SCIENCE & TECHNOLOGY

September, 1971

Vol. 20, No. 9

computers and automation

Computer Prints Kanji

Announcement

The Most Important of All Branches of Knowledge

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Edmund C. Berkeley

EDITOR

DO YOU WANT TO

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Editor: Edmund C. Berkeley, author, businessman, actuary, scientist, computer professiona first secretary of the Associatio for Computing Machinery 1947 editor of *Computers and Auton*

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Vol. 20, No. 9
September, 1971

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Advertising Contact	**THE PUBLISHER** **Berkeley Enterprises, Inc.** 815 Washington St., Newtonville, Mass. 02160 617-332-5453

Computers and Automation is published monthly (except two issues in June) at 815 Washington St., Newtonville, Mass. 02160, by Berkeley Enerprises, Inc. Printed in U.S.A.
Subscription rates: United States, 11 monthly issues and two issues in June (one of which is a directory issue) — $18.50 for 1 year, $36.00 for 2 years; 12 monthly issues (without directory issue in June) — $9.50 for 1 year; $18.00 for 2 years. Canada, add 50¢ a year for postage; foreign, add $3.50 a year for postage. Address all U.S. subscription mail to: Berkeley Enterprises, Inc., 815 Washington St., Newtonville, Mass. 02160. Second Class Postage paid at Boston, Mass.
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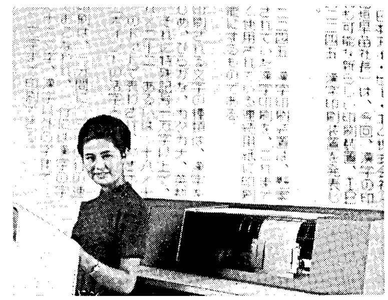
computers and automation

The magazine of the design, applications, and implications of information processing systems.



Front Cover Picture

The front cover shows an impact printer which, together with a keyboard attachment, can input or output to a computer over 10,000 different characters. These may be ideographic, alphabetic, or symbolic, including Kanji ideograms (shown in the background), the Hiragana and Katakana alphabets, the Roman alphabet (upper or lower case), Arabic numerals, and other symbols. The two peripherals will be manufactured in Japan by IBM Japan Ltd. For more information, see page 43.

NOTICE

*D ON YOUR ADDRESS IMPRINT MEANS THAT YOUR SUBSCRIPTION INCLUDES THE COMPUTER DIRECTORY. *N MEANS THAT YOUR PRESENT SUBSCRIPTION DOES NOT INCLUDE THE COMPUTER DIRECTORY.

Departments

Key

[A] — Article
[C] — Monthly Column
[E] — Editorial
[F] — Forum
[G] — Golden Trumpet
[NT] — Not Technical
[T] — Technical Computer Information

NINE AND NI-YEN

The use of computers is having a wholesome and beneficial influence on a number of strands of the conventional behavior of human beings. In this respect, computers are exerting an influence like the influence of big capital cities, and like mass communication systems such as radio and TV; these have caused the decline of linguistic dialects and the decrease of provincialism, among other things. Computers are exerting profound influences on the human uses of symbols and language.

More Systematic Symbols

For example, mathematicians have had until recently a habit of designating various rather simple mathematical ideas with ideographic symbols that are rather strange and forbidding to ordinary human beings. For example, an integral is often designated by the ideogram $\int$; an ideogram is a single picture, a diagram, or nonalphabetic symbol for an idea; the biggest ideographic system in existence is the system of Chinese characters. The ideogram $\int$ is derived from an old form of capital letter S, and was chosen in order to allude to the initial letter of the word sum; it refers to the fact that an integral is a certain kind of sum. The symbol has an exact meaning that usually takes about twenty words to express, but is often read aloud by mathematicians as "the integral of".

But if a mathematician wishes to use this concept in a computer programming language, he regularly has to submit to the discipline of a regular typewriter keyboard with 42 keys and two shifts for producing 84 letters, figures, and signs. And so he is compelled to use the far more general and basically much more sensible alphabetic system of symbolizing which employs a string of several letters together, such as INT or INTG to stand for "the integral of". In trigonometry the alphabetic system has been used for more than 70 years; the usual trigonometric symbols are SIN, COS, TAN, COT, SEC, and CSC.

The alphabetic form of symbolizing will increase, the ideographic form will decrease, as the result of the use of computers.

More Distinguished Sounds

When we turn to spoken symbols, we notice that the use of machines to understand spoken words is just beginning. Among the first words which a listening machine (or listening peripheral for a computer) will need to distinguish are the spoken words for the ten decimal digits: ONE, TWO, THREE, FOUR, FIVE, SIX, SEVEN, EIGHT, NINE, ZERO (or OH). Nowadays even human beings listening often have trouble deciding whether a speaker is saying FIVE or saying NINE. So the telephone company has suggested using the pronunciation NI-YEN.

This suggestion often calls forth from many human beings the silly laughter and ridicule which expresses their resistance to change. These are the people who would rather believe what they already believe than make any effort to change their minds for valid reasons. In other words, they would rather die than think – and often do. It is an unusual person who can reply like the famous Irishman who, when asked why he had changed his mind and run away from a battle, replied, "I'd r-r-ruther be a cowar-r-rd for five minutes than a cor-r-rpse for the r-r-rest of me life."

NI-YEN is a good suggestion, and there are many more like it. Everybody who is interested in a better future – one which holds less confusion than our days do – should try to implement NI-YEN and its relatives. In this way we give the listeners the breaks, rather than the dictionaries, which regularly report only good current usage – and do not add such a remark as "the recommended new pronunciation is NI-YEN".

Less Sloppiness

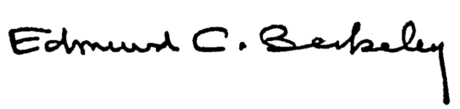
Another significant influence of computers on conventional human behavior is the increased requirement computers place on human beings to be more accurate and more complete – less sloppy. Nowadays, computer programs only rarely apply common sense to words and figures, and "recognize from the context" that certain words must be wrong. In the printing of an article to be read by human beings, a proofreader can let slip by the word "bandwith" instead of "bandwidth" (as we unfortunately did on page 30 of "Computers and Automation" for April). Human beings (though not computers) are likely to guess the correction needed, in fact may not even detect the error.

But a computer is sensitive to the spelling of the symbols that its program works with. There is on record the miss of a Mariner space probe to Mars; it missed Mars, as I recollect, because at one point in the computer program there was a hyphen instead of a blank.

Human beings are able to function with ideograms, insufficiently distinct pronunciations, incorrect spellings, imprecise words, and many other kinds of inaccuracies, confusions, and perplexities. This occurs mainly because human beings come equipped with a built-in evaluating function which uses observations, context, surroundings, experience, judgement, and capacity to decide. So a human being can easily say, "She told me 'I hate you', but I know she did not mean that." A computer program can't behave that way at all easily.

This evaluating function clearly is derived from more than 300 million years of evolution, during which living species developed capacities to solve problems of finding food, judging food, finding shelter, escaping from danger, etc. I would like to call the evaluating function "the old brain". The evaluating function does not include symbolic language, a facility which probably has not evolved for much more than 3 million years, although the evaluating function can of course be applied to symbolic language. The handling of symbolic language is in "the new brain", in the human brain and perhaps in the dolphin's brain.

Computers behave very differently. Within a computer there is a very close correspondence between ideas and strings of symbols. Computer programming for reasonable operations, and computer representations for reasonable data, are very systematic. And so computers require from human beings behavior which is more sensible, reasonable, accurate, complete, and systematic than human beings have ever been accustomed to providing. This is a desirable pressure.



Edmund C. Berkeley
Editor

c.a PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 719: MESSAGES IN MATH?

"Abe is a queer combination of mystic and computer man", Pete said. "He sees all sorts of meanings in things we'd never give a second thought to."

"What is he seeing now?" asked Dick. "Not some more hexadecimal output spelling out his name, I hope."

"No, not this time. He's trying to figure out why he got the number of this year as a solution to one of his problems. He's sure there's something significant there."

"What problem is that?"

"Well, he decided he would try to disprove Fermat's Last Theorem by finding an integral solution of $x^3 + y^3 = z^3$. He had the crazy idea that he might be able to creep up on it by easy stages, first solving $x^2 + y^2 = z^3$, then $x^2 + y^3 = z^3$, and finally $x^3 + y^3 = z^3$."

"Did he ever succeed?" Dick was beginning to get interested.

"No, of course not. Actually he got sidetracked and never got beyond the first equation. The first solution he got for $x^2 + y^2 = z^3$ had $x = 1971$ and he was sure the computer was trying to tell him something. I don't know how much machine time he's wasted trying to figure this out."

"What were the values of y and z?"

"Suppose we leave that as an exercise for the student", said Pete with a smile.

What were the values of y and z?

Solution to Problem 718: Odds on Aces

The probability of getting an Ace in the first seven cards is $1 - \frac{24\cdot23\cdot22\cdot21\cdot20\cdot19\cdot18}{26\cdot25\cdot24\cdot23\cdot22\cdot21\cdot20} = \frac{154}{325}$ or .474 approximately. Hence the odds were against Joe.

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.

The C&A Notebook on COMMON SENSE, ELEMENTARY AND ADVANCED — NEWS AND DEVELOPMENTS

We are much encouraged by the subscription enrollment so far in "The C&A Notebook on Common Sense, Elementary and Advanced". Although no subscription solicitations have been mailed so far, our subscribers to the Notebook (at present writing almost 200) include many very thoughtful people and a number of large, important organizations.

As a result, it seems clear: first, that the Notebook is filling a definite need; and second, that we can do some things that we had hoped to do, but were not at the start ready to promise to do, namely:

(1) Include as dividends in the first volume at least 6 more issues, making the total issues in Volume 1 at least 30;
(2) Focus from time to time on ideas that are worth their weight in gold;
(3) Continue to mail all issues by first class mail; and
(4) Continue to start all subscribers at Vol. 1, No. 1, so that no one loses earlier published information.

The contributions of essays and reports that have so far been received from the two dozen Participators in the project are in general much more interesting and much more squarely on the subject than we had anticipated.

So the project of investigating common sense, wisdom, and science in general, and their relations to computers appears to be one of the most interesting and important projects that "Computers and Automation" and its supporters have ever undertaken. Of course, computers are an ideal resource for investigating situations, environments, and problems in general.

For more information, see pages 2 and 3 of this issue.

MANAGEMENT, THE COMPUTER, AND SOCIETY

"It is important to recognize the existence of many factors which can operate to make the computer socially unpalatable."

Martin Ernst
Arthur D. Little, Inc.
25 Acorn Park
Cambridge, Mass. 02140

(Based on a talk to businessmen in Boston, Mass., June 9, 1971)

Seventeen years ago the first attempt was made to put a computer to routine industrial use. In 1953, General Electric tried to place their local payroll on a computer at Appliance Park. From all accounts, they had a terrible time. It took many months; major difficulties were encountered; and, all in all, it was a very painful process.

If you want to buy a computer today, Neiman-Marcus will be glad to supply you with a Honeywell machine for home use – if you can figure out what you want to do with it. So, computers have moved from a rarity to something we encounter almost every day in one form or another.

Cost Reductions

Growth in the computer business has been fed by technological advances that have made computing equipment cheaper and better each year; and technological progress is definitely going to continue at a high rate for at least another decade. For example, we can expect approximately a doubling in speed of large central processors, during the next five years or so and a halving in cost per unit of computer power. Even more dramatic improvements in mini-computer cost-effectiveness seem assured. Gains by a factor of as high as ten may be possible prior to 1980.

For a long time, high speed core memory has been an expensive item in computer configurations. These memories will probably improve in access time by a factor of four in the next decade, and their costs will probably decrease by a factor of between four and eight. Low speed memory in the past has tended to be monopolized by magnetic tapes or by fairly clumsy random access equipment. Now it is technically possible to build devices that, for all practical purposes, have infinite memory capacity and modest costs, although they will be relatively slow of access.

Cheaper Peripherals

With these equipment cost reductions under way, peripherals such as input/output terminals have become a major factor in the cost of modern installations; but even these are going to become cheaper as we move from mechanical devices, with their high production and maintenance costs, to all-electronic systems. Finally, there is a strong likelihood that the entire data insertion process will be revolutionized before the end of the next decade through the introduction of voice control mechanisms and

Martin L. Ernst pioneered in operations analysis and systems development. As Associate Director, he was responsible for most of the research done by the Operations Analysis Group operated by Massachusetts Institute of Technology for the Chief of Naval Operations. His projects at Arthur D. Little include one of the world's largest non-government on-line systems and the current attack on Wall Street's paper crisis. Mr. Ernst is a past President of the Operations Research Society of America.

inexpensive, broadly useful character recognition equipment.

Stage Three

As equipment is becoming more diverse, efficient and cheaper, we are entering what sometimes is called Stage Three of computer usage. We have passed through the earlier periods, when the computer's capability was limited to performing simple clerical operations, or to producing routine decisions in areas such as inventory control. Now the primary excitement is in how computers can aid in major management decisions.

Social Problems of Computers

I could devote considerable space to discussing the problems of using computers for management decision-making, but there is another family of problems that is even more deserving of attention – what I will call the social problems associated with the use of computers. First, let me explain *why* I have selected this subject. Fundamentally, I happen to be a believer in computers – in the sense that I think they can help us perform a great range of tasks better, while relieving us of a lot of boring, routine, human operations. However, I think it important to recognize the existence of many factors which can operate to make the computer socially unpalatable.

There are large groups of people who can be hurt by expansion in the range of computer activities and there is a lot of fear – both justified and unjustified – of such developments. Many of the sources of concern arise in a business context and businessmen can alleviate some of them. So, I seek to call the attention of businessmen to these problems in the hope that you will recognize them in your own use of computers and will make the effort to overcome them. By doing this it will be possible to take relatively full advantage of computers without paying undue social penalties.

Although I repeatedly refer to the computer, I am concerned not with the computer itself but with the many activities and operations which it makes possible and economical. The computer is a tool and no more responsible for its use than the gun employed in a murder; however, in both instances, those who build and sell these tools, and those who have legitimate and desirable uses for them, have an obligation to participate actively in measures to prevent their misuse. The problem of personification of computers is not a theoretical one: a small society of professionals has already been organized to combat this tendency. Somewhat related, a major computer manufacturer is placing advertisements devoted to the question of whether computers are "for or against us."

Early Warnings of Social Dangers

We have had early warnings of the social dangers in the growth of computer usage; for example, Norbert Weiner raised important questions many years ago in his first book on cybernetics. However, until recently these warnings meant very little – computers played too small a role in society to make their unpleasant aspects very painful. Our period of grace is now coming to an end. It would be good to give you a well structured and orderly statement of the origins of our problems and their potential cures. But, I don't believe we have reached a stage in understanding that permits this. The best I can do is to share with you some examples, ideas, and suggestions that are still in a formative stage, in an effort to begin more productive thinking.

To help present these tentative ideas, I have divided computer impact into three broad areas: depersonalization, talent bias and vulnerability. These terms can best be explained by citing some examples.

Depersonalization

The origins of depersonalization lie in the high degree of standardization needed to use computers efficiently. As computer activities spread their influence, individuals tend to feel that they are being molded to fit the computer's needs rather than that the computer is being employed to meet their needs. It probably is no accident that, during the first of the major campus riots at Berkeley, resentment was directed to the punch cards and computers that students claimed made them feel more like numbers than like people.

