), are helping keep track of 135,000 fishermen, 81,000 fishing craft, and about 225 different kinds of fish and shellfish. The purpose is to help government and industry shape the future of America's oldest industry — commercial fishing. Until 15 years ago, this country had been second only to Japan in total catch. The U.S. is currently in fifth place — behind Peru, Japan, the U.S.S.R. and Mainland China.

Government experts, in the division of statistics and market news (part of the National Marine Fisheries Service), are using their computers to collect, analyze and disseminate a wide range of information on the industry. This information is used, in turn, by both government and industry groups to frame legislation and to help make business decisions. The information analyzed by the computer ranges from the kind of fish people prefer to the profit ratios produced by various catches. For instance, in 1969 the average American ate 11.1 pounds of commercially-caught seafood — 6.4 pounds were fresh and frozen, 4.2 pounds were canned and .5 of a pound was salted, dried, smoked or pickled. Also, despite their fifth place finish worldwide, U.S. fishermen had a record year in 1969, with a domestic catch worth $518 million at the dock representing the highest dollar value in history.

The information used by the division is obtained from a variety of sources. The division's staff of 125 employees, operating out of 50 offices around the country, make frequent visits to fishing ports. Other information is supplied by state fishery agencies and through interviews with fishermen and fish processors.

Much of this information is processed by IBM System/360 Model 65 and 20 computers in Washington. The division produces over 1½ million daily market reports a year, as well as 21 monthly and annual bulletins on particular states. Some 20 other reports, dealing with frozen fish, imports and exports, processed products, catches and vessel data, are produced on a monthly or annual basis. In addition, special reports are released when needed.

COMPUTER SIMULATES BEHAVIOR OF METALS DURING PROCESSING

Scientists at Bell Laboratories (Murray Hill, N.J.) have found a way to use a computer to simulate the behavior of metals during the manufacturing process. As a result, metallurgists and metal producers now are one step closer to being able to predict and control physical and mechanical properties of metals without conducting extensive experiments.

The development of this work dates back to 1938, when British scientist, Sir Geoffrey I. Taylor, set up his mathematical model describing what happens to the millions of tiny crystals that make up a metal bar as it is deformed. This model yields many sets of five simultaneous equations which describe the movement of atomic planes during deformation. Solving some of the more complex problems, however, at the time, required solving up to two million sets of five simultaneous equations. This procedure is impractical even with the help of modern high-speed computers.

Recently a group at Bell Laboratories used linear programming to solve the equations. They were able to do in 32 seconds what had taken 12 hours with previous computing methods done on comparable computers. In another problem, solution to two million possible sets of equations was obtained in 43 seconds; previous methods would have taken 500 computer hours.

This work is being done at Bell Laboratories to understand crystal alignment during deformation — the first step towards controlling the properties of deformed metals. Since material properties may be greater in one crystal direction than another, metallurgists can make the most efficient use of a metal by knowing how alignment occurs.

Stimulated by the computer, Bell Labs scientists, Gilbert Y. Chin, Robert R. Hart, and Bud C. Wonsiewicz, developed a process for strengthening copper alloys, thus permitting the design of smaller components and consequently savings in materials costs. The high-strength materials are being evaluated for use as springs in miniature electrical contacts and telephone relays and in other communications equipment.

EDUCATION NEWS

LOCOMOTIVE THAT "GOES NOWHERE" IS CLASSROOM FOR SOUTHERN PACIFIC'S NEW ENGINEERS

A new kind of railroadmen have begun taking their places in the cabs of Southern Pacific locomotives. They are engineers who have trained for their jobs in the classrooms of Southern Pacific's Engine Service Training Center (at Downey, Calif.). The core of their training has been on a locomotive that "goes nowhere" — Southern Pacific's locomotive and train simulator, the first to go into active training duty in the United States. Additional training time on actual locomotives is given the new enginemen before they're given command of a train themselves.

The $1 million, computerized simulator (built for SP by Conductron Corp., a subsidiary of McDonnell Douglas) gives the railroad the ability to confront its fledgling engineers with every operating problem in the book, without ever leaving the room in which the mock locomotive rests. The main drawback to the traditional method of learning "by osmosis", is that you can ride a cab for years without experiencing some of the emergencies which can happen to a locomotive engineer. The young engineer who has trained with the simulator has already gained a wide range of "experience".

The computer which controls the simulator can produce just about any kind of a train you want — 100 cars, or 200 if you wish, from one diesel locomotive on up. It also can imitate every type of operating emergency that experienced rail men can imagine. An intricate hydraulic system reproduces the motion of a diesel locomotive underway, and speakers in the cab reproduce all the sounds that go with railroading. Sound, motion and visual effects are all controlled by the unit's computer, which can set up any operating problem that Dale Culbertson, manager of engine service training, and his staff decide on.

Southern Pacific's simulator cab is a duplicate of one of the railraod's 3,600 horsepower SD45 locomotive units. Its controls are identical with that of a real life locomotive, except for the inclu-

sion of an instructor's control panel to the rear of the engineer's seat. Across its nose stretches a 22-foot wide screen; other screens flank each window. Three variable speed projectors behind the screen feed films of Southern Pacific's actual tracks throughout the West onto the screen, so the fledgling engineer is running his simulated train through areas he may soon be seeing in real life. "Realistic?" asks Culbertson. "Well, when we first had it completed, I let my secretary take a ride on it. She wouldn't get off again until we shut it completely down and turned off the screen."

COUNTRY'S LARGEST EDUCATIONAL COMPUTER NETWORK ANNOUNCED BY HONEYWELL

The country's largest educational computer network, covering all geographic areas of the state of Minnesota, links nearly 100 schools to a complex service center in Honeywell's General Offices. The recently announced system, which Honeywell calls EDINET (Education Instruction Network), includes educational levels ranging from elementary schools all the way to state public and private colleges.

Three major problem areas have previously hindered the implementation of the computer as a teaching tool: (1) lack of instructional resource material related to the computer; (2) lack of an effective training program for teachers who want to use the computer to improve their instructional techniques; and (3) high costs. EDINET centers are solving these problems by: storing a large educational program library in the computer for immediate access by students and teachers; holding training sessions, seminars and workshops for teachers on a continuing basis; and, because of the computer's time-sharing capabilities, holding costs to the lowest possible levels (several pricing structures responsive to a school's individual needs are available).

Currently, there are 97 subscribers to the system. One participant is in Estherville, Iowa, a few miles over the Minnesota border. (Several schools in western Wisconsin are expected to join the network shortly.) Each school has at least one computer terminal on its premises. Each terminal, which resembles an electric typewriter, is tied directly by telephone lines with a Honeywell 1648 time-sharing computer in the firm's Minneapolis General Offices. More than 100,000 students could benefit educationally from EDINET in the 70-71 school year.

RESEARCH FRONTIER

OPTICAL TELECOMMUNICATION CABLES FORESEEN WITHIN FIVE YEARS

International Telephone and Telegraph Corp. (New York) has announced that commercially operating fiber-optic telephone and television systems are foreseen within five years by engineers of its British subsidiary. ITT's Standard Telecommunication Laboratories (Harlow, England) has developed a single-mode optical waveguide fiber with dimensions ideal for very-wide-band communications. They also have announced a laser light source that will work at room temperature.

The hair-thin fibers have been successfully processed through a plastic extruder to form a plastic-coated wire-like element suitable for assembly into a complete cable. In addition, the Corning Glass Company has indicated that fiber losses as low as 20 dB/km, with the required geometry, have been achieved. These developments, together with STL's recent achievements, mean that practical optical-fiber communication systems are likely to be produced within five years.

At a meeting of the British Institution of Electrical Engineers and the British Post Office in Martelsham (England), the ITT unit exhibited a complete experimental system including the room-temperature laser and its drive circuits, the laser/fiber detector assembly, low-noise wideband amplifiers, and regenerative repeater. The system capacity is 100 MB/s. The laboratories also showed the fabrication processes for the fiber waveguide and samples of fiber and plastic-coated fiber.

COMPUTER-LIKE "BLACK BOX" COULD CHANGE SOME OF NATION'S ELECTRONIC COMMUNICATIONS

Although radio and television have made it possible for us to see and hear "live", someone thousands of miles away, the rate at which a person speaks has remained unchanged by even the most modern technology. Some experts think that it is in the area of rate of transmission that the next important advances in communications may come.

At the Rome Air Development Center (Griffiss AFB, N.Y.), Air Force scientists are working on a system to improve drastically that rate. Their system relies on a computer-like "black box" that goes by the name of Digital Message Entry Device — DMED. The "black box" is less than a foot long, about three inches high, four inches wide and operates on four common "C" flashlight batteries. What the "black box" can do, may be lifesaving.

For example: a policeman on a beat or in a squad car could silently send a rapid, printed and detailed cry for help in situations where either time is too short, or to be overheard could mean danger; or future pilots approaching their landing fields could get a printed message from the ground advising them of the latest weather conditions — without talking to the busy controllers at all.

The DMED, built for the Air Force by Litton Industries, relies on a technique called "burst communication". Instead of speaking his message, the operator codes his message by translating it into numbers (digits, thus the name digital) and then presses a button that sends the message in a "burst" of these numbers to the receiver. At the other end is a receiver-printer that automatically prints out the message in text. Maximum transmission time for the device has been put at two seconds. Since the system has an automatic error-correction circuit built into it, the result is an error-free, printed message transmitted silently and in a fraction of the time required for voice communications.

The receiver, with its automatic strip printer, weighs about 65 pounds. Operating with standard ¼-inch magnetic tape, it converts the digital message into words, acknowledging the message with an electronic tone such as that used in commercial touch-tone dialing. At present, the receiver is wired for either 28 volts DC or 115 volts AC so that it can be used either in a jeep or aircraft.

Originally built to allow forward units in combat areas to communicate with headquarters, it was tested in Southeast Asia in late 1968. The machine (although not yet completely bug-proof) proved its usefulness. With only two seconds or less air time, it is very difficult for an enemy to monitor. Adding to that its potential for accuracy, the elimination of talking when talking can give away one's position, and its life-saving features can be seen.

The speed and accuracy of the system have brought it to the attention of the Aerospace Defense Command. People who have tested it even foresee its possible use as a translation device, with an English-speaking originator putting in a message that comes out at the other end, say, German.

The Assassination of Reverend Martin Luther King, Jr., the Role of James Earl Ray, and the Question of Conspiracy

RICHARD E. SPRAGUE
HARTSDALE, N. Y.