Airlines Systems

A more concrete example lies in airlines reservations systems. A few of the largest airlines have been able to plan and develop computer reservations systems tailored to meet their own particular needs, but this process is difficult and expensive. Smaller airlines have no choice but to select an existing package of programs and attempt to modify them to fit their own character and style. I know of one case where a review indicated a need for some 60 significant program changes in an available package if the resulting system was to match the operating procedures and philosophy of the airline. When the effort for performing such a surgical operation was investigated, the airline decided it could afford almost none of these desirable changes. It now operates like every other airline employing the same basic system and has lost a bit of its special personality and flavor.

Billing Operations

Another unpleasant encounter with computers, which I am sure we all face, involves dealing with a company that has automated its billing operations. At first I had faith that this would be a transient situation but during the preparations for this talk I found that this is not the case. One associate of mine is currently going through the excruciating process of unsnarling his financial obligations to a successful, widely known and highly efficient organization, while another associate went through exactly the same process – and for the same reasons – with the same company as much as six years ago. The problem arises from the fact that it is always difficult to insert an exception into a computer run. This difficulty is compounded if an organization seeks to get by with minimum training of the clerical staff that examines the customer input of payments and complaints about misbilling. The final result is that the customer writes letter after letter into a non-answering void, with resentment growing at each cycle.

There are ways for the individual to deal with these mis-billings and to achieve fairly prompt satisfaction. However, it's probably only the more sophisticated of our population who will learn these methods. The poor and the less educated are ill-prepared to deal with these situations; they are far more apt to accept errors and try to pay, but they do this with a sense of resentment and growing dissatisfaction.

Dealing With Exceptions

I regard this as a real business failure. Planning to deal with exceptions has been completely inadequate in the design of most computer billing systems and their associated manual procedures. There seems to be little excuse for this. Very few companies have difficulty picking up changes of address in the blank spaces provided for this purpose on most bills. No company with which I have had contact has similarly provided a set of blank spaces for their customers to register disagreement with the billing data reported to them!

Load Balancing

There are many other examples associated with standard customer-business relationships. We are all subject to some of the penalties of load balancing, which has become an important requirement of all major computer installations. Instead of consistently getting bills to be paid by the tenth of the month, as was the case in my father's day, bills keep streaming in throughout the month as various service installations attempt to keep their computers loaded evenly. With delays in computer output and mail delivery, and interest penalties for slow payment, one has to keep the checkbook constantly on hand.

These are all minor matters if viewed singly, but, when accumulated, they boost our frustration level alarmingly and seem to chip away at our individuality and personality.

Privacy

A second area of depersonalization concerns privacy. Privacy considerations occur most frequently in regard to credit information, though even more serious invasions may occur in the collection and transmission of health, employment and other information. We have collected and employed credit information for a very long time, but never with the degree of completeness and nationwide access made possible by high speed communications and electronic data processing equipment. I wonder how many of you are completely satisfied that the information concerning your own credit is based on appropriate inputs? How many of you would like to see this information, to make sure that failure to pay a bill during some past period because the circumstances justified your delay does not appear on your records as a negative mark.

Rights to Individuals to Discover what Credit Organizations Have on File About Them

Fortunately, some solid steps have been taken in this area of credit information. A national law now gives significant rights to individuals to discover what information concerning themselves is being held on file. Some of the better credit associations took equivalent or even stronger steps prior to the passage of this law. Unfortunately, as with most legal steps, there are a number of loopholes; and we again face the problem that the least sophisticated among us are not apt to discover and apply their rights even though they are the ones who probably suffer most from the system.

Further, credit information is by no means the only area of concern. There are many reasons for developing good medical data banks but the issues of privacy and access must be solved before these banks can be made effective. The subject of psychiatric information is a particularly difficult one since, without proper safeguards it could be used for blackmail purposes.

Displacement by Computers

A third area of depersonalization has to do with the opportunities for white collar workers to get started in business. The current situation, as most of you are aware, is one wherein more and more clerks are being displaced by computers. So far, this displacement has been largely made up for by the increasing numbers of people needed to handle the input and output information, to design computer programs, and to undertake the variety of services necessary to use computers effectively. However, one very large component of this work force – the personnel responsible for preparing input – is threatened by the development of efficient and economical character recognition devices. I feel that in the next decade a significant component of the current work force in this area will be eliminated. This means that a certain type of starting job for the white collar worker will disappear in much the sense that the automatic elevator removed a kind of starting opportunity for the least trained blue collar workers. We do not seem to have particularly good alternatives available for the starting clerical worker, so a certain range of opportunities is going to be cut off and there undoubtedly will be resentment about this process.

Disenfranchisement of People Through Credit Cards

Finally, and an extreme case, the use of computers can lead to a form of disenfranchisement of people. This possibility shows up most clearly in the area of credit cards, a phenomenon whose growth is closely tied to computers. The use of these cards is increasing at a rapid rate, and over a period of time, we can visualize approaching an almost cashless society. One can ask the question: what happens then to a man who cannot get credit and cannot obtain a credit card? Will he, in a valid sense, be banned from a form of equal opportunity in our society?

We have other examples of indirect forms of disenfranchisement already operating and some of them are quite painful. People who, because of age or disability, are not able to drive private automobiles, are disenfranchised from a considerable portion of our social activity because they have almost completely lost a mobility on which our society depends as our public transport degenerates.

They find themselves limited as to where they can live and where they can work; they are not only restricted in activities but very likely must pay more for the basic elements of living because of these restrictions.

The beginnings of this type of disenfranchisement in the credit card area are already beginning to be evident. When one registers at a hotel in a number of U.S. cities, there is a sign behind the registration desk to the effect that the local innkeepers' association "requires" that guests either provide an acceptable credit card or pay for their room in advance. This may make good business sense for the hotels, but it is also a minor indignity. The passing of blame for the act to an innkeepers' association has a ring of phoniness and deprives the consumer – and, at least in theory, the hotels – of their freedom of choice in the market.

Talent Bias

A second broad area of social impact by computers concerns the extension of an existing talent bias – a bias in favor of technical training and experience as opposed to the humanities. As we move into Stage Three of the computer revolution, there will be changes in the requirements for talent to serve business effectively. Previously, computers have been devoted to clerical areas which, by their nature, already had to be routinized within a given company. Management decisions are not standard and we rarely have a library of procedures available that can be programmed into a computer. If we wish to use the computer effectively, we are going to have to develop new techniques. We will have to acquire large numbers of personnel for developing these techniques and analyzing the output of computer runs. For example, a lot has been written and some excellent work has been done on the role of simulations in the decision-making process. But just a few minutes of time on a computer, running a complex simulation, can call for many man-months of analysis to understand the implications of the output. One result will be enormous requirements for analytical skills in business staffs.

Analytical Skills Not Backed With Practical Experience

Analytical skills unbacked with realistic experience can lead to a variety of difficulties. Our military organization has often been a leader in trying new techniques; so it is worthwhile taking a quick look at what has been happening recently in the Pentagon. During the McNamara era, enormous emphasis was placed on employing analytical techniques to establish and justify expenditure levels. There were many cases in which these techniques were not well employed because we did not have the skills available yet. Failures due to misapplication have approached a very strong reaction to the analytical approach for developing expenditure budgets. These skills are now being employed far less by the military.

We face a situation where competition will demand effective employment of skills in short supply. Either the performance will be poor, leading to backtracking and loss of efficiency, or new procedures will be necessary for providing both a larger supply of technical skills and a basis for combining these skills with practical experience.

Addiction of Playing Games With Computers

Another area of talent bias arises in training and education. Some months ago *Datamation Magazine* published a rather interesting science fiction-type article which, among other things, discussed a future period where playing games with computers had become a sociological disease very equivalent to narcotics addiction. It was an amusing article but it lost some of its humor when we made a recent survey for a major university concerned with planning for their development and use of computers. We encountered a number of students who had become so fascinated with the computers made available to them that they lost all interest in their courses and were devoting essentially all of their time to playing with the computers!

New Demands for Skills

We face a number of problems in educational institutions in that the future demands of business call for certain talents to a greater extent than they probably are naturally present in the human race. These demands tend to cut down the stature and role of the student studying humanities as he visualizes his position in future society. The new demands place great emphasis on mathematical and analytical skills and tend to split the student body into two components — technically-oriented and humanities-oriented. I believe this split is resented, and some evidence of a rather emotional getting-together of the segments of the student body was quite visible in the recent riots and protests. It should also be pointed out that a significant number of faculty members in most of our schools have an extreme distaste or even fear of the computer. Some of this will begin to come through to the students that they train, as the computer develops a bigger and bigger role in university and daily life.

Loss of a Training Ground for Management

The talent bias also has an impact on management training. The use of computers has often led to elimination of some echelons in the organization of companies. This may achieve greater efficiency, but you also can lose a very important training ground for future management. The result may be an increasing trend for progress to senior managerial positions to come through staff rather than line positions. There are some reasons to suspect that over time, this trend could have disastrous results. As the computer plays more and more of a role, there will be less and less opportunity to develop junior and intermediate management skills. This must be faced as a real threat for the future.

Vulnerability

The third general topic is that of vulnerability. There are a number of forms which this can take. First, I do not think we have even begun to see the extent to which fraud can take place through the use of computers. There have been a limited number of examples, but skills in manipulating computers can unquestionably be employed in ways we have not yet visualized to milk companies and to perpetrate fraud or thefts. This subject has not received adequate and serious study.

Reliability Problems

Second, we are going to face a variety of reliability problems. I was once told of an occasion when the head of the American Airlines automated reservations systems paid a visit to the U.S. Air Defense Command. During a discussion, one of the officers turned to him and said in effect: "You know, you people really have the reliability problem. Our equipment can go down for an hour or so, and if the Russians don't choose that period to attack, we bring it up again and nobody knows anything has happened! But if you go down for an hour or so, you have got a lot of angry customers who are aware that you have been having difficulties." We can extrapolate this further. There has been a lot of attention paid to the problems of floor automation on Wall Street. To my mind, one of the most legitimate barriers to progress has been the reliability of equipment. An airline may get into difficulty if its reservations equipment goes down for an hour. On the trading floor, a five minute failure of a computer can lead to nearly disastrous results.

Increased Vulnerability

In the future we are going to be faced with problems as our banking system, our mutual funds, our stock exchange

(Please turn to page 14)

COMPUTERS AND THE NATION

"We all have an awesome task to convert the image of computers from the image of an unwelcome intruder and a disagreeable agent of change, to the image of a benevolent helper and resource for our country."

Dr. Edward E. David, Jr.
Science Adviser to President Richard M. Nixon
The White House
Washington, D.C.

(Based on a talk to the Computer Science and Engineering Board of the National Academy of Sciences, June 25, 1971, Washington, D.C.)

What can computers do for the nation as a whole?

I am eager that the best minds in the computer field look upon the computing field as a national resource, and not as a closed community for disciplinary effort with only financial connections to the outside world.

The future wellbeing of computing depends at least in part upon the resolution of questions of communication about computers to the general public and to potential users – for in my present position I find a profound skepticism of projected beneficial uses of computers.

People Unwilling to Accept Computers

It seems very clear that the most frequent barrier to the use of computers in imaginative ways is that people and institutions are not ready for them.

For example, I understand that physicians and hospital personnel in some places have shown themselves unwilling to accept the complete change in their professional habits that effective computer usage requires. This seems to arise primarily because these people seem not to understand the nature of their own work. Such a situation is often a precursor to rejection of automated techniques. In effect, people want simply to mechanize their usual ways of going about their jobs, rather than asking how computers will enable them to do things differently and more efficiently.

I know that this is a familiar story to most computer people, but it is ill understood by officialdom, whether in government, industry, or universities and colleges.

Adapting to Rapid Social Change

The computer is indeed a catalyst for change and people tend to resist change when they do not control it themselves.

Change as a social phenomenon is something which has been addressed by Alvin Toffler in his book, *Future Shock.* Toffler's thesis in that book is that when the rate of change is too great, people are not able to adapt and go into a condition which he calls "future shock". Actually, my social scientist friends tell me that there is little evidence for the existence of this phenomenon. However, there is good evidence that people can adapt to change when they themselves are controlling it. They do not adapt when change is imposed upon them by some outside force. As all good computer people know, this observation provides the key to using the computer efficiently as a catalyst for change in institutions. This process involves communication about computers to the layman, to the person who is wary of computers, or who has encountered them only as an impediment to correct department store billing. It is no easy task.

I look upon the computer as a resource for the nation; and indeed there are many national problems to which it seems central.

Decline in Productivity Increase

One of these is the area of productivity. As many of you know, the rate of productivity increase in our economy in the past few years has been slowly declining. This means that the output per worker is not increasing as rapidly as it did in the past. The figures are something like this: The average yearly productivity increase from 1948 through 1968 was about 3.2%. Since that time it has dropped to between 1 and 2%, although recently we have observed a higher rate. Some economists have said that the lag in increase of productivity is a cause of inflation, since wages have been going up more rapidly than productivity. When one looks into the structure of the economy, the importance of the computer in the productivity context becomes evident.

Service Industries Increasing

Currently, the people working in agriculture and manufacturing are about 45% of the total U.S. work force, while 55% are engaged in rendering services of one kind or another including, for example, education, health care, government operations, and the like. This implies that more than half of our workers are engaged in the service industries as opposed to those which produce real goods. If we look into the future, we find an even more startling situation. In 1980 it is estimated that 65% will be in the service industries. Taken with the growth of jobs, this implies a rather startling fact: namely, nine out of every ten new jobs which are created between now and 1980 will be in the service industries.

Improving Productivity in Service Industries

If we are to improve productivity markedly, therefore, a substantial part of that improvement must come in the service industries as opposed to improvements in manufacturing productivity. I might add that since only 5% of the work force is engaged in agriculture, and that figure is still shrinking, productivity improvements in agriculture will have little overall effect on productivity figures.

Now, computers and computer-related technologies have a high potential for improving productivity in services; but as you well know, to do so is not simple. In addition to the necessity for allowing users to participate in the process of computer-induced change, there are several other necessities.

One clear-cut necessity concerns economies of scale. Often and often the prospective economies leading to improved productivity depend upon high levels of traffic, and this involves system considerations including (1) communication techniques to cover geographically-distributed populations and (2) multi-programming as an aid to sharing facilities among many users. Finding a critical mass of users to generate the necessary traffic is only one of the many impediments to applying computers in the service sector.

Another necessity is reduction of the cost of terminals. This is a major hurdle. The point is that we clearly need focussed efforts to solve such problems. Needless to say, their solutions would be good for the computer industry but also, of course, good for the nation.

Disquieting Performance in Foreign Trade

A similar situation exists in foreign trade. Here again our index of performance as a nation is disquieting. We have seen our foreign trade balance dwindle to about $1 billion out of about $40 billion of total exports. We do best in high technology products; we run a large deficit in labor-intensive products. This story is also undoubtedly well-known, but again a close examination of the anatomy of the problem indicates that many of our manufacturing industries cannot compete because of (1) the differential in wage rates and (2) antiquated plant. Here again computers can provide a way of overcoming the differential, but there are the difficulties in gaining the necessary rapport with traditional industries. The labor unions as well look with some suspicion on computers. Solving this set of problems in a humanitarian and effective way is a real challenge to the computer community.

Improving the Quality of Life

So far I have been talking about using computers to improve the performance of our economy and our economic situation in the world. But the nation requires also that computers be used to improve the quality of life. Here one can think of many possible applications, but the one that appeals to me the most lies in the areas of privacy and individuality.