Reverend Martin Luther King, Jr., Negro leader and winner of the Nobel Peace Prize in 1964, was shot to death at the Lorraine Hotel and Motel in Memphis, Tennessee, on April 4, 1968. He was killed by a single exploding bullet in his neck and chin while standing on the balcony, and talking. The time was 6:00 p.m.

A man was seen running out of a rooming house across an alley from the motel immediately after the shot. Several eyewitnesses also saw him running down a hallway from a room and bathroom whose window faced the Lorraine balcony. They saw him throw several objects on the sidewalk in front of the rooming house, which faced another street one block from the hotel. They saw him get in a white Mustang, and then the white Mustang drove away.

Among the objects on the sidewalk was a rifle which eventually was traced to James Earl Ray, an escaped prisoner from Missouri State Prison. There were also nine rounds of ammunition, a green and brown bedspread, and a zipper bag containing a hammer, pliers, binoculars, a shaving kit, a transistor radio, clothes, and toilet articles. There is no question that the rifle and the zipper bag and contents belonged to James Earl Ray. His finger prints have been found on the rifle and other articles; he has said that they are his articles.

Ray was eventually arrested in Heathrow Airport, London, England, June 8, 1968, extradited after a hearing in London on application of the Department of Justice of the United States, brought to Memphis, and tried on the charge of killing King. Before his trial in March, 1969, Ray was persuaded by his second defense lawyer, Percy Foreman, to enter a guilty plea -- so as to receive as a "plea bargain" a life sentence instead of the death penalty, from Judge Preston Battle of Shelby County, Tennessee. (Judge Battle has since that time died.)

James Earl Ray's Account

What is Ray's account of what happened?

Ray says that after his escape from Missouri State Prison in April 1967, he went to Canada with the intention of going from there to Europe or Africa. In Montreal, he met a French Canadian, whom he knew only as "Raoul", in a waterfront bar; Raoul recruited Ray to help smuggle drugs and other items across Canadian and Mexican borders. Raoul supplied Ray with funds, and told Ray he would arrange for his eventual escape to Europe.

After some smuggling activities in Detroit, Windsor, Los Angeles, Mexico, and some meetings in New Orleans, Raoul told Ray to purchase a gun for some negotiations with anti-Castro Cubans. Raoul had already furnished Ray with several thousand dollars for clothes, travel, and living expenses in cities here and there in the U.S., Canada, and Mexico, and for purchasing a car, a white Mustang.

Raoul told Ray to meet him in Mississippi after buying the rifle, and then to go to Memphis. Ray was instructed to register at the Rebel Motel in Memphis and then to rent a room in the back at Bessie Brewer's rooming house at 422½ South Main, under the name John Willard. Ray did this. Then Ray was told he would not be needed, and that he should go downtown and have supper. He claims he was not at the rooming house when the fatal shot was fired. Later that evening Ray drove by himself in the white Mustang to Atlanta.

Checking of James Earl Ray's Account

In two articles in LOOK Magazine, in November 11, 1968, and November 25, 1968, a great deal of "the story" of James Earl Ray was reported to the American public, by a free-lance writer, William Bradford Huie. In these two articles, Huie reported that Ray stated that there had been a conspiracy; that Ray had not fired the fatal shot;and that he, Ray, had only driven the getaway car.

Many of Ray's movements as he described them in his account and the possibility of his meetings with Raoul were verified by Huie, and by other researchers, including the late Louis Lomax. For example, Lomax retraced an auto trip Ray said he had made with a man named Charles Stein, from Los Angeles to New Orleans. Ray says he telephoned Raoul in New Orleans from a pay phone in Texas. Stein helped Lomax find the phone booth and verify that the phone call took place. Ray says he met Raoul in New Orleans at the end of the trip with Stein. Lomax published his report in a column for the North American Newspaper Alliance.

Later, Huie wrote a book about Ray, but in that book Huie took the stand that Ray had actually fired the shot that killed Martin Luther King; and Huie entitled the book "He Slew the Dreamer".

James Earl Ray at the present time is still sticking to the claim that he did not fire the fatal shot, and that he was coerced into pleading guilty.

This is the basis of a new legal plea by Ray in the courts of Shelby County, Tennessee, put forward by Ray's third lawyer, Bernard Fensterwald, of Washington, D.C.

Two important documents have recently been filed in behalf of Ray, by Fensterwald, and associated Tennessee attorneys in the Criminal Court of Shelby County, Tennessee. These documents are printed in this issue of "Computers and Automation", for readers to judge for themselves.

Questions

There is a long list of strange events and unanswered questions in connection with the death of Martin Luther King, Jr., and the connection of James Earl Ray with it. Here are a few of them:

1. Money. Where did James Earl Ray get the money necessary for what he did and what he bought from the time of his escape from Missouri State Prison in April 1967, until his arrest in Heathrow Airport, London, on June 8, 1968? Estimates of the amount of money needed range from $25,000 to $50,000.

2. Lack of Identification of Ray as Killer. The Tennessee prosecutor Pat Canale claimed that Ray shot King. Ray claimed that "Raoul" shot King, and he (Ray) only made the arrangements "unknowingly". Questions:

(a) Why do the eyewitnesses in the rooming house without exception say that Ray was not the man they saw?

(b) Why do the drawings at first published of the killer as reconstructed by the police artist look so very different from Ray?

(c) Why did the U.S. Justice Department in the extradition hearing in London use only one "eyewitness" Charles Stephens to identify Ray -- when at least two eyewitnesses said Stephens was lying drunk in his room at the time and unable to see anything?

3. U.S. Attorney General's Statement. Why did U.S. Attorney General Ramsay Clark, within 24 hours after King's assassination, say that there was no evidence of conspiracy? especially when Clark could not possibly have known either way, and when every item of news that had come out up to that time pointed towards a conspiracy?

4. Dropping of the Gun and Ray's Belongings. The Tennessee prosecutor claimed that Ray dropped the rifle and his belongings when he came out of the rooming house directly after the shot that killed King, and then got into the white Mustang and drove away. Ray says he was not at the rooming house at the time of the shot. And Ray says he did not know until later that his belongings had been dropped nearby. Is it reasonable behavior for a man who intends to escape to drop a zipper bag containing hammer, pliers, binoculars, his shaving kit, a transistor radio, clothes, and toilet articles?

5. Multiple Identities. A large amount of evidence, which will be examined in a later article, indicates that:

(a) There were two persons using the alias Eric Starvo Galt. One of them was Ray. Who was the other?

(b) There were two men using the alias George Ramon Sneyd. Again, one of them was Ray. Who was the other?

(c) There were two white Mustangs; both were seen by eyewitnesses outside the Brewer rooming house; both drove away within a short time of each other. What was the other one?

(d) A fake chase of a white Mustang was broadcast from 6:35 pm to 6:47 pm on April 4, on citizens' band radio, and described simultaneously on the police radio. The Memphis Police concluded that this broadcast was a hoax. Was it a hoax? Or was it a diversionary tactic on the part of conspirators?

6. Motive. What was the motive for Ray's killing of King — if he did kill King? The Tennessee prosecutor implied that Ray sought notoriety. All of the evidence in Ray's background suggests that Ray participated in order to gain money only.

Why, at the trial of Ray on March 10, 1969, in Memphis, in the course of the "plea bargaining" procedure, did Ray speak up and say that he did not agree with Ramsay Clark, or J. Edgar Hoover, or Pat Canale, that there was no conspiracy?

A discussion of possible answers and explanations will appear in an early issue of "Computers and Automation".

DOCUMENT 1

IN THE CRIMINAL COURT OF
SHELBY COUNTY, TENNESSEE

Filed: August 31, 1970

JAMES EARL RAY, Petitioner	:	
vs	:	
STATE OF TENNESSEE and LEWIS TOLLETT, WARDEN State Penitentiary at Petros, Tennessee, Defendants	:	NO. H.C. 661

PETITIONER'S ANSWER TO RESPONDENTS' MOTION TO STRIKE

I. RESPONDENTS' MOTION TO STRIKE

Respondents have moved to strike Petitioner's Petition for Post Conviction Relief and Amendments thereto on grounds that:

1. Petitioner does not allege any abridgement in any way of rights guaranteed by the Constitution of Tennessee or the Constitution of the United States.

2. Further, all matters alleged have either been previously determined or waived.

II. PETITIONER HAS ALLEGED ABRIDGEMENTS OF HIS CONSTITUTIONAL RIGHTS

In regard to the first ground set forth by the Motion to Strike, Respondents are referred to the averments on page three of the Amended Petition for Post Conviction Relief, wherein Petitioner alleged the following abridgements of his constitutional rights:

1. That his rights of "due process" guaranteed him by both the State and Federal Constitution have been grossly violated;

2. That his rights to counsel guaranteed him by the State and Federal Constitution at all stages of the criminal proceedings against him have been grossly violated;

3. That he has not been accorded the "equal protection" guaranteed him by the Fourteenth Amendment to the United States Constitution, and

4. That, as a result of these violations, Petitioner's plea of guilty was involuntary. ....

Specifically, Petitioner has had no prior evidentiary hearing under the Post Conviction Procedure Act; and, in addition, his petition has raised substantial questions of fact as to events in which he participated, namely, his guilty plea. Standing alone, each of these circumstances requires that Petitioner be called to testify at an evidentiary hearing in accordance with the provisions of section 40-3810.

Further, the nature of Petitioner's allegations are such as to require under section 40-3818 that the court shall set forth in an order or written memorandum of the case all the grounds presented, stating the findings of fact and conclusions of law with regard to each such ground. No such findings of fact and conclusions of law have been set forth with regard to Petitioner's present allegations brought under the Post Conviction Procedure Act. ....

D. Petitioner's Grounds For Relief Were Not Determined At Hearing On His Motion For A New Trial

Defendant's Amended and Supplemental Motion For a New Trial set forth two grounds for relief:

1. That Defendant should be granted a New Trial under the provisions of section 17-117 of the Tennessee Code Annotated; and

2. That the waiver, plea and conviction were the result of Defendant being deprived of legal counsel in violation of the Fourteenth and Sixth Amendments to the U.S. Constitution.

Subsequently, Defendant submitted a Motion For a New Trial which added the following grounds for relief:

1. That he was denied effective counsel.

2. That the preponderance of the evidence was not such as to support a jury verdict of guilty;

3. That there was no evidence introduced upon which he could be found guilty; and

4. That since Judge Battle died, and he is the only one who could have tried the above questions, he is, as a matter of law, entitled to a New Trial. ....

IV. ALLEGATION THAT PLEA WAS INVOLUNTARY HAS NOT BEEN "PREVIOUSLY DETERMINED," THUS, A HEARING ON THE MERITS IS REQUIRED

Petitioner has alleged violations of his constitutional rights to due process of law, equal protection of the laws, and his right to effective counsel. Concomitantly, he has alleged that as a result of these violations, his guilty plea was involuntary.

Petitioner has alleged certain facts in support of his claims that, as a result of these violations of his constitutional rights, his guilty plea was involuntary. For the sake of clarity and information, some of the facts alleged which have not been introduced into evidence before are outlined below. None of this material has previously figured in any court decision; therefore, it cannot be considered 'previously determined'.

1. Exculpatory information was withheld from Petitioner, to wit:

a. The fact that no identifiable bullet was removed from Dr. King's body.

b. That Dr. King suffered a second and more damaging wound than the one to the jaw, proving that the missile was frangible or fragmentable, and

c. That, immediately after the crime, the state's chief eye witness, Charles Quitman Stevens, could not and would not identify Petitioner as the killer.

2. Unavailability of Witnesses:

Mrs. Grace Stevens, potentially a key witness for Petitioner, was wrongfully incarcerated in the Western State Mental Hospital because she might have testified favorably to Petitioner.

3. The trial Judge prominently participated in the plea bargaining which led to Petitioner's guilty plea.

All of the facts stated above are alleged in Petitioner's Amended Petition For Post Conviction Relief, and all present grounds for relief which have not been previously known or disclosed, much less previously determined. Petitioner is prepared to proffer considerable evidence in support of these and other grounds alleged.

For example, with regard to just one of the facts enummerated above, Petitioner is prepared to show, on the basis of sworn court testimony, that Gracie Stevens was never insane and was thus illegally incarcerated in Western State Mental Hospital under the guise of "protective custody", further, Petitioner will call witnesses to show that other mysterious and irregular circumstances attended the incarceration of this witness who might have testified favorably to Petitioner.

Attached to this brief is an affidavit by Petitioner. The factual statements averred in the affidavit have a strong and direct bearing upon the grounds for relief alleged in the Amended Petition for Post Conviction Relief, particularly as concerns two paramount legal issues: 1) whether Petitioner's guilty plea was voluntary, and 2) whether Petitioner was the victim of ineffective and fraudulent legal counsel.

The statements in Petitioner's affidavit constitute very grave charges, and it is clear that the allegation of such detailed facts makes it imperative that an evidentiary hearing be held, in accordance with the provisions of 40-3810, and that the court shall set forth its findings of fact and conclusions of law with regard to each ground of relief alleged, as is required by section 40-3818 Tennessee Code Annotated. ....

Under these circumstances, then, it is clear that the voluntariness of Petitioner's guilty plea is not an issue which has or can be waived; consequently, Petitioner is entitled to an evidentiary hearing on the facts alleged in his Petition For Post Conviction Relief.

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DOCUMENT 2

IN THE CRIMINAL COURT OF
SHELBY COUNTY, TENNESSEE

Filed: Sept. 22, 1970

JAMES EARL RAY, Petitioner vs STATE OF TENNESSEE and LEWIS TOLLETT, WARDEN State Penitentiary at Petros, Tennessee Defendants	No. H. C. 661

SUPPLEMENT TO AMENDED PETITION
FOR POST CONVICTION RELIEF

Petitioner submits for the Court's consideration the following additional allegations in support of his Petition for Post Conviction Relief.

I. ATTORNEY PERCY FOREMAN VIOLATED LEGAL ETHICS AND PETITIONER'S LEGAL RIGHTS BY NEGOTIATING THE GUILTY PLEA DIRECTLY WITH TRIAL JUDGE PRESTON BATTLE

In a deposition taken on November 11, 1969, Attorney Percy Foreman made some highly revealing yet incomplete disclosures as to the manner in which the negotiation of Petitioner's Guilty Pleas was handled. The deposition was taken by Attorney J. B. Stoner; and, in the process, the following exchange occurred:

STONER: "Well, let me ask another question. In regard to James Earl Ray's criminal case, you made an agreement with the State of Tennessee, subject to the approval of Judge Battle, to enter a plea of guilty, is that correct?"

FOREMAN: "No, sir, that is not correct. I never made an agreement with the State of Tennessee subject to the approval of Judge Battle. All the agreements I made with the State of Tennessee were made with Judge Battle. I didn't talk with the prosecution about a plea. Judge Battle was running this lawsuit." (Emphasis added)

STONER: "On what date did Judge Battle and you get together on entering a plea of guilty?"

FOREMAN: "It wasn't a matter of getting together. I simply told Judge Battle what I decided was proper and what I would like to do and I was attempting to find out whether or not he would do what the Judge did in the Sirhan case, queer the deal, in case I was able to negotiate a plea with the District Attorney and a lot going through the District Attorney and a lot of work there and then come to see the Judge because the Judge, in California, had already indicated that he would not approve such a disposition of the Sirhan case." (Foreman Deposition at pages 15-16)

Foreman's statements, that he personally "didn't talk with the prosecution about a plea" but made all the agreements "with Judge Battle" (emphasis added), were made under oath. Therefore, only two possibilities exist: either Foreman's statements lack forthrightness and truthfulness, raising a question of perjury, in which case Petitioner's claim that he lacked effective and honest counsel is shown to be true; or, Foreman is telling the truth when he says he dealt directly with Judge Battle in establishing the guilty plea, in which case he violated Petitioner's legal rights and the requirements of legal ethics.

Foreman's deposition contains other admissions of frequent and prolonged private negotiations with the Judge over the guilty plea. The following exchange takes place at page 17 of the Foreman Deposition:

STONER: "Your conversations with Judge Battle where you told him what you wanted to do, was that in his chambers there in Memphis?"

FOREMAN: "Yes, sir, I met with Judge Battle many times, six or eight times."

Petitioner alleges that this direct negotiation of his guilty plea constitutes a fundamental violation of his rights of due process and equal protection of the laws, as contained in the United States and Tennessee Constitutions. Specifically, Petitioner alleges that Foreman's direct negotiation of the guilty plea with Judge Battle constituted a violation of section 3.3 of the American Bar Association's Standards Relating to Pleas Of Guilty. Section 3.3 requires that: "The trial judge should not participate in plea discussions."

In addition, Petitioner alleges that Foreman's direct negotiation of the guilty plea had to raise in Petitioner's mind the question of whether he could possibly receive a fair trial were he to go to trial before Judge Battle with Percy Foreman as his counsel. This affected the voluntariness of his plea. At the same time this history of prior negotiation between Judge Battle and Percy Foreman also made it difficult, if not impossible, for Judge Battle to objectively determine the voluntariness of the guilty plea when it was offered.

In this connection, Petitioner alleges that had Judge Battle been capable of making an objective judgement as to the voluntariness of Petitioner's Guilty Plea, he would have halted the trial proceedings on March 10 the very moment Petitioner stated in open court that he didn't agree that there was no conspiracy, and he would then have ordered that the Guilty Plea be withdrawn and a trial held.

II. THE TRIAL JUDGE ENTERED A JUDGEMENT UPON PETITIONER'S GUILTY PLEA WITHOUT MAKING A SUFFICIENT INQUIRY AS TO WHETHER THERE WAS A FACTUAL BASIS FOR THE PLEA

Section 1.6 of the ABA's Standards Relating to Pleas of Guilty reads as follows:

> "Notwithstanding the acceptance of a plea of guilty, the court should not enter a judgement upon such plea without making such inquiry as may satisfy it that there is a factual basis for the plea."

Petitioner alleges that Judge Battle failed to make an adequate inquiry into whether there was a factual basis for the Guilty Plea. Petitioner again points out that during the trial proceedings on March 10 Petitioner stated in open court that he didn't agree that there was no conspiracy involved

in the assassination of Dr. Martin Luther King. Even had Petitioner not made such statements in court, Petitioner submits that Judge Battle was required to ask certain questions of him in order to satisfy himself that there was a factual basis for the guilty plea. Specifically, Judge Battle should have inquired whether or not Petitioner fired the rifle shot which killed Dr. King, or was even in the bathroom from which Dr. King was allegedly shot at the time the shot was fired. The statements made by the Petitioner in open court on March 10 made it obligatory for the Trial Judge to ask such questions of Petitioner in order to establish that there was a factual basis for the guilty plea.

III. ATTORNEY PERCY FOREMAN VIOLATED LEGAL ETHICS AND THE LEGAL RIGHTS OF THE DEFENDANT BY COERCING DEFENDANT'S GUILTY PLEA

Petitioner alleges that Defense Attorney Percy Foreman violated section 3.2(a) of the ABA's Standards Relating to Pleas of Guilty, which reads as follows:

> 3.2 Relationship between defense counsel and client.
> (a) Defense counsel should conclude a plea agreement only with the consent of the defendant, and should ensure that the decision whether to enter a plea of guilty or nolo contendere is ultimately made by the defendant.

It is clear from the statement in Foreman's deposition which was quoted above that by his own admission he violated section 3.2(a). Part of that statement says: "I simply told Judge Battle what I decided was proper and what I would like to do and what I thought my client would like to do . . ." (emphasis added) Aside from the light this casts upon Foreman's rather curious notion of what is proper, the statement reveals that Foreman was negotiating the terms of the Guilty Plea on the basis of ". . . what I would like to do and what I thought my client would like to do . . ." (emphasis added) There is no indication in the statement that Foreman actually sought out Ray's opinion as to whether he wanted to negotiate a Guilty Plea. As a matter of fact, Mr. Foreman had actually authorized Hugh Stanton, Sr., to negotiate the Guilty Plea with the State nearly two months before his client had authorized him to negotiate any plea.

Thus, Mr. Foreman made no attempt to ensure that the decision to enter a guilty plea was actually made by the defendant; rather, he decided what he thought his client should do, which conveniently coincided with what Percy Foreman wanted to do.

In actual fact, as Petitioner has previously alleged, "consent" to a plea of guilty was given only under duress and only after Mr. Foreman had resorted to the most extraordinary measures, including fear, cajolery, and intimidation.

Further, once Petitioner's "consent" to the guilty plea was coerced, Mr. Foreman resorted to illegal and extralegal measures to keep Petitioner from withdrawing from his agreement to plead guilty. In addition to the bribery he used the day before the trial, Mr. Foreman also took the unusual step of traveling to St. Louis, where he met with relatives of James Earl Ray and asked that they use their influence to persuade the Defendant to plead guilty.