Computers Protecting Individuality

Now, it is often said that computers are a challenge to the privacy of the individual and to individuality itself. Indeed, it cannot be denied that computers have been used in just these ways in the past. However, these effects are not intrinsic to the computer itself. Computers can be used to protect people's privacy. In fact, a well-designed computer system can be made more nearly private than the manual filing methods used today. The technology and technique to accomplish this is in hand or nearly so. Some further innovative effort can provide further advances, but the problem is that system designers and their customers have not seen fit to utilize the available technology to protect people's privacy. Again, in this area the question of efficiency and costs arises. It may well be true that special hardware will have to be incorporated into computing systems to facilitate the elaborate protective mechanisms which in the end will be required for adequate privacy. The impetus for these developments has been slow in coming, but I believe we will see incentives by government for such developments. Senator Ervin has held hearings at which issues concerning privacy and computers have been examined.

Establishing Privacy Standards

The executive branch of the government also is looking at these problems, and it may be that the day will come when we will see privacy standards established and published. This should not be necessary, but many people believe that it is. It is not too much to say that the government will not shirk its duty in this regard.

As for individuality, again computers can be the key to the individually-tailored service or product. Yet, we do not see a widespread attempt to use computers in this fashion. Again, I think that the future health of the computer industry depends upon successful attempts in this direction.

Malevolent Effects of Technology

I feel strongly about all these matters because we as scientists and engineers are getting clear signals from the public about the malevolent effects of technology. As you know, computers are in the forefront of people's minds in this regard. This syndrome has led some to conclude that there is a strong wave of anti-technology overtaking us. They point to the vote on the supersonic transport and to environmental extremism and other supposed evidences. It is easy to identify some people who are negative about technology. There are some highly-respected people such as Lewis Mumford and Marshall McLuhan whose utterances range from rational attacks on rationality to extolling the irrational and occult. Movements in this spirit can succeed at times, particularly when we as a community show our technological teeth rather than displaying our human values, but overall I find no wave of anti-technology in the executive or legislative branches. In fact, quite the opposite. I find people in responsible positions very receptive to responsible proposals for advancing science and technology.

Collisions re Energy Supply

The President's recent energy message to Congress is an interesting case in point. His message confronts the collision between environmental values and energy supply. The solution he proposes is a pluralistic one based on research and development aimed at new technology. The nuclear breeder reactor is the centerpiece of the new effort because it today holds the greatest near-term promise for the generation of clean energy. Recognizing that other technologies will be needed, however, the President has proposed two other initiatives related to recovery of clean energy from fossil fuels. In addition, he has asked me to evaluate longer-range possibilities, among them fusion power and solar power.

It is interesting and significant that this energy message was, as nearly as I can determine, the first message from a President to a Congress whose thrust was an R&D effort aimed at solving a national problem. I hope and expect that this is but the first of many others to follow, and it seems clear to me that computers must play an important role in many of them.

Presidential Message on Computers

A criterion of success for ambition to "communicate about computers" is this: success will be achieved when there is a Presidential message recognizing computing as a resource to solve national problems. Unfortunately, we are not close to this result at present.

In fact, in my office's forthcoming annual report on science and technology, there is no chapter on computing. Of course, computing is referred to in other chapters.

What should such a chapter say if there were to be one? The report is intended to be a report to the Congress and the nation at large. The standard format we have adopted is first a recital of significant accomplishments; second, exposure of the issues confronting the field; and finally a projection of the possibilities for resolving them, coupled with a discussion of the attendant policies. I invite computer people to write to me concretely about this matter.

Communicating to the Public About Computers

It is necessary to communicate with the public so that computers become more acceptable and less frightening to them. It is necessary to gain the participation of people whose lives and jobs will be affected by computers, if they are to accept computers and if they are to use them wisely and effectively. Many opportunities exist for the infusion of computing into the service and manufacturing industries. In fact, I believe this infusion is a necessity if productivity and our foreign trade are to be kept healthy.

In addition, as computers become more and more a part of our society, the reliability of both hardware and software must be geared to avoid human tragedies. Computers must be used to protect people's privacy and to insure their individuality.

Changing the Image of Computers

We all have an awesome task to convert the image of computers from the image of an unwelcome intruder and a disagreeable agent of change, to the image of a benevolent helper and resource for our country. Changing this image will require the computing community to communicate about computers in ways which it has not done before.

In addition, there must be communication within the computer community to increase its level of professionalism and its responsibility for its own impact on society. ☐

Ernst – *Continued from page 11*

and other institutions make increasing use of electronic records. We already have cases where records were destroyed by mistake or were lost; a small mutual fund, for example, has had the embarrassment of having to write its customers to find out how many shares they owned! No system is perfect in reliability; and no matter what steps we take, sooner or later there are going to be errors and failures. As we build bigger systems and become more dependent on them, we faced increased vulnerability. The size of the largest organization in a given field of endeavor tends to approach the maximum that is manageable. The use of the computer increases the manageable size of a company; but it also increases the vulnerability of that company if something happens to the computer.

Sabotage

There is also the question of sabotage. It is probably no accident that quite a number of efforts of the radical left and students in their bombing attempts, building seizures and such, have involved computer systems. We are not too vulnerable now, but in the future these actions can cause far greater difficulties.

Industrial Espionage

In addition to straightforward sabotage, I think we have to look forward to problems of increased industrial espionage. If it is known that a company bases its marketing plans very heavily on a simulation it has developed, the simulation itself can become a target for a competitor. And it is not too difficult in normal situations to arrange for the disappearance of a program or the disappearance of input data from most of our current computer systems.

More Filtering of Data for Decision Making

Finally, we face the fact that management itself will become more vulnerable in its decision-making. As we use more complex decision-making tools, and as we rely more heavily on large data banks, there will be more filtering of information by management staffs before materials for decisions are presented to the senior management. Even today, I feel that a large fraction of the decisions of senior managers are not made by them. They are forced on them by the selectivity of their staffs in providing data and in presenting arguments. As the staffs grow bigger and the data base more complex, the filtering mechanism will expand and senior managers will find it more difficult to exercise effective personal control.

Business Will Suffer from Failures to Deal with Problems

In this brief review, I have described some of the problems of computers I have encountered in a variety of work for business, universities and governmental organizations. The list is obviously not complete. Though the examples range from fairly trivial to moderately serious, all are characterized by the fact that they will become far more extensive and very likely far more dangerous as our use of computers broadens. At the moment, these problems don't hurt us very much. I don't believe they will be painless for much longer, however, and I do believe businessmen have an important responsibility for helping solve these problems. If they do not, business will certainly be among the first groups to suffer from our failure to deal with them. ☐

SECURITY IN ON-LINE SYSTEMS – A Primer for Management

"How about the clandestine intruder who . . . through illegal or unauthorized access at a remote terminal, steals or manipulates your data? . . . Or brief power failures that leave you with a three-day recovery problem? . . . How does one secure his system to prevent such occurrences?"

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This article concerns "on-line computer systems" – breeds of computer systems replete with central processors and terminals in a myriad of configurations. Little attempt has been made to distinguish the differences in security requirements for various types of on-line systems, such as on-line batch dial-up, dedicated real-time inquiry, etc. Rather, the approach here is generic; it is concerned with the inherent problems whenever you attach a terminal outside of your data center to your central processor and thus expose your data files to remote access.

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Mr. Hirschfield is a graduate of Rutgers University with a B.A. degree, and served for four years on active duty in the U.S. Air Force, specializing in the installation and operation of ICBM computer guidance systems.

Just for a moment, visualize your computer center. Is it well situated? secured with badge lock controls, magnetic detectors, automatic fire alarm systems and other similar physical security devices? If the answer is yes, and we hope it is, is it a secure installation? Probably quite secure against a frontal assault.

But how about the clandestine intruder who does not steal a tape but, through illegal or unauthorized access at a remote terminal, steals or manipulates your data? Even worse, do you even know this happened until your stockholders list shows up in the hands of a firm selling cancer cures by mail? Or how about just simple accidents that can clobber your data files? Or brief power failures that leave you with a three-day recovery problem and a system that's out of balance by four transactions, but no one knows which ones; or by $4,000 and no one knows why.

Well, enough of the potential. The question is how does one secure his system to prevent such occurrences? We believe the control problem can be viewed as having four dimensions:

1. Preventing illegal or unauthorized access to the computer and its data files and programs.
2. Control over data transferred from remote locations to the central computer.
3. Back-up and recovery systems for the computer complex.

4. System auditability – the ability to audit the system.

Access Control

Access control is an area which requires early and comprehensive evaluation. The umbrella of security which is inherent in computer and file access can only provide adequate protection if the structure of the system itself will allow the appropriate access control mechanisms to function. Thus, proper security cannot be built in after the system is built. Security must be an integral part of the systems planning, for as in any construction, the architectural scheme must be determined before the first brick is laid.

Security in on-line systems begins at the same point as in self-contained, non-terminal systems – with the physical security of the installation. In the case we are considering, however, a new dimension is added: physical security must be extended to the outlying terminal locations, for they may be rightly viewed as your first line of defense. Not only must access to them be controlled, but the materials associated with their use must be carefully handled, for these materials can be a valuable source of information for someone aspiring to enter your system on an unauthorized basis using legal codes and procedures. These physical control functions, however, are straightforward. They are similar to practices already in existence if your data center is well controlled; so we will not dwell on them here. Rather, we wish to concentrate on those areas of security more directly pertinent to on-line systems.

First, appoint someone to be responsible for the security provisions of the system. To extend a previous metaphor, he is the architect and the contracting engineer for systems security. He should be one person, reporting at a high enough level to insure that proper attention is given to essential security matters. Ideally, he should have the experience of a senior systems analyst or programmer, the tenacity of a skeptical auditor, and the patience of Job. For, let me warn you, security provisions are easily discarded. They are expensive, time-consuming to implement and process, and in general, a pain in the neck to the systems developers. So pick a good man and give him the responsibility and the authority to back up that responsibility. Give him the tools sufficient to impede hasty and ill-conceived systems decisions affecting security.

All right, we are physically secure. We have a security manager who is qualified and ready to do his job. What next? The answer is so simple it is often not done. We examine the problem; the data, the files, the needs of the user, from the viewpoint of how can we minimize the security problem before we begin. There are several things that can be done to secure a system before the final design ever begins. Among them:

1. To the extent possible *restrict the number and location of terminals* and the *categories of system users.*
2. *Don't put sensitive data into files* that will be available to terminal users unless the data is absolutely essential.
3. *Establish and maintain a system to purge unneeded data* from the files periodically. Aside from being a generally good practice in any systems design, the periodic purging of unnecessary data will lessen security requirements. It will also tend to have a corollary benefit in certain types of organizations, i.e. the protection of the individual's right to privacy by not storing, in an accessible and manipulative form, extraneous and gratuitous information about that individual. Public pressures will make the question of protection of individual rights in computer systems a crucial area of concern to systems designers in the future, and rightly so. Attention to this area now may preclude many headaches later. However, this consideration has broad implications which are not the subject of this article, so we will not dwell on it here.

Let us then assume we have taken the pre-design steps to insure that unnecessary sensitive data will not complicate our control needs and the number of users and terminals are restricted by the basic principles of the right and need to know.

What next? First, we need a system for controlling access to the computer from remote terminals. Such systems are usually called password control systems. In their most basic form they insure that an authorized terminal and user is requesting access to the system. In dial-up systems this requires entry of a terminal and user code. In directly connected terminals only the user code may be necessary. The problem of access, however, is complicated by the necessity of being more selective than simply the granting or refusing of access. For example, files containing sensitive information cannot be available to all persons having general access to the system. Thus, a comprehensive password system may contain several levels of access information such as terminal identifiers and user codes which identify the individual and his access classification. The access classification code may, in turn, simply delineate the data files that are available to that individual and/or terminal or may be much more complex; restricting read-write access on each file or making individual fields or groups of fields on a data file inaccessible.

The determination of the type of access restrictions is based on several factors. Among them are:

a) *The nature of the data* – Obviously, access to sensitive data such as marketing planning information, stockholder lists, customer information and the like must be more strictly controlled than your inventory of office furniture.

b) *The structure of the data files* – For example, files which have data of similar security classification stored independently are normally less costly to secure than files imbedded with a varying level of sensitivity. The former allows record level control while the latter may preclude it.

c) *The cost of security* – Generally, as the level of control becomes more discreet, i.e. moves toward the field level, the cost of security goes up rapidly. The cost being measured in terms of computer storage required, processing time for security measures, implementation costs and, often overlooked, the cost of maintaining, utilizing and verifying the security measures.

We should note that we are discussing only data which is stored in a record structure. For list structures and other non-record formats, the parameters of the relationship of security level to cost will be the same although the method of measurement may be greatly different.

So, we have planned ahead and designed cost-effective access controls into our system and have assured a secure physical environment. We are on the way to a secure on-line system, but the path is still long and difficult. Let's look at another factor to be considered: the transfer of data from the terminals to the central processor.

Data Transfer Controls

Several levels of controls are necessary in data transfer. The most common are the familiar terminal and line checking features such as horizontal and vertical parity, bit counts and sequential message numbering. All of these are important and should be used where appropriate; but for our purposes we need to cover some less familiar yet potentially critical data transfer controls, i.e., computer logs, encrypting of data and closed loop verification.

Computer Logs

In an on-line system a complete computer log should be kept of every terminal and operator access to the system. The log will record the time of access, the terminal number and user password, the purpose of the access and other information deemed pertinent. It must be maintained on a "real-time" basis and information printed out from it periodically for review and analysis. Items of special interest, such as attempts to gain access to files with illegal passwords or unusual halts, should be flagged for frequent investigation by the security officer. In addition, in dial-up systems, a user requesting access with an illegal password should be allowed a few erroneous attempts to allow for honest error, and then be bumped from the system. This will be a serious deterrent to the casual interloper who is trying to figure out your password system through trial and error. Such system-generated terminations should be items for follow-up action for they might be the first and perhaps only indication of an attempted illegal access.

Closed-Loop Verification

In addition to the log, we recommend strongly the use of closed loop verification to insure that all data transmitted to the system has been received as transmitted. This positive confirmation, transmitted from the computer to the terminal contains the message number, the time of day, and a character or bit count which should correspond to the character and bit count transmitted. This method assures that no data has been lost in transmission and facilitates recovery in case of system failure (a subject which will be covered later in this article). A similar technique can be used in processing. If each item of update input data is viewed as a trigger for certain processing steps, then positive verification can indicate that the data has passed preselected points and the appropriate files have been affected. As part of the normal back-up-restart pattern, a predetermined level of closed loop control points will be necessary.

Encrypting of Data

Another method of data transfer security, encrypting of data, is not designed to prevent loss due to transmission error, but to prevent theft of sensitive data during transmission. All public lines are subject to being electronically monitored without the user's knowledge. Even private lines are not completely secure and microwave may prove to be the least secure of all. Thus, when sensitive data is transmitted, the user must realize that through a concentrated effort on the part of a malicious intruder, this data can be obtained. If the data is sensitive enough, the only recourse is to encrypt it. The use of encrypting is growing among many companies who transmit confidential data and of course is heavily used by the U.S. government. Many users have even begun encrypting the actual data files in the computer for maximum security.