Petitioner submits that such measures are obviously not in accord with the ABA's standard which requires that defense counsel "should ensure that the decision whether to enter a plea of guilty . . . is ultimately made by the defendant." (emphasis added)

IV. ATTORNEY PERCY FOREMAN VIOLATED DEFENDANT'S LEGAL RIGHTS BY FAILING TO CONDUCT AN ADEQUATE INVESTIGATION INTO THE STATE'S CASE AGAINST HIS CLIENT

Section 3.2(b) of the ABA's Standards Relating To Guilty Pleas reads as follows:

> "(b) To aid the defendant in reaching a decision, defense counsel, after appropriate investigation, should advise the defendant of the alternatives available and of considerations deemed important by him or the defendant in reaching a decision." (emphasis added)

Petitioner alleges that Mr. Foreman failed to conduct an appropriate investigation into his guilt or innocence, or into the merits of the State's case against him, and that therefore Mr. Foreman was unable to properly advise him of the alternatives.

Mr. Foreman himself says he never asked Petitioner whether he was guilty of the murder of Dr. King. Petitioner alleges that Mr. Foreman also did not discuss the physical evidence of the crime with Petitioner.

Nor did Mr. Foreman take steps to have an appropriate investigation made of some of the most important, if not the most important physical evidence of the crime which his client is alleged to have committed. Specifically, Petitioner alleges that Mr. Foreman made no attempt to obtain a spectroscopic analysis of the bullet fragments in Dr. King's body and of the bullets allegedly left near the scene.

In the court proceedings on November 12, 1968, Foreman maintained that a defense counsel has an affirmative duty to attempt to interview all of the witnesses:

> "Now, the law of the United States Supreme Court and of the Court of Criminal Appeals which is our Supreme Court in criminal cases, and I am sure that of the State of Tennessee because while I haven't researched it in this State I have in many other of the common law states and everywhere I have found the uniform ruling in which the Supreme Court of that particular jurisdiction said that it is not only the right of defense counsel to interview all of the witnesses of the prosecution but that it is his duty to do that or at least to attempt to do that." (emphasis added) (November 12, 1968 transcript at pages 18-19)

Foreman also stated that he interviews all prosecution witnesses who will talk to him before he starts interviewing defense witnesses. However, there is no indication that Foreman attempted to interview even a majority of the prosecution witnesses before pleading Petitioner guilty, much less all of them.

The record is replete with indications that little was being accomplished investigatively. Foreman stated in court on February 14, 1969 that:

> "A proper preparation of this case requires that the London depositions, affidavits, exhibits, and testimony be available to Counsel

> for Defendant in order that he may brief the law of extradition and the Treaties between the United States and Great Britain, so as to file any preliminary motions revealed as necessary by such testimony from depositions and affidavits as may be included in the 200 pages referred to in Michael D. Eugene's letter of February 10, 1969."

Foreman also admitted in court that as of February 14, 1969, he had not received the approximately 200 pages of documents relating to the extradition proceedings in London. Thus, only three weeks before he was to plead his client guilty, Mr. Foreman admitted that he was not yet in possession of basic documents, documents which reflected upon his ability to properly advise Petitioner as to whether or not he should plead guilty.

On February 14, 1969, Petitioner's attorney submitted a Motion For Continuance in which it was stated that:

> ". . . investigators of the Public Defender's Office, Shelby County, have not completed and will not be able to complete an adequate investigation and interview of witnesses, so as to be prepared for trial on March 3rd . . ."

Although the Public Defender, Mr. Hugh Stanton, Sr., had stated in court on January 17, 1969, that:

> "We have started this investigation and accumulated quite a bit of material, enough to show us that there is work to be done."

it is clear that such progress as there was could at best be said to be painfully slow. Nearly a month later, on February 14th, Defendant's Motion for Continuance stated:

> "Approximately seven to ten days ago . . . Percy Foreman was able to obtain an additional 150 pages, more or less, of investigatory effort, which, for the first time, . . . furnished information upon which to base an investigation."

In short, Petitioner alleges that there is no credible evidence that Mr. Foreman made any appropriate investigation of the State's case against his client prior to "advising" him to enter a plea of guilty; rather, the evidence indicates that he did for James Earl Ray what he has said he does for other clients charged with murder: he extended to Mr. Ray the "courtesy" of assuming he was guilty. (Look, April 15, 1969, at p. 112)

Thus, the character of the legal representation afforded by Mr. Foreman was such that it added to the other pressures forcing Petitioner to plead guilty against his will. Taken together with the fact that Judge Battle had told the Defendant that he could not be permitted another change of attorneys, such pressures explain why defendant believed he had no alternative but to enter a plea of guilty he was opposed to giving.

V. ATTORNEY PERCY FOREMAN WAS NOT PHYSICALLY CAPABLE OF RENDERING EFFECTIVE AND COMPETENT LEGAL COUNSEL

On June 26, 1969, the Court of Civil Appeals of Texas affirmed the decision of a lower court which awarded Percy Foreman $75,000 for injuries arising out of an automobile accident in which Mr. Foreman suffered a whiplash injury. Approximately $65,000 of the $75,000 award was for past and future pain and suffering. In affirming the judgement, the Court of Civil Appeals declared:

> "Foreman testified that he has been in pain almost constantly since the accident except when he is moving . . . . He has not slept longer than an hour at a time since the accident except when he was in a hospital where he received medication to keep him asleep the full night." (Bluebonnet Express, Inc. v. Foreman, 431 S. W. 2d 45 (1968) at pages 46-47)

In its opinion the Court of Civil Appeals made clear what might otherwise be gathered by inference from the above passage and explicitly stated that the injuries Mr. Foreman had suffered would affect his performance as a lawyer, as Mr. Foreman himself had testified:

> "He (Foreman) testified that the lack of rest and the pain made him highly nervous and irritable to the extent that he is required to schedule important conferences for early in the mornings or not later than 10:00 in the morning . . . . In important cases he invariably engages some other lawyer to deal with his clients because of his nervous condition." (Bluebonnet, supra, p. 47)

As Petitioner has previously alleged, Mr. Foreman failed to secure the services of private counsel experienced in the practice of Tennessee criminal law, although he had assured Petitioner that he would do so. Aside from the deception which Mr. Foreman thus practiced on Petitioner and the Court by not carrying out his promise to hire another attorney, this fact may, in light of the above-quoted passage, reflect Mr. Foreman's opinion that the defense of James Earl Ray was not an important case, not the kind of important case in which "he invariably engages some other lawyer".

The Texas Court also quoted testimony given by Foreman which stated that his physical condition was worsening:

> "He testified that the pain, instead of getting better, has gotten worse from month to month and from year to year." (Bluebonnet, supra, p. 47)

In addition to the testimony offered by Foreman himself, the Court also quoted the testimony of a qualified physician who testified on Foreman's behalf. Excerpts from the Court's recapitulation of that testimony are given below:

> "Dr. Robertson stated that future medical care would be necessary by reason of his neck and back injury, and that he would need hospitalization at least one time a year, at a cost of about $600.00 per year, plus from $150.00 to $200.00 for doctor bills . . . . The witness stated that he did not believe a patient could go for a long period of time and perform work very well with the symptoms and the findings which the patient had . . ."

> "His injuries are calculated to cause pain and discomfort, and such pain and discomfort will occur in the future. The Doctor stated that he did not know whether appellee would ever get over his present injuries, but that from the experience he has had with him since 1962, he doubted whether Foreman would ever be completely rid of such injury, including the pain . . ." (Bluebonnet, supra, p. 48)

(please turn to page 52)

NEW PRODUCTS AND SERVICES

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
Digital		
BR-1018 computer	Uses range from military and aerospace to industrial / smaller than a desk telephone, the tiny size is possible through use of Bunker-Ramo's proprietary PLANAR COAX© packaging which reduces mainframe, memory, and input-output units to solid blocks equivalent in size to bars of soap / general specifications include: memory capacity, 8192 words (4906-word modules); 18-bit word size; 5 usec instruction time; repertoire of 43 instructions; under 10 pounds in weight / can be operated in any environment	Bunker-Ramo Corp. Electronic Systems Div. Western Technical Center 31717 La Tienda Drive Westlake Village, CA 91361
IBM System/3 Model 6	For use by almost any office worker / direct data entry from typewriter-like keyboard, "conversational" problem-solving and ledger card processing / typical configuration includes central processing unit with 8,192 character main core storage; 2.45 million character disk file; and 85-cps serial matrix printer	IBM Corporation Data Processing Div. 112 East Post Road White Plains, NY 10601 ATTN: Ed Nanas
IBM System/7	For real-time industrial and laboratory control applications; operates unattended in most environments / includes processor module, from 1 to 11 input-output modules, and an operator station / 400-nsec cycle time; 16-bit word length, parity checking; 2,048 to 16,384 words of monolithic storage, four priority interrupt levels	IBM Corporation Data Processing Div. 112 East Post Road White Plains, NY 10601 ATTN: Ed Nanas
LN5100 system	For industrial process control / basic package consists of LN5100 CAMP(Controls And Monitoring Processor) system programs and LN5100 standard control system hardware capable of scanning, alarming and logging process instrument input signals / LN5100 includes one usec cycle time; 16-bit memory word size, memory expandable from 4K to 65K words with 8K mainframe; 2 usec add time; repertoire of 72 instructions / standard system can be customized to meet special application requirements	Leeds & Northrup Co. North Wales, PA 19454 ATTN: K. W. Conners
Model 108 and Model 116 Minicomputers	Software compatible with CAI's earlier models, both minicomputers operate at 1.6 usec / machines also are I/O compatible with their predecessors using same line printer interface circuitry	Computer Automation, Inc. 895 West 16 Street Newport Beach, CA 92660
ND 812 computer	Stand-alone system for various general purpose as well as dedicated uses / provides 8,192 words of core memory, directly addressable using two-word instructions / includes 16 memory reference instructions; double accumulators with individual sub-accumulators; hardware multiply and divide; and four-level priority interrupt	Nuclear Data, Inc. 100 West Gulf Road Palatine, IL 60067
UNIVAC 1110 computer	Firm's largest, most powerful general-purpose system / minimum system includes two Command/Arithmetic Units (CAU's) and one Input/Output Access Unit (IOAU) / main storage is non-destructive-readout plated wire; operates at read speed of 320 nsec and a write speed of 520 nsec / also includes core storage, available in 131,072 word modules from minimum of 262,144 to 1,048,576 words with cycle time of 1.5 usec / new system employs both multiprocessing and multiprogramming	Sperry Rand P. O. Box 500 Blue Bell, PA 19422 Attn: Peter R. Sigmund or Michael M. Maynard
Westinghouse 2500	For industrial, communications and scientific markets / modular construction permits hardware and software expansion in field / memory speed, 850 nsec; 16-bit word length; 4096 words core memory expandable to 65, 536 words / wide range of hardware options; full line of peripherals	Westinghouse Electric Corp. 1200 West Colonial Drive Orlando, FL 32804
Special Purpose Systems		
CL-II Clinical Data Processing System	For maximum utilization of automated laboratory analysis equipment with minimum manual intervention / technologist controls system computer in familiar laboratory terms / up to 2,000 patient samples accommodated at any one time / 20 input channels accept data from variety of sources / expandable capability through modular design	Infotronics Corp. Clinical Systems Group 8500 Cameron Road Austin, TX 78753