Back-up and Recovery from Systems Failure

The functions that have been built into the on-line system for control and security purposes are essential for recovery in case of systems failure. The combination of computer logs, back-up files and closed-loop verification provide a dynamic status which is necessary if the user is to restart the system with minimum loss of time and money. Without such controls, transactions may be mishandled, processed twice or even lost. The subject of back-up systems is one which assumes critical importance in an on-line environment. Often the applications processed and their immediacy do not allow the system to be down for any extended period of time. Depending on the criticalness of the processing, on-line systems may have to be duplexed or in some cases even triplexed to assure an uninterrupted flow of processing. However, an often overlooked point, is that if the user is to go to this expense and difficulty he must also consider the back-up requirements of his power supply, air conditioning, etc., and provide proper switching mechanisms to assure that back-up transfer can be effected when necessary.

Back-up of data files and programs is another consideration. How often do you want to copy these files? The answer will be determined by the nature of the applications and the restart requirements determined by management. For inquiry files, perhaps a daily back-up for files is enough. For files that are being updated by transactions during the day, perhaps the updated records should be duplicated concurrently with the update cycle. In this way, if the master file is destroyed, the back-up file (which can be physically protected), in conjunction with the back-up master with which processing began, can be used to quickly recreate the master up through the last transaction processed. The question again is one of cost weighed against the nature of your business and the structure and criticality of the application(s).

System Auditability

If you have implemented the appropriate security measures outlined in this article, or similar effective measures you should be feeling quite secure and rightly so, for, to the extent possible, you have prevented accidental or malicious intrusion into your system. All right then, publish your security procedures. Describe them. Tell in detail the security measures in effect. Let it all hang out. If the security system can't stand scrutiny, it will not be effective, for in one way or another it will be scrutinized. For example, a basic design criteria of sophisticated encrypting systems is that, even if you have available a message in its "clear" and encrypted forms you cannot determine the encryption formula. Thus, a second encrypted message would be untranslatable and useless to you. So, open your security system up. Let it be audited. It will stand or fall on its power to withstand knowledge of its internal workings.

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THE JAPANESE COMPUTER MARKET – CHARACTERISTICS ADVERSELY AFFECTING U.S. TRADE INTERESTS

Part Two

"A number of measures, legal in nature, are enforced by the Japanese Government in order to reduce the impact of foreign competition, mainly U.S., on the domestic manufacturers. These measures include restrictions, licensing, tariffs, and quota control and all serve to exclude imports and discourage U.S.-owned Japanese-based computer manufacturing operations."

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Part One of this article, which appeared in the August issue, discussed Japan's efforts to give financial assistance to domestic computer manufacturers. This has been accomplished through two semi-governmental organizations: the Ministry of International Trade and Industry (MITI) and the Japan Electronic Computer Company (JECC). The MITI subsidizes the computer industry and coordinates the industry's work through "administrative guidance." The JECC is a leasing firm that gives capital to computer manufacturers by renting computers at many times the rental fee.

Japan Development Bank

The Japan Development Bank (JDB) lends money to JECC at 7.5%. This subsidized interest rate is quite competitive to U.S. computer firms in Japan. JDB's funds however are not unlimited especially in light of the fact that Japanese firms are all heavily debt financed (80-90%) rather than equity financed. Thus there is great demand for capital in Japanese industry and JECC receives only a limited amount. Because of JECC's capital constraints in the face of increased computer leasing business, the organization was forced to reject some computer manufacturer's leasing and installment selling contracts for the first time in 1969. JECC's share of the computer rental and installment sales market thus fell somewhat.

Under MITI and JECC are other quasi-governmental bodies whose specific financial activities aid Japanese computer manufacturers at the expense of U.S. computer vendors in Japan.

Information Processing Promotion Corporation

The Information Processing Promotion Corporation is an organization which promotes Japanese data processing firms by extending loans, on liberal terms, to general business companies, service firms, and software developers for the development of advanced software and data information. Loans are also extended to JECC for the purchase of software. Terms are 6 years including a two year grace period at 6.5% interest per annum. The amount of the loans ranges from \$6.7 to \$22 million annually. In addition to financing software development this organization also purchases privately developed software and leases it out to users much like JECC does computers.

Japan Electronic Industry Development Association

The Japan Electronic Industry Development Association (JEIDA) is a government supported organization comprised of the leading Japanese manufacturers of electronic equipment. Its purpose is mainly that of educational and research coordination in order to further rationalize the industry. The Government gives limited financial support to the group and thus stimulates Japanese international competitiveness by improving manufacturing and market techniques, and developing new and improved equipment.[7]

Other Bodies

In addition to the previously described organizations there are several other groups which receive government financial, manpower, and advisory support. These include the Electronic Computer Usage Development Corp. (promotes computer usage), the Information Processing Development Center (trains systems engineers and programmers), and the System Technology Development Center (develops sophisticated software packages). All of these organizations give the Japanese computer industry a competitive advantage over the U.S. computer interests in Japan. A major factor in the viability of these organizations is the Government financial support.

Financial Controls

A number of measures, legal in nature, are enforced by the Japanese Government in order to reduce the impact of foreign competition, mainly U.S., on the domestic computer manufacturers. These measures include restrictions,

Table 3

Effect of Japanese Import Restrictions on U.S. Computer Exports in 1967*
(All Data = $ 000's)

Country	U.S. Exports 1967 A: 714.2005 Electronic computers, digital, including process control computers	B: 714.2010 Electronic computers, not elsewhere classified including process control computers	A + B	C: Gross domestic fixed capital formation*	Ratio: A+B / C %
United Kingdom	35,298	14,215	49,513	17,196,000	.029
France	35,614	11,726	47,340	28,800,000	.016
West Germany	17,463	33,575	51,038	28,500,000	.018
Japan	30,452	8,425	38,877	37,765,000	.010
Rep. SAF	3,691	963	4,654	3,149,000	.014
Total U.S. Exports	205,947	107,446	313,393		
United Kingdom) France) West Germany) Rep. SAF)	92,066	60,479	152,545	77,645,000	.01964
Japan	30,452	8,425	38,877	37,765,000	.01029
					.00935

Estimated U.S. Trade Loss in 1967 = .00935 X $37,765,000 = $35,310,000.

*United Nations, Monthly Bulletin of Statistics, June 1969, pp. 189-195.

licensing, tariffs, and quota control and all serve to exclude imports and discourage U.S. owned Japanese-based computer manufacturing operations.

Quantitative restrictions are imposed on imported computers in accordance with the Japanese Negative List.[12] Such a restriction limits the quantity of U.S. computers by type that can be imported into Japan. Further restriction comes in the form of required MITI authorization to bring in operating capital, open branch offices to engage in importing and direct selling, and be assured of repatriation of earnings. This action falls under the Foreign Investment Law of 1950 and as a result, because of consistent opposition from MITI, few U.S. computer firms have been authorized to engage in direct sales of computers.

The effect of Japan's import restrictions on U.S. exports of computers may be roughly estimated by comparing the ratio of U.S. computer exports over gross domestic fixed capital formation in Japan, to that ratio in other comparable markets. The amount by which this ratio is lower in Japan than it is in other markets may be attributed to the effect of Japan's restrictions.

An estimated U.S. trade loss in computers of $35,310,000 in 1967 is derived by taking the ratio (A+B)/C for the United Kingdom, France, West Germany, and the Rep. of South Africa (.01964) and subtracting (A+B)/C for Japan (.01029) and multiplying the difference (.00935) times Japan's gross domestic fixed capital formation ($37,765,000,000), C. This calculation is shown in Table 3. The result, a $35 million opportunity cost to the U.S., reveals the effectiveness of the Japanese restrictions. U.S. trade interests have suffered accordingly.

Another financial control is the import licensing requirement. Computers cannot be imported into Japan unless the import is approved by MITI. All importers must submit to MITI import application forms that carry an attachment requiring, among other things, the name of the end-user of the imported computer. End-users normally are asked by MITI to justify their purchases of imported equipment. At times, pressure to use domestic equipment is applied and financial backing is arranged to permit purchase from a domestic firm. Domestic manufacturers are notified of the potential sale so that they may compete for the business. The net result of this arbitrary system of import licensing is that the domestic computer manufacturing industry is given a high degree of protection.[13]

Japan places comparatively high tariffs on imported computers and related equipment. The rate for computers is 15%, input-output peripheral equipment 25%, and integrated circuits 15%.[14] This compares to the U.S. duty on these items of 10%. While other countries are reducing the duty rates on such commodities as computers in conjunction with the Kennedy Round talks, Japan retains the high tariff rate. The Common Market countries (EEC) for example, are reducing tariff rates on imported computers to 7% by 1972.

Meanwhile the U.S. has forcefully argued with the Japanese Government to reduce the restrictions on U.S. computer imports, thus far without material success. Formal talks commenced in May 1969 between the Secretary of Commerce and the Japanese and were followed up by a Cabinet level bilateral discussion in July 1969 and an Assistant Secretary of Commerce presentation in October 1969.[15] The U.S. Embassy in Tokyo has continued the plea since.

Japan's six leading computer manufacturers have petitioned their government and business leaders to exclude computers from the import liberalization list scheduled to be completed in fiscal 1972.[16] This action was a result of the Government's consideration to liberalize small-scale computers by 1972. The Japanese have been all promises so far and no action. Summer 1970 is presently promised as the time to expect Japanese announcement of her intentions concerning this matter. Import restrictions such as these are illegal under the GATT Agreement to which Japan is a participant. A further problem is the U.S. Government's lack of support by the major U.S. computer producers in convincing the Japanese to liberalize. This is due to fears that if forced to remove restrictions the Japanese will retaliate by tightening the screws even tighter on the U.S. producers' subsidiary operations in Japan.

U.S. Advantage: Japanese Incurring Problems

Despite the determined effort to stimulate the domestic computer industry at the expense of U.S. trade interests the Japanese computer manufacturers are still incurring financial problems. None of the firms are making a profit on their computer operations. Sales volume is too low to cover costs. MITI is attempting to reduce the industry's costs by urging more specialization and restricting the number of models. Aggregate savings accruing from this effort, however, may not be enough.

Japanese computer firms presently spend little money on research and development. Expenditures are woefully inadequate because stockholders are not willing to invest substantial funds in this field which may not yield large and early dividends. Thus a technology gap exists between U.S. and Japanese computers. All but one Japanese computer manufacturer are dependent on U.S. firms for technology. The dependency is in the form of license agreements. Export expansion into the international market is, according to the Japanese, the means by which to increase sales volume, become profitable, and undertake R&D so as to break the ties with U.S. firms and become competitive. This indeed is beginning to take place as Japanese computer exports are appearing in Europe, United States, and the Soviet Union.

Conclusion

Mr. Kaoru Ando, president of Fujitsu Facom, Ltd., Japan's leading computer manufacturer, admits the Japan Government financially fosters the domestic computer industry. In explaining the basis for such policies he states, "the key word is government guidance." He further explains, "Japan's computer industry, like any other of its growth industries, receives government protection from foreign interests and from excessive competition from domestic circles."[17]

This reveals the philosophical belief which underlies the concerted guidance and support effort being directed at the Japanese computer industry by the Japanese Government at the expense of U.S. computer firms. The practice is thorough and effective. It is mainly centered around financial supports, controls, and barriers. Being faced with such competition the U.S. has voiced opposition but nothing more. Presently the situation is a standoff. MITI may have enough power to harass IBM out of Japan, but IBM could cripple the budding Japanese computer industry by withholding IBM patent licenses.[18] Both governments have too much at stake to directly confront one another. In the meanwhile, the U.S. computer vendors are losing much potential business and being kept out of a lucrative computer market by unfair, unilateral practices.

What will be the fate of U.S. computer vendors in the Japanese market? Speculation on the future suggests gradual liberalization but only after Japanese manufacturers are totally capable of competing on equal terms with U.S. manufacturers. By this time it will be too late for the U.S. to benefit from such liberalization. It will be like the Japanese competing with IBM in the U.S. market. U.S. firms will not be able to match the Japanese computer firms' advantages in their own market.

The decade of the 70's will find the Japan Government investing more heavily in the domestic computer industry. "Such investments must be made in conjunction with what is determined to be the most effective schedule for progress after due consideration of the special governmental, economic, and social features of the country."[19]

The direction in which the Japanese Government will head is evidenced by the proposed course of action as stated in the Computer Usage Development Institute's *White Paper* of 1969.[8]

(1) That the Government should actively aid in the establishment of local and specialized data banks . . .

(2) That the Government should aid in the research and development of the hardware and software necessary for time sharing at private research laboratories through the granting of substantial funds.

(3) That the Government should take special measures against inroads by foreign enterprises into the information industry until Japan's industry has reached a certain level of independence.

Obviously, much of the adverse development and control actions will be financial in nature. Whether it be due to financial aid to develop the domestic computer industry or financial restrictions to repel U.S. sales efforts, Japanese market penetration by U.S. computer vendors will be increasingly difficult in the future. □

Footnotes

1. *Japan Times*, Oct. 30, 1969
2. State Dept. Tokyo Airgram A-43, Jan. 16, 1970
3. Sandra DiGioia, "Computers," Chase Manhattan Bank, Economic Research
4. State Dept. Tokyo Airgram A-2290, Dec. 6, 1969
5. Sherman R. Abrahamson, "The Manufacture of Computers in Japan," *Dept. of State Case Study*, 1969, p. 8
6. State Dept. Tokyo Airgram A-710, July 28, 1969
7. State Dept. Tokyo Airgram A-2290, Dec. 6, 1968
8. *Ibid*
9. *Computer White Paper*, Japan Computer Usage Development Institute, 1969, p. 10
10. *Electronic News*, June 15, 1970, p. 32
11. "Japanese Courting Foreign EDP Sales," *Electronic News*, Apr. 13, 1970, p. 27
12. *Business Machines in Japan, 1962-67*, U.S. Department of Commerce OBR 68-88, Dec. 1968
13. Sherman Abrahamson, "The Manufacture of Computers in Japan," *Dept. of State Case Study*, 1969, p. 7
14. U.S. Dept. of Commerce, *Kennedy Round Special Report*, Feb. 1970, p. 12
15. "Japan Resists U.S. Efforts to Ease EDP Import Restrictions," *Electronic News*, Feb. 23, 1970, p. 21
16. "Don't Ease Computer Imports," *Electronic News*, Apr. 6, 1970, p. 44
17. "Japanese Courting Foreign EDP Sales," *Electronic News*, Apr. 13, 1970, p. 27
18. "Japan's Computer Industry -- Wait Till 1980," *Forbes*, Dec. 15, 1969, p. 37
19. *Computer White Paper*, Japan Computer Usage Development Institute, 1969, p. 81

INFORMATION SYSTEMS IN URBAN GOVERNMENTS

"In the past, municipal functions were separated to make manual record keeping tasks manageable. With the availability of ADP, it makes little sense to sustain this situation. Systems analysis reveals that ADP technology demands a more sensible integration of these functions. So what we are talking about is not the integration of information systems, but rather the integration and reorganization of basic municipal functions themselves."

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The purpose of this article is to summarize the current status of Automatic Data Processing (ADP) in local government and to project several major themes for future development. The broader topic of information systems will be considered as the principal element of management in public administration. Information is, in fact, the major element and a primary commodity in local government, for local government does not produce physical products in the industrial sense. The local administrator deals with a massive flow of information concerning public finance, the physical environment, and the community which he serves.

The Current State of Affairs

Based on our observations over the past four years, the current state of affairs in local government in regard to ADP can be summarized as follows:

1. Computers have penetrated extensively into local government; in particular, small municipalities in the range of 10,000 to 50,000 population are introducing ADP at an increasing pace.
2. ADP development is generally insular in nature, with little transfer of experience and poor communications.
3. Public administrators generally have a meager knowledge of computer technology and are often unwilling to be exposed to educational opportunities.
4. ADP utilization is highly constrained by political, economic, legal, inter-governmental and traditional considerations.
5. The majority of local government users are led blindly by ADP "sophisticates" and the many special economic interests in the field including vendors of hardware, software, education, and services.
6. Some cities, counties, and municipalities have made significant strides in the effective utilization of ADP, and have demonstrated the feasibility and effectiveness of such advanced technology when properly applied.