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
(Special Purpose Systems, continued)		
IDAS (Information Displays Automatic Drafting System)	Designed primarily for non-dimensional topological drawings; also can be used to store and revise old drawings, and to generate second-level documentation / software permits operator with no programming experience / hardware consists of IDIIOM computer-driven interactive display system with a 16K, 16-bit-word core memory; disc pack and tape drives; paper tape reader and punch; and electronic keyboard / IDADS can interface with incremental plotters and other commonly-used hardcopy devices capable of accepting binary-coded information	Information Displays, Inc. 333 N. Bedford Road Mt. Kisco, NY 10549
Varitext©, an automated text-setting system	Output of camera-ready text at rate of 200 pages-per-hour / includes digital tape transports using standard, Philips-type cassettes to record original and revised inputs at each Selectric typewriter terminal; a high-speed line printer; and a Varian 620/i minicomputer to automate all operations via stored formats and instructions / two separate systems available to accommodate various applications and workloads	Varian Data Machines 2722 Michelson Drive Irvine, CA 92664 Attn: Larry Cechin
Memories		
Disk File Systems	DM-312 disk drive and DC314 disk storage control unit are direct plug-to-plug replacements for the IBM 2312 disk drive and 2314 control unit / minimum, average and maximum access times of the disk drive are 8, 32 and 58 msec., respectively / DC-314 control unit interfaces directly with all IBM models with a minimum data transfer rate of 312,000 bytes per second; disk packs recorded by Ampex unit are fully IBM interchangeable	AMPEX Corporation 9937 West Jefferson Blvd. Culver City, CA 90230 Attn: Chris Hoppin
M-200D Disc Memory System	For industrial process control applications and for small computers / 8.7 msec average access time / storage capacities from 265,000 to 6,400,000 bits / 16 to 128 tracks on single 12-inch diameter nickel cobalt disc / head-per-track configuration / compatible with any computer family	Applied Magnetics Corp. 75 Robin Hill Road Goleta, CA 93017
Series 6000 systems	Mass memory systems for Honeywell H-112, H-316 and H-516 minicomputers / includes rotating drum mass memory, a controller, power supplies and inter-connecting cables for a direct connection to the DDC channel of the H-112 computer, or the DMC channel of the H-316/H-516 computers / one controller may control to four drum memory units / 8.7 msec average access time; 62 or 128K wps transfer rates; storage capacities from 32,000 to 262,000 words	DATUM, Inc. 170 E. Liberty Avenue Anaheim, CA 92801
2048-Bit Read-Only Memories	The 3507 and 3590, new MOS integrated circuits in 24-lead dual-in-line packages, are identical except for their format / 3507 is organized as 256 words x 8-bits; 3580 is 512 words x 4-bits / each has three chip select gates that are customized according to customer's program requirements / access time typically less than 1.3 usec over full temperature range — 0°C to +70°C	Fairchild Semiconductor 313 Fairchild Drive Mountain View CA 94042 Attn: Jack K. Ayre
Software		
COBILITY	A multi-function COBOL UTILITY program / automatically performs many of tedious functions necessary for program development and maintenance / package includes installation, user training, manuals, maintenance / leasing arrangements available	Data Technology, Inc. 206 N. Washington St. Alexandria, VA 22314
Dump/Restore/Copy	Software package speeds up Dump/Restore/Copy backup and provides 100% verification of restored or copied data / for S/360 Disk Operating System computers using 2311 or 2314 disk drives / software package includes program object decks ready to catalog, documentation, maintenance, and source programs	Marketing Department Westinghouse Tele-Computer Systems Corporation 2040 Ardmore Blvd. Pittsburgh, PA 15221
GASO	Optimization program for gasoline blending / essentially a mathematical model of an ASTM D-86 still / can be used to maximize profits by selecting that blend which meets octane and ASTM 90 ratings at lowest cost; also to minimize lead content and still meet ratings for both gasoline grades / demonstrations offered to interested firms	Sci-Tek, Inc. Computer Center Inc. 1707 Gilpin Avenue Wilmington, DE 19806

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
(Software, continued)		
IAM (Interactive Algebraic Manipulation)	For the engineer, mathematician or scientist / a proprietary system designed to handle analysis and solution of large-scale algebraic problems / capabilities include over 45 built-in functions which represent standard functions and operations in applied mathematics / available through ADR's time-sharing service; also may be licensed or leased on the users own PDP-10 computer	Applied Data Research, Inc. Route 206 Center Princeton, NJ 08540
MATCH	Circuit design program for engineers / automatically optimizes electronic circuits / easy-to-learn command language permits free format input / provides output flexibility / available on AL/COM Time Sharing Service; uses standard teletypewriter to access program	Applied Logic Corporation 1 Palmer Square Princeton, NJ 08540 Attn: Thomas A. Grant
VIPcom '71	Text processing software for 360 computers / contains over 100 modifications and extensions of ATS/360 and related software according to President Joan M. Van Horn / now offered for rental or purchase for use on customers' own 360 computers	VIP Systems Corporation 1145 19 Street, N.W. Washington, DC 20036 Attn: L. W. Frazier
Peripheral Equipment		
Auto-Pro 3500 Digital Plotter	For processing time share data from scientific instruments / performs as both an incremental digital plotter and a standard 10" analog strip chart recorder / plots in forward or reverse on standard roll chart paper	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, Calif. 92634 Attn: Pat Anderson
CR11/CM11 Card Reader	For PDP-11 computers / reads EIA standard data cards in either punched or mark sense format / reads up to 200 cpm under program control / information may be read in 12-bit or in an 8-bit format for condensed packing	Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754 Atten: Dennis C. Goss
CompuScan Model 170, Page Reader	For printing and publishing industry / upper and lower case scanner permits corrections to be made at any stage in manuscript preparation / capabilities include scanning pages of variable size at rate of 100 cps; on line error correcting; extensive editing facilities; variable output	CompuScan, Inc. 900 Huyler St. Teterboro, N.J. 07608 Attn: Donald Busch
DATA-KAP Model 811 Receiver/Converter	Converts cassette data to ½" computer-compatible tape / performs in off-line mode / output either 7 or 9 track EBCDIC, 200, 556, or 800 BPI / other codes available	Electronic Laboratories Inc. 3726 Dacoma St. Houston, Texas 77018
Friden® Model 800 Individual Store and Forward Module	Self-contained magnetic tape device / provides intermediate storage of input from data terminals prior to ASCII data telephone transmission to computer / can store data from current activity while forwarding previously recorded data / transmission rate, 120 cps	Friden Div., The Singer Co. 2350 Washington Ave. San Leandro, Calif. 94577 Attn: W. J. Bettencourt
PortaCom, a portable communications terminal	For consultant engineering field / travels in attache case; under 30 lbs. with all options / full page computer printout, up to 3 carbon copies / built-in acoustic coupler for instant computer access / standard ASCII keyboard, teletype compatible / also designed to interface with tape cassettes	Data Products Corp. Telecommunications Division 17 Amelia Place Stamford, Conn. 06904 Attn: John Cooke
Printer, Model 828	Designed specifically to eliminate delays in buy/sell orders on floor of stock exchanges / can receive and print 60 trading orders a minute / produces an order ticket in format accepted and approved by Floor Committee of both New York and American Stock Exchanges	Shepard Division of Vogue Instrument Corp. 131st Street & Jamaica Ave. Richmond Hill, N.Y. 11418
Silent VDT-3 terminal	90% less noise than standard TTY terminals / mobile / communicates with computer over ordinary voice grade telephone lines / 96 USASCII characters including upper case alphabetics, numerics	Vernitron Corp. Data Devices Division 176 Central Ave. Farmingdale, N.Y. 11735
Computer-Related Services		
Electrocardiogram processing by telephone	For hospitals, diagnosticians and cardiologists offices; also, industrial plants where regular checkups include ECGs / ECG machine is linked to computer by telephone; computer performs analysis of all pertinent ECG readings / report is teletyped or mailed to origin of ECG	Boeing Computer Services The Boeing Company Seattle, Wash. 98124
Product Quality Evalustion Service	"Computer on Wheels", a mobile computer data logger / GE's Drive Systems Department's on-site method of reporting the producing capability of a hot or cold mill / all-weather, self-contained trailer unit contains GE-PAC® 4020 computer system for measuring and logging strip gage or width deviations in mils / complete report on operation of mill available in 2 to 3 weeks	General Electric Co. 1 River Rd. Schenectady, N.Y. 12305 Attn: R. D. Bartnett