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His professional memberships include the Urban and Regional Information Systems Association, the Association for Computer Machinery, and the Society for Information Displays.

Areas of Concern

On the basis of this state of affairs, we see three major areas of concern regarding the development and social impact of ADP in urban society.

First, the effective utilization of advanced technology will result in far-reaching changes in the management, politics, organization and procedure in local government. The thesis that information system technology is merely a service function which supports or replaces manual procedures on a one-for-one basis while carefully sustaining the status quo is a great myth. Data processing technology, in order to be effectively utilized, must become an integral part of the basic administrative processes rather than an awkward encumbrance. Recognition of this sometimes painful fact will enhance the ability of administrators to cope with the situation, and to use it to their advantage. We recommend the concept of "enlightened self-interest" as a management attitude toward automation.

Second, there is a pressing need for a concerted attack on urban problems through the close coordination of diverse but related public administration services including welfare, health, housing, recreation, education, etc.; ADP technology can facilitate this effort by making available comprehensive information on the socio-economic status of the community and by facilitating evaluation of the effectiveness of social programs.

Third, a "clearinghouse" is needed for the sharing of local government ADP capabilities and reduction of the "re-invention of the wheel," so common in this field.

ADP Penetration

According to a 1970 survey conducted by the International City Management Association (ICMA)[1], there are 844 municipalities in the U.S. known to have computer installations or TAB equipment. This represents a growth of 213% over the estimate of 270 installations in 1967. Total expenditures for ADP in 1970 were estimated to be about $70,550,000. Annual ADP budgets had a mean value of $225,367 in 1970 compared to $53,000 in 1967. The range was $1,000 to $6,164,000 in 1970 compared to $1,500 to $3,900,000 in 1967. (See Figure 1.) However, it should be emphasized that only 1,562 of 3,303 municipalities responded, and no assumptions can be properly made concerning the use of ADP in the remainder.

Centralization

ADP has generally been implemented on a fragmentary departmental basis, resulting in incompatible sub-systems and a lack of broad socio-economic data on urban localities. However, a strong trend toward centralization has been fostered primarily by economic considerations. In 1967,

Surveyed - 3,303 Cities; 1,562 Responded

844 or 54% Used ADP in Municipal Operations

Municipal Use of ADP

Population	No. of Cities	1962	1965	1968	1970
Over 250K	54	31-58%	30-55%	38-70%	45-83%
100-250K	96	37-38%	37-38%	48-50%	76-79%
50-100K	232	39-13%	46-20%	50-25%	147-63%
25- 50K	477	30- 6%	67-14%	70-15%	226-47%
10- 25K	1213	28- 2%	--	57- 5%	242-20%
Totals	3303	178- 5%	180- 8%	272- 8%	844-26%

Annual ADP Budgets in 1970

Population	No. of Cities	Low	Medium	High
Over 500K	27	$115,000	$1,755,158	$6,164,000
250-500K	27	31,000	507,954	1,595,000
100-250K	96	5,000	209,431	990,000
50-100K	232	1,000	80,478	364,000
25- 50K	477	1,000	43,478	480,000

Figure 1 — Survey of ADP in Municipal Government June, 1970 — I.C.M.A.

81.7% of 246 "automated" cities had implemented hardware centralization; 41.9% were developing functional applications for single departments, 9.4% had interdepartmental "data banks," and 11.8% claimed a "Management Information System (MIS)" approach.[2] Problems encountered in centralization include sacrifice in responsiveness to users and the batch processing "bottleneck". Management responsibility for ADP was found to be in the Finance Department — in 70% of the localities, although 14% of them had separate ADP departments.

The current trend is toward departmental systems. Finance, public utilities and personnel are the most common; planning, public works and police are intermediate; social services are rare. Finance usually represents the most obvious use of ADP and can most often produce real dollar savings. Law enforcement, public utilities and education most often justify and maintain separate ADP facilities due to special requirements and frequent jurisdictional independence.

Data Banks

The Urban Planning function most often demands comprehensive information concerning the community as a whole. This demand cuts across functional lines and encompasses real-property, health, welfare, police and other data. To meet this need there is a growing trend toward the development of urban "data banks." They are usually independent of departmental operations, based on one-time surveys, and rarely maintained current and up-to-date. Consequently, the data are static, the costs are excessive and difficult to justify (for planning alone), utilization is often low, and effective information retrieval and display techniques are frequently lacking.

Because of the fundamental role of maps in urban administration, a strong trend has developed toward the "Geographically-Oriented Urban Data Base" concept. This technique involves the relation of diverse urban data to maps by means of coordinate indexing using digitizing devices. The advantages include: a common denominator correlating urban data; geo-retrieval; potential for graphics display; and socio-economic indicators. (See Figure 2.)

Costs

The acquisition of a computer installation will almost invariably create more administrative problems and costs than will be resolved for the first several years. The computer hardware is only one source of expense; to this must be added facilities, installation, personnel, supplies, software, consulting services, etc. Inadequate selection decisions and lack of planning at this point can result in disastrous future results.

As an example, a small IBM System/360 Model 30 would lease for about $12,000 per month or $144,000 for the first year. To this must be added various supporting services. On the average the basic hardware costs of $144,000 must be supplemented with $190,000 in the first year, a ratio of 1.3 to 1, for a total budget of $334,000. (See Figure 3.) Of course, smaller installations can provide useful results, and some of these costs will be reduced in future years.

A minimum budget for an effective in-house ADP installation would probably be about $100,000 per year, would more likely average about $350,000 and can readily approach $1,000,000. Therefore, questions of economic feasibility become highly relevant and consideration of automation alternatives such as a service-bureau, time-sharing or shared facilities become crucial.

Expenditures for ADP usually range from 0.4% to 2.0% of total budgets, with an average around 1.0%. (See Figure 4.) In many cases, however, the adequacy of the percent is questionable.

No.	Agency	Title	Plan.	Ops.	Digitized Level	Applications	DASD	On-Line	Update	Software
1	St. Louis County, Mo.	Geo-Coding	X		P.C. S.I.	Tax Billing Land-Use Re-Districting Title Search	No	No	Sporadic	Custom
2	Santa Clara County, Calif.	Local Government Information Control LOGIC		X	P.C.	Real Property Voter Registration Planning	No	No	Regular-Batch	Custom
3	Los Angeles, Calif.	Automatic Planning Operations File APOF		X	P.C.	Planning Socio-Economic Economic	No (Plan)	No (Plan)	Regular-Batch	Planned General Purpose
4	New York City, N.Y.	Geographic Information System GIST	X		S.I.	Planning Assessor	No	No	Department Responsibility	DIME
5	Portland, Oreg. Metropolitan Planning Commission	Map-Model System	X		Polygon/ Districts	Land Use	No	No	Field Survey	FORTRAN/ PL/1
6	Kansas City, Mo.	Metropolitan Planning Commission Geo-Plan System	X		S.I./ Districts	Planning	No Summary Files on Disk	No	Sporadic	Graphic Output Cobol/ Fortran
7	Washington Council of Governments	Metropolitan Parcel File	X		Census Tracts Block Centroids	Transportation Land Use	No	No	Annual	Custom
8	New Haven, Conn. Census Use Study	Dual Independent Map Encoding DIME Technique	Research		S.I.	Census Planning	No	No	N/A	DIME
9	IBM/FSD Alexandria, Va.	Geographically-Oriented Urban Data Base	Research		S.I.	Public Works Planning	Yes	Yes	N/A	FASTER Geo-Retrieval

Figure 2 — Geo-Data Base Systems Currently Under Development

Political Aspects

There is at present, an explosion of urban problems — in the physical, personal, social, economic and governmental aspects of the environment. Secretary Romney of HUD emphasizes the severity of these problems as follows:

> ... urgent needs and problems press in upon our cities and those who try to govern them: youthful immorality and drug addiction, idleness, traffic jams, polluted air and water, filth and ugliness, deteriorating education, rising crime, intractable poverty — racial, ethnic, social and economic tension.
>
> Against the tide of problems, city governments are fighting a heroic but generally losing rear guard action with inadequate citizen concern and involvement, balkanized and archaic state and local governments, hostile state and local relationships, inflation, excessive self-defeating property tax structure, and lack of money.
>
> The crises of hope in local government is the direct result of a growing sense that problems of the city cannot be solved, that its government cannot govern, and that its life cannot be made livable.[3]

IBM System/360 Model 30 Disk @ $12,000/Mo. Lease	$144,000
Facility Rental, 3,000 Sq. Ft. @ $5.00/Sq. Ft.	15,000
Site Preparation	30,000
Personnel	85,000
Supplies	10,000
Data Preparation (Key Punch, etc.)	12,500
Software	10,000
Consulting Services	25,000
Education	2,500
Total	$334,000
Hardware	$144,000
Operating Expenses	$190,000
Ratio	1.3

Figure 3 — A Simulated ADP Budget

Jurisdiction	Population*	Total Budget*	ADP Budget*	Per Cent	Per Capita
District of Columbia	808	$750,000	$6,000	0.7	$7.42
Montgomery County	341	71,000	630	0.9	1.85
Prince George's County	357	93,000	1,063	1.1	3.00
Arlington County	173	31,000	300	1.0	1.73
Fairfax County	249	68,000	1,350	2.0	5.40
Alexandria	115	37,000	187	0.5	1.62

*In thousands.

Figure 4 — Examples of ADP Budgets in the D.C. Area

Solving Urban Crises

We will contend that information systems technology (including ADP) can contribute to solution of these urban crises. It can:

- Provide answers to the growing demands for comprehensive socio-economic information on urban localities to accurately pin-point problems, describe actual conditions, and provide the basis for the evaluation of social programs.
- Assist local government in meeting the growing onus of federal & state reporting requirements associated with grants in aid.
- Rationalize many administrative tasks through the process of systems analysis required prior to automation. Procedures must be minimized; the opportunity exists for the elimination or reduction of unnecessary and unproductive record keeping tasks.
- Strengthen the planning process as an essential management tool for the coordination of governmental services rather than a supernumerary function, often separate and independent from the operational departments.
- Facilitate the operational service functions through desperately needed automation in such areas as health, welfare, employment security, licensing, courts, and many others in which the complexities and time consumed in standing in lines often discourages those people most in need of essential services from utilizing them.

There are two categories of public administration functions that provide further understanding of the political aspects of information systems.

The first is the internal administration and finance which involves the management and control of municipal organization and resources, such as payroll, personnel, accounting, etc. Internal functions can usually be handled in an insular fashion without substantial impact from other units of government, although taxation is often an exception.

The second is public and social services which address regional problems which do not respect municipal boundaries such as crime, poverty, transportation, pollution, etc. These service functions often cannot be adequately handled without close coordination and cooperation with adjacent jurisdictions.

Too Many Local Government Units

Metropolitan areas are a conglomeration of multiple levels and numbers of independent jurisdictions. The number of local government units in the 40 largest SMSA's (Standard Metropolitan Statistical Area) range from 28 to 1,060, are relatively independent of population, and result in both vertical and horizontal conflicts. (See Figure 5.)

There are several approaches to the solution of this problem of too many local government units.

One solution is the establishment of Regional Councils. Regional Councils are growing at the rate of over 40% in the Eastern U.S., according to the National Service to Regional Councils directories for 1969 vs. 1970. Whether these agencies can solve the problems, or in some cases represent only one more jurisdiction to further compound the problem, remains to be seen. But they appear to be a step in the right direction.

A second way to decrease the number of government units is the political merger of county and municipal governments. This has been done in several areas, including Nashville, Tenn., and Jacksonville, Florida.

The functions performed by local government units vary depending on their level of jurisdiction. Municipalities concentrate heavily on public finance; counties usually perform the real property assessment function; welfare and employment security are usually administered at the state level. This factor enhances the importance of regional cooperation and inter-governmental relations.

Effective Implementation

Internal politics within jurisdictions raises questions about the effective implementation of ADP, particularly when a centralized approach is attempted. The functions of municipal government represent strong vested interests; furthermore, the possession of information is in itself a major element of administrative power and influence. The development of urban information systems cutting across departmental lines, in which a wide variety of functional

Rank	SMSA City	1965 Estimated Population (in 000's)	Local Governments
1	New York	11366	555
2	Chicago	6689	1060
3	Los Angeles	6765	234
4	Philadelphia	4664	963
5	Detroit	3987	242
6	San Francisco	2918	346
7	Boston	3205	125
8	Pittsburgh	2372	806
9	St. Louis	2249	482
10	Washington	2408	84
11	Cleveland	2000	205
12	Baltimore	1854	28
13	Newark	1857	204
14	Minn.-St. Paul	1612	261
15	Houston	1696	166
16	Buffalo	1320	153
17	Milwaukee	1275	238
18	Cincinnati	1347	259
19	Paterson	1307	196
20	Dallas	1289	198
21	Seattle	1179	281
22	Kansas City	1183	338
23	San Diego	1136	140
24	Atlanta	1216	84
25	Indianapolis	984	311
26	Miami	1061	32
27	Denver	1073	205
28	New Orleans	1027	31
29	Portland (Ore.)	897	374
30	Providence	739	72
31	San Bernardino	1026	250
32	Tampa	873	40
33	Columbus	847	128
34	Rochester	804	224
35	Dayton	791	162
36	Louisville	771	129
37	Birmingham	644	79
38	San Antonio	808	59
39	Anaheim-Santa Ana	1107	114
40	Memphis	740	46

(Dept. of Commerce, Bureau of the Census; "Census of Governments" 1962, Vol. V, Local Governments in Metropolitan Areas.)

Figure 5 — Local Government Units in Standard Metropolitan Statistical Areas

information may be readily accessible to many individuals, is often conceived to represent a threat to these vested interests.

Typically, municipal functions have not been developed in the context of advanced technology for handling information. Separation of functions was required to make manual record keeping tasks manageable, leading to extensive fragmentation. Legislative, political and economic motives also led in this direction.

With the availability of ADP it makes little sense to sustain this situation; e.g. financial management is often fragmented into separate accounting, budget, revenue, purchasing, payroll and other segments. Systems analysis reveals these factors and ADP technology demand a more sensible integration of functions. So what we are talking about is not information system integration, but rather the integration and reorganization of basic municipal functions.

The organizational locus of the ADP organization also presents a tense political problem. Although, it often originates in the Finance department, its broad service responsibilities often lead to an independent status under the chief administrative officer. Department heads often come to feel that the ADP group usurps their authority. This is often due to the failure to make ADP techniques an inherent part of the administrative process.

The administrative weakness of the planning function, contrasted with its heavy demands on the use of ADP, also compounds the problem. There is need for more effective use of planning as a viable tool for urban management. Management must interact continuously with operations, receive information feedback, and provide evaluative data on the effectiveness of programs.

The "Privacy" Issue

The cross-correlation and availability of comprehensive data on persons raises serious questions concerning the individual's rights to "privacy". This issue is with us at present and is not brought about by ADP alone. Solution will involve legislative and administrative safeguards to establish proper guidelines (which often do not exist at present) and the use of technological restrictions such as scrambling, keyword, physical security and limited access.

This issue is often confused with that of confidentiality, which refers to the proprietary possession of data by specific departments (which may otherwise be in the public domain). This is another internal political constraint that may be difficult to justify, but it often results in significant obstacles to effective system development and implementation.