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Century Data Systems, Anaheim, Calif.	Burroughs Corp., Detroit, Mich.	Supplying computer disc drive memory systems over a three-year period	$25+ million
Collins Radio Co., Dallas, Texas	McDonnell Douglas Corp.	Work as prime contractor to provide the area-inertial navigation system for new DC-10 advanced technology tri-jet transport	$8.5 million (approximate)
Computer Sciences Corp., Los Angeles, Calif.	U.S.Navy Purchasing Office	Full development of an acoustic intelligence data system for the Naval Scientific and Intelligence Center at Suitland, Md.	$6.5 million
Univac Division of Sperry Rand Australia Limited	Trans-Australia Airlines (TAA), Melbourne, Australia	A computer system to provide TAA's reservations services throughout Australia; will consist of two UNIVAC 494 real-time computers and associated peripheral equipment	$5.5 million (approximate)
Computer Sciences Corp., Los Angeles, Calif.	NASA, Goddard Space Flight Center, Greenbelt, Md.	A 2-year contract to provide programming and computer support services for manned space flight network computing system; contract includes 1-year extension option to make total value approximately $7.5 million	$5 million
Tempo Computers, Inc., Fullerton, Calif.	Tracor Data Systems, Austin, Texas	100 TEMPO I computer systems to be utilized in medical, scientific, and business applications	$4.8 million
California Computer Products, Inc., Anaheim, Calif.	Veteran's Administration	Installation of CalComp CD1 and CD22 disk drives and a CD14 controller to replace IBM disk drive memory systems in Chicago, Washington, D.C., and Austin, Texas	$3.5 million
Di/An Controls, Inc.	Computer Sciences Corporation, Los Angeles, Calif.	Providing 1,000 ticketing terminals as part of New York City's Off-Track Betting System	$2.6 million
Telefile Computer Corporation, Newton, Mass.	Cox Data Systems, Inc., Atlanta, Ga.(subsidiary of Cox Broadcasting Corp.)	Three Telefile systems; DPE-411 management information system — an on-line data base management information system	$2.5+ million
Univac Division of Sperry Rand Corporation, Blue Bell,Pa.	Deere & Company, Moline, Ill.	22 UNIVAC 9200 and 9300 model third-generation computers to be installed in U.S. and Canada; some will operate as remote data terminals;others to handle business applications	$2.5 million (approximate)
The Plessey Company Limited's Components Group, England	International Computers Limited, London, England	Plated wire computer memory systems	$2.1+ million
Control Data Corporation, Minneapolis, Minn.	Prakla, Hannover, Germany	A super-scale Control Data 6600 computer system for land and marine seismic data processing applications	$2.1 million
Wyle Computer Products, Inc., El Segundo, Calif.	Computer Sciences Corporation, Los Angeles, Calif.	Data terminals for New York City's Off-Track Betting System, to include approximately 1150 Wyle Computerminals® in 100-200 offices and a telephone betting exchange.	$2+ million
Control Data Corporation Minneapolis, Minn.	Northern States Power Company	Installation of a CDC computerized data gathering and control system.	$1.8 million
Burroughs Corporation, Detroit, Mich.	Banque Industrielle et Commerciale de La Region Sud (B.I.C.S.), France	Two Burroughs B 3500 electronic computer systems to establish data communications network to provide more flexible and efficient banking services to B.I.C.S. customers	$1.6+ million
Raytheon Company, Sudbury, Mass.	Federal Aviation Administration	Establishment and operation of a testbed facility for display systems for the nation's automated air traffic control network	$1.5 million
International Computer Products, Inc., Dallas, Tex.	Takachiho Koheki Co., Ltd., Tokyo, Japan	Digital cassette recording devices including ICP's Digideck, Digicorder and Keycette	$850,000+
Computek, Inc., Cambridge, Mass.	First National Bank of Chicago	Equipment to be used in an interactive information retrieval and analysis system for the bank's trust department	$360,000
Computer Sciences of Australia	Australian Customs and Excise Department	Design and implementation of an automated system for speeding up the clearance process for commodity imports	$200,000+
Informatics Inc., Canoga Park, Calif.	U.S. Government, Electronic Systems Division, Air Force Systems Command	A computer software product, outlining for all federal agencies terms, conditions, and prices for acquisition of the MARK IV File Management System	—
GT&E Information Systems,Inc., Commercial Electronics Division, Chicago, Ill.	The Atchison, Topeka and Santa Fe Railway, Kansas City, Kansas	Production of nine KarTrak© Automatic Car Identification systems and installation at the railroad's new $12 million Argentine yard	—
Sanders Associates, Inc., Nashua, N.H.	General Electric Company, Phoenix, Ariz.	Four computer driven graphic display systems for training and education at the U.S.Air Force Institute of Technology, Wright Patterson Air Force Base, Ohio	—
Control Data Corp., Professional Services Division, Minneapolis, Minn.	National Co-operative Highway Research Program	Studying the use of interactive computer-graphics in the design of U.S. highways	—
Molsler Information Systems, Milford, Ohio	Essex County Sheriff's Department, Newark, N.J.	High-speed microfilm information storage and retrieval system providing one of the most advanced systems in the country	—
Collins Radio Company, Dallas, Tex.	Western Electric Company, Baltimore, Md.	Advanced processing system for communication, computation , and control functions	—
Xerox Data Systems El Segundo, Calif.	CAE Electronics, Ltd. Montreal, Quebec	Six Xerox Data Systems Sigma 3 computers for DC-10 pilot training	—

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B6500 system	Institute Nacional da Providencia Social, Brazil	Processing social security documents, handling payment benefits and collection of all company contributions; also to monitor medical reports (system valued at $2 million)
Control Data 1700 system	University of Arkansas Medical Center, Little Rock, Ark.	Retrieval of information on migratory workers' children, part of a Migratory Student Project (system valued at $700,000)
Control Data 3400 system	Petroleos Mexicanos (PEMEX), Veracruz and Tamaulipas, Mexico	First phase of PEMEX plan to provide business and seismic data processing services at its oil fields
Honeywell Model 115 system	Arvada State Bank, Arvada, Colo.	A variety of banking and general accounting applications
	Mahaska State Bank, Oskaloosa, Iowa	A variety of banking and general accounting applications
Honeywell Model 4200 system	California Canners and Growers, San Francisco, Calif.	Production control, sales and marketing reports, inventory control, and order processing; also general accounting procedures and field research
IBM System/3	Allied Artists, Inc., New York, N.Y.	Processing bookings, invoicing, sales analysis and theater listings.
	Bachrachs Fine Men's Wear, Decatur, Ill.	Inventory control, sales and inventory analyses; also billing and payroll
	McCarty Corp., Baton Rouge, La.	Profits analysis, inventory control, payroll records and paychecks; soon to do job costing and general ledger accounting
	Mr. Gasket Co., Cleveland, Ohio	Production, inventory and marketing control functions
	Murray Distributing Co., Charlotte, N.C.	Inventory control; also to centralize invoicing, accounts payable and receivable, sales analyses, and general accounting
	Pepsi-Cola Syracuse Bottlers, Inc., Syracuse, N.Y.	Sales analyses; later to include payroll, general ledger and billing chores
IBM System/360 Model 20	Duckwall Stores, Inc., Abilene, Kans.	Accurate inventory-taking and store reporting; also reduce outages by letting buyers know in advance what and when to re-order
	Franzia Brothers Winery, Ripon, Calif.	A variety of accounting tasks, plan production, and sales analyses
	South Carolina State Agency of Vocational Rehabilitation, Columbia, S.C.	Helping state double vocational rehabilitation assistance; administrative work, staff payroll, accounting records and as a management tool
IBM System/360 Model 25	Mid-Southern Toyota Distributors, Inc., Franklin Park, Ill.	Keeping track of and processing orders for over 50,000 different kinds of parts; also monitors car shipments from U.S. arrival to dealer delivery
IBM 1130 system	Professional Photographers Color Corp., Inc., Beloit, Kans.	Management control of film processing and printing of color photographs for portrait and wedding photographers coast to coast
NCR Century 100 system	Cedar Rapids Municipal Bldg., Cedar Rapids, Iowa	Utility billing and voter registration, with payroll and budget reporting to follow
	Escondido Finance Dept., Escondido, Calif.	Producing payroll; will move into other municipal finance operations, water dept. billing to be next
	Verifine Dairy Prod., Inc., Sheboygan, Wisc.	Various accounting procedures, including accounts receivable, accounts payable and route records
NCR Century 200 system	Security First National Bank, Sheboygan, Wisc.	Nucleus of a Central Information File to maintain complete banking history of each customer in a single location
RCA Spectra 70/60 system	Regional Crime Information Center, Cincinnati/Hamilton County, Ohio (2 systems)	Replacement of 2 smaller systems; expansion of law enforcement, city and county administrative programs; Health Dept. records and Water Dept. billing
UNIVAC 1106 system	Calculo y Tratamiento de la Informacion, (C.T.I.) S.A., Madrid, Spain	Production control applications (system valued at approximately $1.5 million)
UNIVAC 1108 system	University of Houston Houston, Tex.	Hub of a complex serving students, faculty members and administration; will provide real-time and batch data processing (system valued at $2.5 million)
UNIVAC 9200 system	ECPI of Boston, Boston, Mass.	"Hands-on" training for students in computer operation
	Northern Electric Co., Ltd., Research and Development Laboratories, Montreal, Canada	On-line terminal to the central computer in Ottawa; to be used with development of switching systems and telecommunications
	Royal York Hotel, Toronto, Canada (2 systems)	Night auditing procedures, billing, checkouts, and general accounting
	Thermotech, Minneapolis, Minn.	Material control, general accounting and payroll processing
	Tri-Data, Saugus, Mass.	Teaching students the fundamentals of data processing
UNIVAC 9300 system	Cointreau Group, Paris, France	Billing and order procedures, management problems, general accounting and stock control; will handle export orders and coordinate studies in the firm's Common Market subsidiaries
XDS Sigma 3 system	University of Utah, Salt Lake City, Utah	Testing designs for artificial hearts, emergency circulation-aid devices, and temporary devices to aid the heart in post surgery convalescence

(continued from page 44)

The Texas Court summed up the situation by saying:

> "Appellee is a busy and active trial attorney . . . . His injuries are calculated to cause intense pain. The pain and anguish interfere with his sleep and interfere with his work. He will, from the evidence, have this pain into the future as a result of the accident involved, and his doctor doubts that he will ever be rid of it." (Bluebonnet, supra, p. 49)

To the summation by the Court of Civil Appeals Petitioner adds that the court record in his case shows that Mr. Foreman was sick and confined to bed from December 23, 1968 through January 20, 1969, except for one two-day period. This bout with pneumonia caused more than 27 of the original 101 days which the Court had allotted for preparation of the case, to be lost on account of sickness. Additional time had also been lost by virtue of the need for Mr. Foreman to re-arrange his busy court schedule. The Court recognized that Mr. Foreman was unable to conduct any investigation at all or to prepare for trial. Judge Battle attempted to circumvent this situation by instructing the Public Defender, whom Petitioner did not want as his counsel, to prepare himself to represent Petitioner at his trial. In fact, Judge Battle, without securing Petitioner's consent, appointed the Public Defender as full co-counsel.

Further, Petitioner alleges that Mr. Foreman also suffered from loss of hearing which affected his ability to render effective counsel. In a statement to the Court, Mr. Foreman described the difficulties he labored under in trying to communicate with Petitioner:

> ". . . the actual mechanical contrivances in all maximum security sections of any jail. is a network of small wires, so tiny and so thick, Your Honor, that it is impossible for a conversation to be carried on and thoroughly understood. My own situation is such that I cannot understand. I'm afflicted, almost totally deaf in my right ear and impaired to some extent in my left. . . ." (Proceedings in court on February 7, 1969 at p. 67 of the transcript)

Even where the acoustical surroundings were much more conducive to hearing than they were in the jail, Mr. Foreman's hearing sometimes gave him trouble:

> "I only heard the last sentence, Your Honor, due to my lack of hearing." (Court proceedings on February 14, 1969 at page one of the transcript)

VI. ACTIONS BY STATE OFFICIALS DENIED PETITIONER HIS RIGHT TO CONSULT WITH COUNSEL AND HIS RIGHT TO FILE A PROPER MOTION FOR A NEW TRIAL

Petitioner alleges that his motion for a New Trial failed because of the obstructive intervention by state officials. Specifically, Petitioner alleges that on March 26, 1969, the Warden at the State Penitentiary at Nashville, Lake Russell, denied access to Mr. Richard Ryan, a Memphis Attorney whom Petitioner had asked to represent him. It is Petitioner's belief that this denial was made with the approval of Mr. Harry Avery, then Commissioner of Corrections. This denial of Petitioner's right to consult with counsel of his choice at this crucial time was of critical importance, since Mr. Ryan had brought with him a formal Motion For a New Trial for Petitioner's consideration, approval, and signature. Because of this denial of counsel, the requests which Petitioner had previously submitted were held not to be in proper legal form, and thus Petitioner was not granted a New Trial as he otherwise automatically would have been, upon Judge Battle's unfortunate demise.

This flagrant denial of Petitioner's rights was accompanied by others which had the same effect:

1) After denying Petitioner the right to consult with counsel, prison officials also refused to grant Petitioner access to law books. Consequently, he was unable to determine what the proper form of the Motion For a New Trial should be.

2) Delay in transmitting Petitioner's letters stating he wanted a new trial meant that Judge Battle was unaware of this, as he otherwise should have been, before he went on vacation.

3) The Prosecutor, Prosecutor's Office, and the Judge pressured another attorney, Russell X. Thompson, to desist from further investigation of information he had as to others involved in a plot to assassinate Dr. King.

VII. PLEA BARGAINING IN THE INSTANT CASE IS UNCONSTITUTIONAL AND, LEAVING OTHER GROUNDS ASIDE, IS SUFFICIENT CAUSE FOR GRANTING A NEW TRIAL TO PETITIONER

A. Plea Bargaining At Best Is Of Doubtful Constitutionality.

The practice of plea-bargaining is subject to fundamental objections as to its constitutionality:

> "The Constitution establishes an accusatorial system of public trials to determine the guilt of persons charged with crimes. The fifth amendment privilege against self-incrimination and the sixth amendment rights to confront one's accusers, to have compulsory process for obtaining favorable witnesses, and to stand trial by jury are available to anyone accused of crime. But by inducing waiver of the constitutional rights, plea bargaining systematically undermines these protections, substituting administrative determination of guilt for the decisions of judge and jury." (83 Harvard Law Review 1387, at 1395; see also ABA Standards Relating To Pleas Of Guilty, supra)

One consequence of this systematic undermining of constitutional protections is that the plea may not be accurate. (See Harvard Law Review, supra, at 1394)

As recently as 1969, the Supreme Court of the United States has cast serious doubts as to the constitutionality of plea bargaining under certain state practices. (See North Carolina v. Pearce, 395 U.S. 711)

B. Plea Bargaining In The Instant Case Was Unconstitutional.

Petitioner alleges that plea bargaining in the instant case was a violation of the fifth and sixth Amendments to the Constitution of the United States because, as a result of a number of interacting forces, all beyond Petitioner's control, Petitioner's plea was involuntary. These interacting forces, inter alia, were as follows:

1. Conditions of confinement over a period of many months made Petitioner incapable of rational

(please turn to page 55)

C·a NUMBLES

NUMBER PUZZLES FOR NIMBLE MINDS –AND COMPUTERS

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:

Stuart Freudberg
Newton High School
Newton, Mass.

NUMBLE 7012

```
          D I S C R E
        ×     T I O N
        S N O E O A S
      S I S S O I T          C = F = M
    S D I F N S I            RU = HA
  D U S I I R H
= D S I T E M I O T S
+             I S
+           T H E
= D S I T E C O I N I    4072 9052 3769 84084
```

Solution to Numble 7011

In Numble 7011 in the November issue, the digits 0 through 9 are represented by letters as follows:

M,V,W = 0	D,R = 5
G,T = 1	N = 6
I = 2	F = 7
S = 3	O = 8
E = 4	L = 9

The full message is: Offended self-esteem will never forgive.

Our thanks to the following individuals for submitting their solutions – to **Numble 7010**: Marijoe Bestgen, Riverdale, N.Y.; A. Sanford Brown, Dallas, Tex.; T. P. Finn, Indianapolis, Ind.; Frank Komorowski, West Chester, Pa.; Andrew L. Nachby, Norwalk, Conn.; Lambert J. Simon, Irving, Tex.; Robert R. Weden, Edina, Minn.; and Brian C. Whitaker, San Diego, Calif. – to **Numble 709**: G. P. Petersen, St. Petersburg, Fla.

C·a PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 7012: THE BUSY PROGRAMMER

"Pete is a real old-fashioned programmer," Al observed. "He'll never get used to hexadecimal."

"He hasn't even gotten used to our time and date system," Bob said. "Whenever he gets a run back with something like 70335 at the bottom he crosses it out and writes Dec. 1, 1970 instead."

"Must keep him pretty busy. He puts in quite a few programs every day."

"Well, he's the kind of guy who amuses himself by seeing all sorts of relations between things that no one else would notice. Like that fellow who noticed that the car that hit him had an interesting license number – the smallest number that could be expressed as the sum of two cubes in two different ways."

"Don't tell me he's been making up problems with license numbers now."

"No, but I remember he once pointed out to me that the number of the day he was crossing out was the square of the date, the day of the month, that is."

Al made a few calculations. "Must have been April 10. That would come out 70100."

"Yes, but this was two years ago, and that was a leap year."

What day was it?

Solution to Problem 7011: A Play at Right End

$\sum_{i=0}^{n} a_i 8^i = \sum_{i=0}^{n-1} a_i 10^{i+1} + a_n$ has no solution in positive integers less than 8 if n is 1, 2, 3, 4 or greater than 5. But for n=5, $517163_8 = 171635_{10}$. The number Pete wrote down was, therefore, 517163.

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.

ADVERTISING INDEX

Following is the index of advertisements. Each item contains: Name and address of the advertiser / page number where the advertisement appears / name of agency, if any

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 NOVEMBER 15, 1970

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	20	20	10
Oslo, Norway	NORD-2B	8/69	4.0 (S)	0	2	2	3
(A) (Sept. 1970)	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	11	11	6
(A) (Sept. 1970)							
Elbit Computers Ltd.	Elbit-100	10/67	4.9 (S)	-	-	150	50
Haifa, Israel							
(A) (Sept. 1970)							
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
(Sept. 1970)	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	0.9	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	0	1690	1690	C
	Elliott 4120/4130	10/65	2.4-11.4	0	160	160	C
	System 4-30 to 4-75	10/67	5.2-54	0	138	138	C
							Total: 525
Japanese Mfrs.	(Mfrs. of various models include: Nippon Electric Co., Fujitsu,						
(N) (Sept. 1970)	Hitachi, Ltd., Toshiba, Oki Electric Industry Co., and Mitsubishi Electric Corp.)					Total: 4150 E	Total: 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)							
Saab-Scania Aktiebolag	D21	12/62	7.0	0	38	38	-
Linkoping, Sweden	D22	11/68	15.0	0	24	24	3
(A) (Nov. 1970)	D220	4/69	10.0	0	9	9	6
Siemens	301	11/68	0.75	-	-	56	C
Munich, Germany	302	9/67	1.3	-	-	27	
(A)	303	4/65	2.0	-	-	67	C
(Sept. 1970)	304	5/68	2.8	-	-	57	43
	305	11/67	4.5	-	-	73	C
	306	-	6.5	-	-	-	C
	2002	6/59	13.5	-	-	40	C
	3003	12/63	13.0	-	-	35	C
	4004S	-	4.0	-	-	4	C
	4004/15/16	10/65	5.0	-	-	97	C
	4004/25/26	1/66	8.3	-	-	47	C
	4004/35	2/67	11.8	-	-	164	C
	4004/45	7/66	22.5	-	-	208	C

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 (Cont'd.)	4004/46	4/69	34.0	-	-	7	C
	4004/55	12/66	31.3	-	-	16	C
	404/3	-	1.1	-	-	-	C
							Total: 274
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIR	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	ONEGA 2	-	-	-	-	C	C
	URAL 11/14/16	-	-	-	-	C	C
	and others	-	-	-	-	C	C
						Total: 6000 E	Total: 2000 E

(continued from page 52)
decision in regard to any plea.

2. Plea bargaining by attorneys Foreman and Stanton began long before Petitioner had been consulted about a guilty plea; Petitioner was, in effect, presented with a fait accompli by his attorneys, both private and court-appointed.

3. Petitioner was threatened with a "99% chance of barbecuing", despite the fact that no person had been executed in Tennessee for a decade, and the constitutionality of the execution of prisoners under any circumstances is currently before the United States Supreme Court for decision; if the death penalty should be declared unconstitutional, certainly plea bargaining based on the threat of a death sentence would be unconstitutional.

4. Petitioner's lawyer, Foreman, has publicly admitted that he "assumed" Petitioner's guilt at the outset (Look, April 15, 1969 at page 112); to the court, however, he maintained that: "I am presuming as the law requires me to and all of us to do, the innocence of my client . . ." (November 12, 1968 transcript at page 20)

5. The Public Defender actively began plea bargaining the very day that he entered the case.

6. Finally, as the Trial Judge later admitted, the State achieved a "good deal" because, had the case gone to trial, Petitioner might have been acquitted.

C. Plea Bargaining In The Instant Case Violated Due Process.

Petitioner further alleges that plea bargaining as it was carried out in his case violated his constitutional right to due process. Traditionally, a crime is an act committed against the state. Under the Constitution, States are delegated the responsibility of administering justice where acts are alleged to have been committed against the state. However, in the instant case Petitioner's plea was subjected to ratification or approval by organizations or authorities not charged with any responsibility in trying Petitioner for the crime of first degree murder. Specifically, Petitioner alleges that his plea was ratified or approved by the Justice Department, and that this intervention into the judicial processes of the State of Tennessee is a violation of his right of due process and equal treatment of the laws.

WHEREFORE, for all of the above reasons, Petitioner hereby respectfully requests that he be permitted to withdraw his plea of guilty and be permitted to enter a plea of not guilty and to stand trial on the charges against him.