If management adopts the concept of "enlightened self-interest" in this sphere, the result can be the concurrent strengthening of both administrative procedures and political entrenchment. Many have concluded that "our localities have suffered a reduction in their capacity to govern themselves." I maintain that the effective utilization of information system technology can begin to close this gap. □

References

1. Malchus, Watlington, "ADP in Municipal Government," Urban Data Service, International City Manager's Association, Oct. 1970, Vol. 2, No. 10.
2. Howe, G. and K. L. Kraemer, "Automated Data Processing in Municipal Government", 1968 Municipal Yearbook, International City Manager's Association, p. 293.
3. 46th Annual Congress of Cities, December, 1969.

Hirschfield – *Continued from page 17*

Of course, auditing of the system is a much more extensive subject and one of great concern for both the internal and external auditors of an organization. For auditors must not only be capable of reviewing the integrity of the controls and security in an on-line system, they must determine the effectiveness of these controls and, most important, be able to detect any changes to the system which affect control and security levels. With less hard copy being produced, the traditional "audit trail" is vanishing; and the auditor must develop new techniques for validating the effectiveness of control and security measures. Some of the techniques that we recommend are:

1. Involvement of the auditor in the systems development effort to insure that adequate controls are built in initially and that the auditor is aware of the control points and satisfied with the systems auditability. Should an auditor experienced in electronic data processing be your Security Officer? It might be a good idea.
2. The use of error analysis systems, particularly in new systems, to indicate weaknesses in systems design which may affect controls.
3. The use of computer audit programs to evaluate the accuracy of data files. An even more advanced approach is the development of resident audit modules in the system which can be triggered either externally or internally by a dynamic happening in the application process.
4. The use of the mini-company concept, wherein a fictitious set of records is processed in the same stream and by the same programs or modules that perform normal processing. In this way the results of processing can be verified without affecting live data.

None of these techniques can stand alone. In fact, in many installations the use of all these techniques is advisable to evaluate the effectiveness of systems controls. The key point is that the auditor will want to be, and should be, heavily involved in the areas of on-line security and control. No system is self-auditing, and exposure to the auditing process may be the best guarantee for the systems developers that the system is truly secure.

Summary

Obviously, in a short article, the requirements of on-line security and control can only be lightly covered. Many extensive volumes and papers have been written on each of the subject areas covered. The purpose of this article is to point out some of the problems inherent in securing on-line systems and some potential avenues of solution.

The selection of the appropriate avenues is a task requiring careful evaluation, for implementation can be complicated, costly, and add greatly to systems overhead. Therefore, the user must carefully evaluate and cost justify the security measures. He must question critically, What is the data worth? What are the true ramifications of the computer system being out of operation one hour; two hours; a day? Ramifications may take the form of direct loss, interruption of customer service, or a failure to fulfill legal obligations. In short, what are the problems and what alternatives exist? Then, and only then, can the user decide on an adequate level of security that he is prepared to pay the price to achieve. □

The Federal Bureau of Investigation and the Assassination of President Kennedy

"Although the Warren Commission had a substantial staff of lawyers, it had no true investigative staff of its own. Consequently, the Commission relied upon other agencies – the FBI, Central Intelligence Agency, Secret Service, etc. – for field investigations and laboratory work. Of these agencies, the FBI acted as the principal investigative arm of the Warren Commission."

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The President's Commission on the Assassination of President John F. Kennedy, popularly known as the "Warren Commission", was appointed by President Lyndon B. Johnson on November 29, 1963. Less than a year later the Warren Commission submitted its report to President Johnson.

Reliance on Other Agencies for Investigation

Although the Warren Commission had a substantial staff of lawyers, it had no true investigative staff of its own. Consequently, the Commission relied upon other agencies — the FBI, Central Intelligence Agency, Secret Service, etc. — for field investigations and laboratory work. Of these agencies, the FBI acted as the principal investigative arm of the Warren Commission.

Theoretically, at least, the FBI was the agent of the Warren Commission and did what the Commission instructed it to do. In actual fact, the relationship between the two was not that simple. But whatever the complexities of the relationship, the role played by the FBI was key to the Commission's working processes and its ultimate product — the Warren Report.

This article focuses upon some aspects of the FBI's role in the investigation into President Kennedy's assassination. It concludes that the FBI did not properly perform its duties. The article charges, among other things, that:

- the FBI withheld much pertinent information from the Warren Commission;
- the FBI flooded the Commission with reams of irrelevant data;
- the FBI altered some items of evidence, and
- in some instances the FBI procrastinated in investigating and reporting relevant information.

A. The FBI Dominated the Investigation: Did It Do Its Job Well?

1. Assigned by President Johnson to conduct a "full and thorough" investigation of the assassination [1], the FBI produced a Summary Report [2], complete with embossed cover and plastic binder, barely two weeks after the murder of President Kennedy and before the Warren Commission could even organize its staff or appoint its Chief Counsel [3]. That report, and a similarly glossy FBI Supplementary Report [4] date January 13, 1964, contained allegations of medical findings and other basic evidence which are in irreconcilable conflict with the Commission's own findings on the same evidence.

Premature Commitment

In addition, these reports prematurely committed the FBI — and probably the Commission as well — to the thesis that Oswald and Oswald alone was guilty of having assassinated President Kennedy. The FBI's errors on the evidence — if that is what they were — were so embarrassing to the Commission that these FBI reports were suppressed in the Commission's own Report and in its 26 volumes of Hearings and Exhibits as well [5]. The contents of these two FBI reports, which seriously conflicted with the Warren Commission thesis, were not disclosed until 1966 [6].

Bullet Fragments and Data

2. The FBI withheld much pertinent information from the Warren Commission. For example, the FBI did not supply to the Commission the essential details of the spectrographic analyses of the bullet and bullet fragments.

Yet this was absolutely crucial evidence, as it could have shown whether all the projectiles and the bullet were identifiable with a single batch of ammunition. Instead, the FBI reported only that the composition of these items was "similar" [7]. Parenthetically, it should be stated that the Warren Commission did not demand the details of the spectrographic analyses, though it should have. On the other hand, when members of the Commission staff made inquiries about neutron activation analysis of the areas surrounding the alleged bullet hole in the President's shirt collar and the nick on his necktie, FBI Director J. Edgar Hoover personally shunted aside any effort in this direction by throwing cold water on the usefulness of such tests as an aid in understanding the origin of the hole and the nick [8]. Yet neutron activation analysis is a test several times more refined than spectrographic analysis and might have resolved conclusively certain questions about the origin of the hole in the President's shirt collar and the frayed area on his necktie. As a consequence, these tests could have answered questions as to whether a single bullet did in fact inflict all seven wounds on both President Kennedy and Governor Connally, a claim which the Commission made and which was essential to its contention that the President was assassinated by a lone rifleman.

Oswald's Records of FBI Agent Hosty

3. In a different form of dereliction, the FBI sometimes procrastinated in reporting to the Commission the results of its investigations. Thus, in one instance the FBI delayed seven weeks in reporting the contents of selected pages from Oswald's notebook. These are the pages which contained the name, address, phone number, and other data about FBI Agent James P. Hosty, and which suggested a possible informant-agent relationship between the two men [9].

Dental Charts of Jack Ruby's Mother

4. Meanwhile, the FBI did not hesitate to swamp the Commission with time-consuming irrelevancies. These included the dental charts of Jack Ruby's mother [10] and the subtle distinctions between the Caucasion, Negroid, and Mongoloid hairs [11]. Recently it has come to light that the FBI sent to the Commission two copies of a 48 page compilation it made of Marina Oswald's medical records for the period of her pregnancy [12].

5. The FBI also meddled with evidence on occasion.

Thus, a camera said to have been used by Oswald to have his picture taken holding the alleged assassination weapon was mended by the FBI prior to duplicating the photographs [13]. The original Oswald-with-rifle photographs themselves were belatedly examined for fingerprints by the FBI in 1968, while in the possession of the National Archives, and they are no longer in recognizable condition [14].

Lack of Identification of at Least 7 Persons

6. The FBI never interviewed or even identified some of the persons who were employed at the Texas School Book Depository (TSBD) at the time of the murder.

Yet certain of these persons might have been among the most important witnesses in the entire investigation. A letter from J. Edgar Hoover to the Commission, date April 3, 1964, purported to forward statements "from each person known to have been in the Texas School Book Depository on November 22, 1963." The number of statements forwarded is 73, and 3 other employees are named as being absent from work that day [15]. Yet the Secret Service had previously identified 80 employees on December 7, 1963 [16]. Another employee, Gordon Wayne Smith, who did work on November 22, 1963 and was in the same group as Oswald, had been interviewed superficially by the FBI on November 27, 1963 [17]. There is no record of a subsequent report on him by either the Secret Service or the FBI. Scattered references in the testimony and various Commission exhibits establish that several other persons are known to have been in the TSBD on the morning of November 22, 1963, but some of these have not been identified to this day [18].

B. Oswald Took the Rap: But Was He an FBI "Subject"? an FBI "Informant"? or Both?

1. Texas Attorney General Waggoner Carr, based on information supplied to him by Dallas District Attorney (and former FBI agent) Henry Wade and others, informed the Warren Commission in January, 1964, that there was evidence that Oswald had been an FBI informant [19].

The Emergency Meeting of the Warren Commission That Was Unreported

This information occasioned an emergency meeting of the Warren Commission on January 22, 1964. The stenographic record of this meeting was confiscated and never written up [20]. Carr and Wade were among those then invited to Washington to discuss this allegation with the Commission. The meeting was held in total secrecy on January 24; even the stenographic reporters were excluded [21]. The proceedings have never been published.

The Commission resolved the dilemma which this allegation posed by asking J. Edgar Hoover if Oswald was an FBI informant. The FBI Director responded that Oswald was not an FBI informant, after which the Commission dropped the matter.

Oswald Sought an FBI Interview When Jailed in New Orleans

2. On August 9, 1963 Oswald was arrested in New Orleans for disturbing the peace. This charge arose out of an altercation which occurred when Oswald distributed leaflets on behalf of a purported New Orleans chapter of the Fair Play For Cuba Committee (FPCC), a national organization suspected as subversive by the FBI. Strangely, Oswald asked for and promptly got an interview with an FBI agent [22]. Would a "true" subversive seek an FBI interview upon being jailed? The FBI later explained to the Commission that it was apparent from the interview that Oswald "was making a self-serving statement" [23] but the FBI also charged that Oswald had told the agent numerous lies during the interview and they neglected to show how any of this served Oswald's supposed purposes.

Seven FBI Agents Associated with Oswald

3. At least seven different FBI agents are known to have been associated with Oswald during the year and a half after his return from Russia and before the assassination, several of them through personal interview of Oswald [24].

One agent, Warren DeBrueys, prepared a report dated October 25, 1963, concerning the "Fair Play For Cuba Committee — New Orleans Division" [25]. Published references to this report seem to indicate that it is entirely or almost entirely about

Oswald [26], although by this date Oswald had departed New Orleans at least a month previously and the FBI later stated that its investigations during the Summer of 1963 "disclosed no existence of organized FPCC activities in the New Orleans area" and, in fact, "the only activities in behalf of the FPCC appeared to be those efforts made by Oswald" [27]. The DeBrueys report, while apparently made available to the Warren Commission, is not printed in the Commission volumes and has never been released to the public by the FBI.

4. FBI Director J. Edgar Hoover, in a letter to the Commission on May 4, 1964, submitted an itemized list of "the contents of the FBI headquarters file concerning Lee Harvey Oswald up to the time of the assassination ..." [28]. The list contains no fewer than 69 items, but despite its length there are at least two known FBI reports concerning Oswald, prepared prior to the assassination, which are not included [29]. Hoover's letter offered no explanation for such omissions.

5. FBI Director J. Edgar Hoover submitted a letter and affidavit to the Commission in February, 1964, in which he stated "categorically" that Oswald had never been an informant for the FBI [30]. Taken in context, Hoover's statement is a response to the allegation that Oswald had been a paid informant for the FBI. Consequently, the refutation of this allegation overshadowed other ticklish questions about the nature of Oswald's contacts with the FBI. The Commission itself published FBI reports of interviews of Oswald on June 26 and August 16, 1962 [31], which state that Oswald had promised to cooperate with the FBI by reporting "any contacts, or attempted contacts, by the Soviets under suspicious circumstances or otherwise." On its face, it seems rather strange that an alleged Marxist who defected to Russia should agree to cooperate with the FBI to the detriment of the Soviet Union.

C. Unanswered Questions About the FBI's Knowledge of Oswald Prior to the President's Assassination

Convincing evidence exists that Oswald could not have been the lone assassin of President Kennedy. Close examination of the available evidence suggests extensive fabrication and cover-up, and also suggests the clear possibility that Oswald was framed for a crime with which he had no connection, particularly not as a rifleman [32].

But assuming for the sake of argument that, although contrary to the evidence, the Warren Commission thesis about Oswald is true, there remain embarrassing but unanswered questions.

1. Dallas FBI Agent James P. Hosty was assigned to investigate Oswald prior to the assassination of President Kennedy. Hosty is reported to have asserted to a Dallas Police Detective on the afternoon of the assassination that the FBI was aware of Oswald and that they had information that Oswald "was capable of committing the assassination of President Kennedy" [33]. Hosty later denied making any such statement, contrary to convincing evidence that he had [34].

2. FBI Director J. Edgar Hoover defended Hosty and claimed that the FBI did not have "any indication that this man was a dangerous character ..." and that there had been no information to justify referral to the Secret Service [35]. The Commission disagreed, and after recounting Oswald's history of hostile and erratic behavior, all of which was well known to the FBI, observed: "All this does seem to amount to enough to have induced an alert agency, such as the FBI, possessed of this information, to list Oswald as a potential threat to the safety of the President" [36].

3. Marina Oswald lived at the residence of Ruth and Michael Paine in Irving, Texas, for some weeks prior to the assassination and Lee Oswald frequently stayed there. For reasons said to have been related to Oswald, the FBI initiated a full field investigation of the Paines in late October, 1963, actually visiting the Paine residence on November 1 and 5, 1963 [37]. FBI Agent Hosty claims that he learned of the Oswalds' living with the Paines only after learning of a change of address filed by Oswald in New Orleans [38].

FBI Interception of Oswald's Mail

4. Numerous FBI reports, some only recently declassified, establish conclusively that Oswald's correspondence with certain organizations was being intercepted and supplied by confidential informers to the FBI. One such report cites the contents of an Oswald letter to the FPCC in April, 1963, the source being described as "Dallas confidential informant T-2" [39]. A New York informer reported an Oswald letter to The Worker in June, 1963 [40]. Another FBI report shows awareness of Oswald's correspondence with the Soviet Embassy in Washington in August, 1962 [41]. The FBI neither admitted nor denied operating a mail cover on Oswald, although this would have been a simple and logical extension of the FBI's investigation of him. The existence of a mail cover on Oswald is, however, a legitimate question, for if such a mail cover was placed on Oswald prior to March, 1963, then the FBI may have known of Oswald's receipt by mail of the rifle which he allegedly used to assassinate President Kennedy. Knowledge of Oswald's receipt of this weapon would clearly have signalled his "capability" for violence which the FBI claimed was unknown.

5. The FBI possessed a massive dossier on Oswald and his activities for several years [42]. FBI Agent James P. Hosty, who knew intimately of Oswald's past and his place of employment at the TSBD, claimed to have been totally unconcerned about Oswald as a threat to the President [43]. Yet this same Hosty said he took it upon himself on November 21, 1963, to inform the Secret Service of certain right-wing activities and threats to the President in Dallas [44], proving that there was no lack of opportunity for the FBI to have warned about Oswald.

D. Does the FBI Mislead Its Bosses?

1. The day after District Attorney Jim Garrison arrested New Orleans businessman Clay Shaw and charged him with having conspired to murder President Kennedy, Ramsey Clark, who was in the midst of Senate proceedings to confirm him as Attorney General, asserted that the FBI had included Shaw in an investigation into the assassination it made in November and December of 1963. Clark then claimed: "On the evidence that the FBI has, there was no connection found" [45].

2. Three months later the Justice Department issued another statement which proclaimed that Clark's earlier statements were in error and admitted that the FBI did not investigate Shaw during its probe of President Kennedy's assassination [46].

3. J. Edgar Hoover has recently asserted that Ramsey Clark was a "jellyfish" — the worst Attorney General he had ever served under. "He was worse than Bobby," Hoover said [47].

However, the incidents related above raise a serious question about Hoover. Did Hoover's FBI mislead Attorney General Clark as to whether the FBI had ever investigated Clay Shaw during its probe of President Kennedy's assassination?

CITATIONS

Following is the explanation of abbreviations used in the citations below:

WR — Warren Report

CE — Commission Exhibit (Printed in one or another of the 26 volumes of Hearings and Exhibits; these can be located by exhibit number.)

CD — Commission Document (These are not printed but are available for examination at the National Archives, provided they are not still classified.)

Certain exhibits, e.g. Gallagher Exhibit 1, are referred to by the name of the person testifying at the time they were introduced; these are printed in the 26 volumes and can be located by name and number in the appropriate volume as identified by the binder.

Testimony is cited by volume and page number, followed in parenthesis by the name of the person testifying, e.g., "5H100 (J. Edgar Hoover)" means volume 5, page 100, testimony of J. Edgar Hoover. In a few instances involving references to lengthy exhibits, this same notation is used to specify a particular volume and page number to facilitate the location of the information being cited.

1. 5H100 (J. Edgar Hoover)
2. CD 1
3. WR, pp. x-xi
4. CD 107 and 107.1
5. No part of CD 1, 107, or 107.1 is printed in the Report or Volumes. Neither J. Edgar Hoover nor Alan Belmont (Asst. to Hoover) refer to them in testimony.
6. "List of Basic Source Materials," National Archives, released to public in 1966. See also Sylvia Meagher, Accessories After the Fact, Bobbs-Merrill, 1967, pp. 147-148.
7. 5H67 (Frazier)
8. Gallagher Exhibit 1
9. CD 833, p. 15; 5H112 (Hoover); the actual entries may be seen in CE 18 (16H64)
10. CE 1281
11. CE 668 through 670
12. CD 884
13. 4H284
14. Information from the National Archives
15. CE 1381
16. CD 87, Secret Service #491
17. CD 5, p. 375; see also CE 1949 (23H751)
18. For example, see 6H366-367 (Danny Arce); Decker Exhibit 5323 (19H511 re a "Joe Loraine"); CD 897, pp. 35-36 (re a Mr. & Mrs. Hawkings).
19. Congressman Gerald R. Ford, Portrait of the Assassin, pp. 13-25
20. Records of Ward & Paul, Court Reporters, Washington, D.C., 1964
21. Ibid. (no entry); the meeting itself is described by Ford, op Cit., pp. 13-14.
22. WR, pp. 436-437; CE 833, p. 7
23. CE 833, p. 10; see also 5H11 (Alan Belmont)
24. CD 821 through 824, 826, 829, and 833
25. CE 833, pp. 7 & 9
26. Ibid.
27. Ibid.
28. CE 834
29. Known to be in existence but not included in Hoover's list are the Fain report of 5/12/60 (see CE 821) and the DeBrueys report of 10/25/63 (see CE 833, p. 7-9). See also 5H26 (Alan Belmont) re certain Hosty notes or reports in October-November, 1963.
30. CE 825 and 835
31. CE 823, p. 13; CE 824, pp. 1 & 6
32. See particularly the works by Sylvia Meagher (Accessories After the Fact) and Harold Weisberg (Whitewash II: The FBI-Secret Service Cover-Up and Photographic Whitewash).
33. WR, p. 441
34. WR, pp. 441-442; CE 709 & 711
35. WR, pp. 442-443; CE 833, p. 2 of cover letter
36. WR, p. 443
37. CE 830; CE 833, pp. 12 & 13; 4H446-448 (James P. Hosty); 5H26 (Alan Belmont)
38. 4H447 (Hosty); CE 833, p. 13
39. CE 829, p. 2; CE 833, p. 5
40. CE 833, p. 6; see also CD 28, pp. 3-4; CD75, pp. 672-673 (declassified in 1970)
41. CE 824, pp. 1 & 4
42. WR, pp. 433-440
43. 4H460 (Hosty)
44. Ibid.
45. New York Times, March 2, 1967, p. 22
46. Ibid., June 3, 1967, p. 64
47. Washington Post, November 17, 1970, p. 1

THE UNEMPLOYED COMPUTER PROFESSIONAL TURNED BUSINESSMAN: Products and Services Which a New Small Business Might Produce or Offer

"... Outside the computer field the opportunities for an unemployed computer professional as a businessman seem to be brighter."

Edmund C. Berkeley
Editor, Computers and Automation

> Note: This article is printed as a result of receiving many requests from subscribers for a memorandum offered at the end of the editorial in the May 1971 issue:
>
> How an Unemployed Computer Professional Might Start His Own Business and Earn a Reasonable Income as his own Employer

In these days when unemployment has overtaken many computer professionals, some of them might well go into business for themselves.

This course of action naturally raises a number of questions. One of the first questions is "Shall I stay in the computer field?"

Computer Field

The computer field in my opinion is not likely to be a good field for a new small business for a number of reasons, such as

— There is intense competition;

— Many well-trained sales staffs make very active sales efforts;

— Most computer products, after they have been sold, require servicing, over a wide geographic area;

— Customers may not stay sold;

— Most computer products require advanced professional engineering, which takes time and is costly;

— As competition increases, the prices of computer products are likely to go down and down;

— Good business management and good technical engineering are not usually combined in the same unemployed person; etc.

In fact, there has been intense cultivation of the computer field as a glamor economic field for at least fifteen years; and most of the economic prizes have been and will be awarded to the bigger companies.

Outside the computer field the opportunities for an unemployed computer professional as a businessman seem to be brighter.

Small Businesses in Towns or Suburbs

A large number of small businesses operate and survive in small geographical areas. These include: carpenter, electrician, painter, roofer, plumber, etc. Also repairing services for: automobiles; typewriters and other office machines; clothes washing machines, dishwashing machines, and other household appliances; etc. Also, gift shops, music shops, fabric shops, florists, and other local suppliers of merchandise. Some of these occupations naturally have training requirements or local governmental requirements to be met.

The classified advertising pages of the local telephone directory should give a full panorama of possibilities in this area.

Anybody who considers paying a carpenter $10 an hour for moderately good work might well prefer to pay $6 an hour to an unemployed computer professional who is able to do carpentering work just as well.

Guides to many of these businesses and occupations should be obtainable from the Department of Labor or the Department of Commerce.

Small Businesses in Large Cities

In larger cities there are many more possibilities for businesses, built around unusual products. Examples I have recently noticed in New York include:

— A maker of "high-fashion" leather sandals, who had developed quite a reputation in Greenwich Village.

— A maker and repairer of umbrellas, who offers excellent products at reasonable prices. For example, he provides among other things men's folding umbrellas (which can be carried in a briefcase until it rains).

— A French pastry shop, making delicious, unusual baked goods, a shop which seems to be always full of customers paying high prices.

One way to find a large number of possibilities would be to compare the classified telephone directory for one's own city with the classified telephone directory for New York or San Francisco.

Unusual Products

There is a fascination about unusual products, which often can lead to a success in a new business.

Among products and services which are new (do not yet exist) or are not new but are unusual (or difficult to some extent to obtain) are the following:

1. Unbreakable Electric Alarm Clock. The common electric alarm clock breaks as soon as it is dropped. It ought to be possible to transfer the works of any electric alarm clock into an unbreakable plastic case and otherwise engineer it, so that if dropped it will not break nor stop running.

2. Novel Foods. There is apparently a considerable upsurge of demand for health foods, and foods produced by organic gardening. People are willing to pay more for what they think is really good food. Several kinds of unusual bread have become famous in this way.

3. Sunny Window Greenhouse. It should be possible to provide materials, controls, and instructions for a combination greenhouse-terrarium (a "greenarium"), which would be placed in a sunny window in the home. By its means, tomatoes and other vegetables and food ought to be able to be grown year-round in the home. (This project has been tried, not very successfully, in the past; but sufficient research and development work has probably never been invested.)

4. Artificial Emeralds. It should be possible to make artificial emeralds (aluminum beryllium silicate, colored with chromium oxide) in a small electric furnace. I have heard a rumor that someone is already doing this, using a secret process of his own invention. Natural emeralds are very rare, in fact much rarer and much more valuable than diamonds; synthetic emeralds would be very beautiful and should sell for a good price.

5. Home-Programmed Knitting Machine. It should be possible to make a small knitting machine for home use that could be programmed from a bought punched paper tape, and which would enable unskilled people at home to knit socks, sweaters, undershirts, etc.

6. Home Grinding Machine. It should be possible to provide small electric-motor driven machines for home grinding of wheat, rye, corn, other grains, dried peas and beans, coffee beans, etc., so that fresh on-the-spot flour or meal could be provided for home cooking. Probably such a machine already exists — but is not vigorously marketed.

7. Stockings and Panty Hose — Spray. It ought to be possible to find a spray to make stockings and panty hose not run — so that if snagged the tear remains small and does not spread. The spray might tack together the crossing stitches in the hose so that they would no longer unravel.

8. Stockings and Other Fabrics Which Do Not Unravel. It ought to be possible to weave nylon, etc., into stockings and other fabrics that will not succumb to runs. Such stockings ought to capture the market from stockings that can have runs.

9. "Minuteries Electriques." This is a French name for time-delay relay devices which close an electric circuit only for a short time. They can be used for lavatory lights, hall lights, etc. They are used very widely in France (where electricity is very expensive).

10. Slippers of Fabric. Very light. For traveling. Enables you to rest your feet while traveling, removing your shoes. Made in France for Air France, and given to airline passengers as a gift.

11. Eye Covers, or Blinders. To place over your eyes when there is bright light around you, so that you can rest or sleep in the dark. Made in Japan for Pan-Am Airlines and distributed to airline passengers as a gift.

12. Scientific and Engineering Specimen Collections. Collections of different kinds of paper, with explanations. Collections of different kinds of artificial crystals. Collection of different kinds of cleavages (calcite, galena, feldspar, sphalerite, fluorite — see a textbook on mineralogy). Collections of common fastenings and stampings and descriptions of what they are used for. Etc.

13. Rechargeable Flashlight Battery. Cheap. Easy to recharge. Proof against leaking.

14. Hair Cutting Kit. So that a man can cut and style his hair for himself in the way he himself chooses — without paying a barber $100 a year. Including mirrors so that he can see the back, the sides, and the top of his head. (Also, similar kit for girls.)

15. Gardening Kit. So that a person can remove weeds from and grow flowers in his flower beds much more efficiently. Including various kinds of pest-killing devices and materials, such as praying mantises, sprays, fertilizers, etc., with directions. With soil testing kit.

16. Ecological Recycling Kit. So that a person can use ("recycle") autumn leaves, glass, waste paper, cans, manure, and other debris from his house, kitchen, bathroom, etc., to make humus, wrapping paper, furnace oil, etc. One way to grow rich might be to convert all one's trash into useful products!

17. Solar Heating Equipment. So that you could cut down your fuel bill to 1/2 or 2/3 of what it was before.

18. Light-Weight Shopping Bag with Handles. In France, Great Britain, Switzerland, etc., when you buy goods in a store, the store almost never gives you a large paper bag to carry them away. Usually, you bring your own very light-weight, very sturdy shopping bag, to hold all your purchases. This type of bag (on sale in many local stores in Europe) is usable over and over, durable, and folds up smaller than a handkerchief.

19. Old-Fashioned Products No Longer Sold. Compare an old Sears-Roebuck catalog with a current one; and see which products have gone out of use (like a bread-making machine). Choose some of these products that are appealing and produce them and offer them again.

20. Small Vacuum Cleaner: Improved; easy to take apart and put together again; fan ahead of the dust bag.

21. Snow Shovel. With replaceable blades so that you do not have to throw away the whole snow shovel when the blade you are using gives up.

Ideas Which Can Lead to New Products

Finally, there are many ideas, questions, principles, and schemes which can lead to new products, such as the following:

1. Can you make it more convenient?

2. Can you make it last twice as long? or much longer still?

3. Can you make it replenishable or refillable or reusable or otherwise increase its life and usefulness? and decrease trashing?

4. Can you engineer it from the point of view of the consumer (who is often neglected) — not the point of view of the manufacturer who wants to make more, nor the point of view of the salesman who wants to sell more.

5. Can you make it more desirable, filling more needs, more comfortable to use, more of a help to the user, more of a friendly expression to the customer who was good enough to you to buy it from you?

6. Can you make the use of it take half the time that the old one required?

7. Can you make it repairable? (Think of the toys that fifty years ago could be mended with nuts and bolts in holes; and that nowadays cannot be mended because they are made of plastic and the plastic has broken.)

8. Can a product which is in wide use in a foreign country be wanted here and used here? (Example: the Volkswagen).

9. Can you apply a new source of modern power (like an electric motor) in the home, so that a big external business is no longer needed? (Example: Because of the electric motor, the entire business of making flour, it would seem, could be replaced by grinding grain on the premises where the flour is to be used.)

I hope these suggestions and ideas may be of use to unemployed computer professionals who are interested in starting their own businesses.

But the road to success is long and hard, and requires much work, much knowledge, and much common sense, both elementary and advanced.

"90 MILLION PEOPLE FULLY EMPLOYED IN 80 MILLION JOBS" — COMMENTS

From "Speculation"
Bethesda, MD

The editorial in the March issue of C&A ("The Number of Answers to a Problem") intrigued me as well as tickled my fancy. However, you overlooked the warning Rudyard Kipling offered in the 69 ways for making tribal lays in that " ... every-single-one-of-them-is-right ..." and your own advice that " ... 70, plus or minus half a dozen, ..." might be offered.

You concluded that it is "impossible" for 90 million people to be fully employed in 80 million jobs.

I offer the very recent "Wall Street Journal" page one article of 23 March 1971 in contradiction. It is entitled "The Seven-Day Week" (get 26 weeks off per year at full pay). Simply put, 160 million people could be fully employed in 80 million jobs. In fact, the concept of "time-off" is readily acceptable as "any-part-of-the-day" for shift work. Putting aside religious issues, for discussion's sake, why can't the American economy and business community go to a concept of "work <u>every</u> day"? The enterprise would be manned 7 days a week 24 hours a day except for a few (10 to 15) national holidays.

The individuals involved would be employed in staggered shifts, staggered hours, staggered periods of no work and vacations.

More managers, services, employees ... , in fact everything, would be required. The result would be an <u>instantaneous</u> (almost) shortage of every skill, every resource, men, machines, materials, factories, services, money, etc. Ah, yes, and an increase in the by-products — waste ecological overloading — but why not solutions, too?