Respectfully submitted,

Bernard Fensterwald, Jr.
927 15th Street, N.W.
Washington, D.C.
(Attorney for Petitioner)

Robert Livingston
940 Commerce Title Bldg.
Memphis, Tennessee
(Attorney fo Petitioner)

Richard J. Ryan
Falls Building
Memphis, Tennessee
(Attorney for Petitioner)

Of counsel:
James H. Lesar
925 15th Street, N.W.
Washington, D.C.

REPORT FROM AUSTRALIA (Continued from page 35)

A revolutionary approach towards lessening the cost of business data processing is being claimed for an information flow system developed in Melbourne and based on a cheap mini-computer.

The system is based on three factors – an extremely powerful operating system, understanding of the needs of commercial EDP users, and the development of an unusually effective data base.

The operating system can handle a large number of programs and at the same time handle the execution of data in the data base.

The systems and programming company, which developed the new approach, claims it can offer an on-line system capable of handling all aspects of commercial operations, with potential savings over conventional installations that rely for computer power on a larger central processing unit.

In a recent demonstration for the Victorian Employers' Federation, a Fairchild Nova computer, selling in Australia at a basic price of about $A5000, was employed, but equivalent machines of other suppliers would be equally suitable.

All communication with the system is by typewriter-like terminals, and there is provision for using CRT display as well.

It has been estimated that a small business could set up an in-house system requiring no specially trained operators for about $A150,000.

W. R. Cooper

W. R. Cooper
Wahroonga, N.S.W.
Australia

CALENDAR OF COMING EVENTS

Dec. 2-3, 1970: Conference on Display Devices, United Engineering Ctr., New York, N.Y. / contact: Sam Stone, Gen l Tel. & Elec., 208-20 Willets Pt. Blvd., Bayside, N.Y. 11360

Dec. 7-9, 1970: 9th IEEE Symposium on Adaptive Processes: Decision and Control, Univ. of Texas, Austin, Tex. / contact: Prof. D. G. Lainiotis, Engineering Science Bldg., 502, Univ. of Texas at Austin, Austin, Tex. 78712

Dec. 7-9, 1970: 26th Annual National Electronics Conference and Exhibition (NEC/70), Conrad Hilton Hotel, Chicago, Ill. / contact: NEC, Oakbrook Executive Plaza #2, 1211 W. 22nd St., Oak Brook, Ill. 60521

Dec. 9-11, 1970: Fourth Conference on Applications of Simulation, Waldorf-Astoria, New York, N.Y. / contact: Association for Computing Machinery, 1133 Avenue of the Americas, New York, N.Y. 11036

Jan. 31-Feb. 5, 1971: IEEE Winter Power Meeting, Statler Hilton Hotel, New York, N.Y. / contact: IEEE Headquarters, Technical Conference Service, 345 E. 47th St., New York, N.Y. 10017

Feb. 17-19, 1971: Sixth Annual Conference on Use of Digital Computers in Process Control, Louisiana State Univ., Baton Rouge, La. / contact: Dr. Cecil L. Smith, Dept. of Chemical Engineering, Louisiana State Univ., Baton Rouge, La. 70803

Feb. 22-24, 1971: DPI's 1971 Data Processing Conference and Trade Show, Skyline Hotel, Ottawa, Ontario, Canada / contact: Revett Eldred, Conference 71 Publicity, Data Processing Inst., Box 2458, Postal Station D, Ottawa 4, Ontario, Canada

Feb. 22-24, 1971: San Diego Biomedical Symposium — 1971, Ramada Inn, Harbor Island, San Diego, Calif. / contact: Richard D. Yoder, M.D., Univ. of California, San Diego, University Hospital of San Diego County, 225 West Dickinson St., San Diego, Calif. 92103

Mar. 1-3, 1971: Data Processing Supplies Association, Spring Membership Meeting, The Doral Hotel & Country Club, Miami, Fla. / contact: Data Processing Supplies Association, 1116 Summer St., Stamford, Conn. 06905

Mar. 1-3, 1971: First International Symposium on Fault-Tolerant Computing, Huntington-Sheraton Hotel, Pasadena, Calif. / contact: Dr. Francis P. Mathur, Sec'y, IEEE Technical Comm. on Fault-Tolerant Computing, Jet Propulsion Laboratory, Calif. Institute of Tech., 4800 Oak Grove Dr., Pasadena, Calif. 91103

Mar. 23-26, 1971: Third National Meeting of the Information Industry Assoc., Host Farm Resort, Lancaster, Pa. / contact: Paul G. Zurkowski, IIA Washington, 1025 Fifteenth St., N.W., Washington, D.C. 20005

Mar. 9-13, 1971: INEL 71, the 5th International Exhibition of Industrial Electronics, Basel, Switzerland / contact: Sekretariat INEL 71, CH-4000, Basel 21, Switzerland

March 22-24, 1971: Numerical Control Society's Eighth Annual Meeting and Technical Conference, Disneyland Hotel, Anaheim, Calif. / contact: William H. White, Numerical Control Society, 44 Nassau St., Princeton, N.J. 08540

Mar. 22-25, 1971: IEEE International Convention & Exhibition, Coliseum & N.Y. Hilton, New York, N.Y. / contact: IEEE Headquarters, 345 E. 47th St., New York, N.Y. 10017

Mar. 29-Apr. 2, 1971: Datafair '71 Conference, Nottingham Univ., Nottingham, England / contact: Datafair '71 Conference Office, The British Computer Society, 21 Lamb's Conduit St., London, W.C.1, England

Apr. 1-2, 1971: ACM Symposium on Information Storage and Retrieval, Univ. of Maryland, College Park, Md. / contact: Dr. Jack Minker, Computer Science Center, Univ. of Maryland, College Park, Md. 20742

Apr. 5-8, 1971: The First National Educational Technology Conference, American Hotel, New York, N.Y. / contact: Conference Manager, Educational Technology, Englewood Cliffs, N.J. 07632

Apr. 13-16, 1971: Ninth Annual Convention of the Association for Educational Data Systems, Royal York Hotel, Toronto, Ontario, Canada / contact: AEDS Convention, P.O. Box 426, Don Mills, Ontario, Canada

May 3-5, 1971: Data Processing Supplies Association, Affiliate Membership Meeting, Copenhagen, Denmark / contact: Data Processing Supplies Association, 1116 Summer St., Stamford, Conn. 06905

May 11-13, 1971: IEEE (Institute of Electrical and Electronic Engineers) 1971 Region Six Conference, Wood Lake Inn, Sacramento, Calif. / contact: Dr. D. H. Gillot, Co-Chmn, IEEE Region 6 Conference, Sacramento State College, Dept. Of Electrical Engineering, 6000 Jay St., Sacramento, Calif. 95819; or, Dr. R. F. Soohoo, Program Chmn., IEEE Region 6 Conference, Univ. of California at Davis, Dept. of Electrical Engineering, Davis, Calif. 95616

May 12-14, 1971: 22nd Annual Conference of the American Institute of Industrial Engineers (AIIE), Boston, Mass. / contact: Anthony J. Jannetti, Exhibit Manager, c/o Charles B. Slack, Inc., Pitman, N.J. 08071

May 18-20, 1971: Spring Joint Computer Conference, Convention Ctr., Atlantic City, N.J. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N.J. 07645

May 24-26, 1971: Power Industry Computer Applications Technical Conference, Statler Hilton Hotel, Boston, Mass. / contact: P. L. Dandeno, Hydro Electric Power Commission of Ontario, 620 University Ave., Toronto, Ontario, Canada

May 24-28, 1971: 2nd International IFAC Conference and Exhibition "P.R.P.-Automation", Centenary Halls, Brussels, Belgium / contact: IFAC/P.R.P.-Automation, Jan van Rijswijcklaan 58, B-2000 Antwerp, Belgium

June 2-5, 1971: 3rd IFAC/IFIP Conference on Digital Computer Applications to Process Control, Technical University, Otaniemi, Finland / contact: 3rd IFAC/IFIP Conference, Box 10192, Helsinki 10, Finland

June 3-5, 1971: Conference on Area-Wide Health Data Network, School of Medicine, State Univ. of New York at Buffalo, Buffalo, N.Y. / contact: Continuing Medical Education, 2211 Main St., Buffalo, N.Y. 14214

June 7-9, 1971: International Computer Forum and Exposition (ComFor), McCormick Place-on-the-Lake, Chicago, Ill. / contact: National Electronics Conference, Inc., Oakbrook Executive Place II, 1211 W. 22nd St., Oak Brook, Ill. 60521

July 26-29, 1971: First International Computer Exposition for Latin America, sponsored by the Computer Society of Mexico, Camino Real Hotel, Mexico City, Mexico / contact: Bernard Lane, Computer Exposition, Inc., 254 West 31st St., New York, N.Y. 10001

Aug. 3-6, 1971: IFAC Symposium on The Operator, Engineer and Management Interface with the Process Control Computer, Purdue University, Lafayette, Ind. / contact: Dr. Theodore J. Williams, Purdue Laboratory for Applied Industrial Control, Purdue University, Lafayette, Ind. 47907

Aug. 11-13, 1971: Joint Automatic Control Conference, Washington Univ., St. Louis, Mo. / contact: R. W. Brockett, Pierce Hall, Harvard Univ., Cambridge, Mass. 02138

Aug. 16-19, 1971: International Symposium on the Theory of Machines and Computations, Technion — Israel Institute of Technology, Haifa, Israel / contact: Sheldon B. Akers, Secretary, IEEE Technical Comm. on Switching and Automata Theory, General Electric Co., Bldg. 3, Room 226, Electronics Park, Syracuse, N.Y. 13201

Aug. 16-20, 1971: Jerusalem Conference on Information Technology, Jerusalem, Israel / contact: The Jerusalem Conference on Information Technology, P.O.B. 7170, Jerusalem, Israel

Aug. 24-27, 1971: Western Electronic Show & Convention (WESCON), San Francisco Hilton & Cow Palace, San Francisco, Calif. / contact: WESCON Office, 3600 Wilshire Blvd., Los Angeles, Calif. 90005

Sept. 1-3, 1971: Second International Joint Conference on Artificial Intelligence, Imperial College, London, England / contact: The British Computer Society, Conference Department, 29 Portland Place, London, W.1., U.K.

Sept. 7-9, 1971: IEE 1971 Conference on Computers for Analysis and Control in Medical and Biological Research, University of Sheffield, Sheffield, England / contact: Manager, Conference Dept., IEE, Savoy Place, London WC2R OBL, England