There are many answers and many <u>values</u> for those answers.

I fear that Murphy's Second Law — "If left to themselves, things always go from bad to worse" — is an <u>excuse</u> for procrastination.

As a systems analyst, I prefer gambler Leoz's laws:

(1) The breaks are what you make for yourself;

(2) Avoid paralysis by analysis;

(3) A committee of one gets things done; and

(4) If it works, take care of it.

Not only is proof not always needed but it could be costly and undesirable.

Since I am just speculating "out loud," you may print this letter and sign it "Speculation".

Not until after I get my postgraduate degree (PhD) will I care to obtain personal publicity and then I hope it will be through a much more professional article for C&A, whose standards I admire.

From Karl Force
Prudential Ins. Co. of America
Newark, N.J. 17101

Re your editorial in the March issue: your imagination is drooping. It is not impossible to fit 90 million people into 80 million jobs ... especially if we consider that an actuary may become an editor of a computer magazine!

REDUCE THE WORK WEEK!

CORRECTIONS

In the April 1971 issue of Computers and Automation, the following corrections should be made:
Page 30, "7. The Case of The Superseding of the Vacuum Tube": In paragraph 2, line 11, replace "bandwith" by "bandwidth"; in paragraph 4, line 5, replace "board" by "broad".

I BELIEVE IN AN ANTI-BALLISTIC MISSILE SYSTEM

1. From Robert L. Glass
26414 124th Ave. SE
Kent, Washington 98031

The question I have been asked is "Would you trust your children's lives to a computer system which cannot be checked out?"

I am a computer programmer, one who has been around long enough to remember "CLA" and even "RAU", a couple of machine instructions for computers long since obsolete. And I have never yet written a checked out program.

Oh, I have a lot of confidence in my programs. I believe in them. But I never believe they are really checked out.

So my answer to that question is another series of questions:

"Would you trust your children's lives to a school class scheduling program which is not checked out?"

"Would you trust your children's lives to an air traffic control program which is not checked out?"

"Would you trust your children's lives to a mandatory school busing program which is not checked out?"

My answer, of course, is yes ... I do do it, and I would do it. And my question to those who would ask me such questions is "Would you trust your children's lives to a non-computerized diplomatic system which cannot be checked out?"

I don't expect an answer. We all do, all the time.

As a computer professional who has worked on complex military and non-military systems, I believe in an anti-ballistic missile system, ABM. I believe in it as a bargaining tactic in a world gritting its teeth but on the brink of peace, and I believe in it as a necessary strategic element in maintaining that peace. I believe in it as a defensive force in a world saturated with stock-piled offensive forces. I believe in it as an element in a defensive posture that I also believe in. And I believe in the computer system, even un-checked-out, as an essential part of that total system.

You see, I know some of the people who have built military and aerospace systems. When they are working in an area of doubt and risk, they understand the importance of doubt and risk. I believe in those people, and in their integrity. I also believe in the integrity of those who oppose ABM, but I believe they are wrong.

One thing we share, I hope — and they hope — it will never come down to finding out which of us is right.

2. From Robert L. Glass

Above is an entry for your ABM contest. As is often the case in my correspondence with you, you will find that I do not agree with your implied position in announcing the contest. I hope that this opposition will not cause my essay to be disqualified. You have been fair in the past, as with my article "Intolerance" in the April, 1970 "House Is On Fire."

My background includes 15 years in the aerospace industry as a computing specialist dealing in research and development of advanced systems. For the past year I have been on the staff of the University of Washington computer center. I have published several articles on various facets of computing, in publications ranging from the ACM Surveys Journal (Spring, 1969) to the British Computer Bulletin (Sept., 1968) to Software Age (July, 1968). I am a contributor to Computerworld, and am deeply involved in local civil rights organizations as my primary non-technical interest.

3. From the Editor

Thank you for your letter and your entry in our ABM contest.

You are right in saying that our opinions of the ABM system are not the same, but your position is well stated and certainly publishable.

A PUBLICATION THAT THINKS ABOUT THE PROFESSION AND THE RELATION OF THE PROFESSION TO SOCIETY

Michael Lipp
Cybermatics Inc.
2460 Lemoine Ave.
Fort Lee, NJ 07024

C&A attempts to support itself on subscriptions plus some advertising in order to achieve editorial independence. As a result, you have developed a forceful, provocative product. It is the one computer publication that I would like to see on every college campus — for many reasons. I would be glad to pay an increased subscription rate if by doing so, you would be able to circulate copies to Universities at no cost. It is important that college students know that there are issues; that they are discussed; that there are possible actions, etc.

Certainly, every single article in the March issue is absolutely pertinent at the concerned student level: community service and the racial issue, education, the pattern of assassinations, data banks and privacy, anti-ABM, Brewster's speech. Any one of those articles would classify such an issue of the usual trade publications as "worthwhile." You have cornered the "meaningful" market.

On the Data Bank article by Professor Foster: this is the first honest presentation on non-security I have ever seen. No system that I have ever worked on (and I have worked on many) is free from erroneous data release or malicious attempts at getting the data. I have seen no solution algorithms that do not result in a totally unusable system. I endorse Professor Foster's position completely. You should solicit further endorsements from your readers and make sure that Senator Ervin receives the article and endorsements.

On the ABM: it is easier to comment than to formulate an essay. One reason why McCracken's non-debuggable argument will not penetrate is the unstated crux of the pro-ABM argument. To wit, its existence should prevent its ever being used. This, incidentally is the "justification" for BMEWS as well. This is incredible reasoning! It is escalation by bluff, defense by projected reciprocal body count. The major risk is that <u>in time</u> the existence theorem is forgotten and the operational presumption remains.

Incidentally, I'm teaching part time at Columbia University. The series of "assasination" articles have become a staple of my course. In addition to provoking much thought vis-a-vis government, media, truth, etc., they are immensely useful for probing the potential social usefulness of our technology.

The course is one of general computing topics for management. I've found it useful to open it with a discussion of the literature. C&A comes off well as the only publication that thinks about itself, the profession, and the relation of the profession to society.

ONE COMPUTER PROFESSIONAL FOR THE ANTI-BALLISTIC MISSILE SYSTEM

Ronald G. Windsor
Director, Research and Data Processing Service
Harford Junior College
401 Thomas Run Road
Bel Air, MD 21014.

(Organization mentioned for identification purposes only)

This is written in the belief that Computers and Automation is read by computer professionals in favor of the ABM, as well as computer professionals against the ABM. With this in mind I ask that you print this letter.

Daniel D. McCracken's announcement of the Anti-ABM Contest in your March, 1971 issue, is impalatable on several counts.

First, the examples used (5000 programming errors in the 360, American Airlines' reservation system, TWA's suit against Burroughs, NASA's program freezes, the Rand study, not moving the moon, and his positive (?) note about trace tapes) to illustrate that the ABM computer system cannot be tested, can serve just as well to show that no such system can be checked out short of nuclear disaster. (By the way, the ABM system is not fully automatic; humans are required, particularly at the critical point — the decision to fire). Although I cannot accept Mr. McCracken's line of reasoning, the fact remains that other defense systems combine computers and nuclear devices. Surely, the same logic applies to these systems. Does Mr. McCracken want all of these scrapped? Evidently not, because the name of the group he chairs is "Computer Professional Against the ABM." Why only the ABM?

Second, Mr. McCracken's remarks about Dr. Foster ("If statements like these were made by a student in his first course in computing, you'd give him a C-minus and forget about it, in his second course you'd flunk him and forget it.") are, to me, unjustified and pernicious.

Third, the essay topic, "Would you trust the lives of your children to a highly complicated computer system that cannot be checked out?", is a play on the emotional. I can think of a host of words to put after the first nine that would arouse negative attitudes on a multitude of subjects.

So, until either a better system is proposed or until mankind can live together in peace and harmony, I am for the ABM.

I ask those readers sharing this view to please write Computers and Automation and (most important) their Senators and Representatives.

One computer professional for the ABM.

SEVEN MORE COMPUTER EXPERTS BECOME SPONSORS OF GROUP AGAINST ABM

M. Kozikowski
Computer Professionals Against ABM
4 Inningwood Road
Ossining, NY 10562

Seven more computer experts have enlisted as sponsors of Computer Professionals Against ABM, an ad hoc organization of more than 500 computer people which has been formed to oppose the ABM Safeguard system on purely technical grounds. The signers of the group's statement come from all over the U.S., from both industry and education, and include some of the industry's pioneers in the development and application of computers.

The seven new sponsors are:

Professor Charles H. Davidson of the University of Wisconsin;

Professor Aaron Finerman of the State University of New York at Stony Brook;

Professor Robert W. Floyd of Stanford University;

Dr. Herbert R.J. Grosch of the National Bureau of Standards;

Peter Zilahy Ingerman of Willingboro, N.J.;

Professor Melvin Klerer of New York University;

Dr. Donald L. Shell of Schenectady, N.Y.

The organization has developed a compelling case for why the ABM cannot work and cannot be expected to work — that is, perform the function it is assigned to do. Successful operation of a complex computer system is critical to the ABM's reliability.

The founder and chairman of the group, Daniel D. McCracken, has addressed organizations of professionals in the computer industry on the subject in 15 cities in February and March, 1971. D.D. McCracken is a computer consultant and the author of ten textbooks on computer programming that have sold over a million copies.

In addition to Mr. McCracken, the Executive Committee of Computer Professionals Against ABM includes: Paul Armer of The Harvard Program on Technology and Society; Joseph Weizenbaum, Professor of Computer Science at The Massachusetts Instutute of Technology; and Gregory P. Williams, a computer technologist in Phoenix, Arizona.

In addition to attracting the attention and support of computer professionals and national media, the Computer Professionals Against ABM has taken its message to Congress in the past few months. Mr. McCracken has briefed various groups of Senate staff personnel on the inherent unreliability of the Safeguard computer system.

"THE ANTI-BALLISTIC MISSILE SYSTEM IS DEFENSIVE"

From: *Patrick M. Cooney*
RD 6
Carmel, NY 10512

To: *Daniel D. McCracken*
4 Inningwood Road
Ossining, NY

According to the March 1971 issue of "Computers and Automation", you are sponsoring a "contest", the apparent aim being to put pressure on the U.S. government to cease ABM development, deployment, etc. You've said that copies of opinions (i.e., contest entries) should also be sent to various officials in Washington. I shall do so.

The stated theme of your "contest" is "would you trust the lives of your children to a highly complicated computer system that cannot be checked out?" The future lives of my children are currently in the hands of various educational computer systems whose effect on my children and the future of our society isn't "checked out", and whose developers certainly aren't "checked out". I consider that this is a real threat to our future; much larger than your, at best, misguided idea that the ability to defend ourselves is somehow bad.

I would agree however, that allowing computers to make the decision that a threat to us exists and that offensive missiles should be launched is wrong. Man must keep this prerogative to himself. In my mind, the key to the shakiness of your position is that ABM is defensive; offensive war-making capability is not at issue here. Would you keep in mind the fact that, with the offensive weapons the Soviets have deployed both on the earth and in orbit, we need something that at least has a chance against incoming missiles and satellite weapons. Are you "for" anything or just "against"?

The ABM concept was tested (without nuclear warheads) in the Pacific. A ballistic missile was fired from Vandenburg AFB and was "successfully" intercepted by the proposed Safeguard system, whose defensive missiles were fired from a South Pacific island. These were "computer-controlled" tests. I think therein lies one of the differences between people like yourself and people like me. I will believe information given out by my government, as long as it's within reason and I have no factual <u>evidence</u> to the contrary. There is none relative to Safeguard.

You seem to have a large worry about <u>computer control</u> of missile flight. All missile flights now are controlled, at least in their powered portion, by computers; "ground to ground", "air to ground", "ground to air", "sea to ground", etc., etc. Is it your contention that they don't really work? We know that at least some of them do; from Vietnam where some are in use, from NASA work which you seem to disregard, from Poseidon tests, etc. A word about NASA whose experience you sneer at. One of the complexities which must be dealt with in manned flights so far, is the use of liquid fuels This one fact requires an unbelievable increase in missile complexity, hence the 30 to 45 day simulation for checkout. My point here is that you're talking about two <u>different</u> systems designed to do two <u>different</u> jobs. They <u>can</u> be related in overall terms (complex computer use), but not in specifics (120 day freeze). You and your ilk are comparing apples and oranges and then going into a funk because they're not the same color.

A note about your organization, if I may: Of the listed sponsors, I note that 16 of the 23 are connected with various universities as "professorial talent". A majority of people from the academic world have displayed over the past several years, no real understanding of the world or human nature. They are certainly not responsible in any way for the defense of the United States, indeed, in some cases don't even seem to care. The quality of their judgment, and handiwork, can be seen in the disruption of educational processes in many universities. Just as a small minority of students were capable of such disruptions with the, at best, passive acceptance of a <u>majority</u> of the "professorial talent", now a small minority of "computer professionals" are attempting to negate the ability of the U.S. to protect itself as a society. By what possible stretching of the imagination do you set yourself up to say how we can best protect our country when you don't have all the information that is necessary to make that decision. Much of it is of a "secret" nature and <u>must</u> be so. Your conclusions in such a context must be suspect.

This is the first time I have written a letter such as this, but I couldn't let your "Computer Professionals against ABM" and your sister organization "Computer Professionals for Peace" speak for me. I have been in the Programming/Systems line of work for 11 years, and I consider myself a "computer professional". Your group does not speak for me, nor I suspect, will it ever. You apparently see the world as you wish it were, rather than as it really is. Laudable for your own peace of mind certainly, but not a view Americans, as a people, can afford in this very predatory world. Would it were otherwise, but it isn't.

GATHERING FORCE AGAINST THE ABM

(Based on a report by Victor K. McElheny, "The Boston Globe" April 4, 1971)

Daniel D. McCracken, chairman of the national group called Computer Professionals Against ABM, is traveling around the country addressing computer engineers' groups on the vulnerability of the ABM's computers. In an interview, McCracken said he is leaving aside other opponents' charges about the vulnerability of the ABM system's radars or the possibility that an enemy would simply build more offensive missiles, equipped with increasingly accurate multiple warheads, to overwhelm any defense.

Among the sponsors of the Computer Professionals Against ABM are such well-known computer engineers as Prof. Robert M. Fano of the MAC computer time-sharing project at MIT; Prof. J.C.R. Licklider, who succeeded Fano as MAC's director; and Prof. Marvin L. Minsky, who concentrates on "artificial intelligence."

The computer engineers argue that every major computer system tried up to now, such as airline reservations set-ups, has always had major breakdowns in the period immediately after entering service.

After a time, the "bugs" are ironed out and the system works. But with the ABM there would be no time. It would have to work right in its first and possibly sole test. The computer engineers say that 20 years experience with new systems makes it a sure bet that the system wouldn't work to its design efficiency the first time.

COMMUNICATION AND CIPHERS

with a Hexadecimal Alphabet and Variations

"With the advent of computers to produce ciphers, to perform enciphering and deciphering and to solve ciphering systems, probably a new level of complexity in ciphering systems becomes thoroughly practical."

1. O.N. Minot
Lexington Research
10 Muzzey St.
Lexington, MA 02173

MR EDMUND BERKELEEE
COMPUTERS AND AUTOMATAEON

SUPPOSE YOU HAVE ONLEE A HECSADECAEMAL ALPHABET OR SAECSTEEN CHARACTERS.

YOU CAN NEVERTHELESS COMMVNAECATE PRETTEE VVELL.

DGUST PHOR ECSAMPLE CONSAEDER: DSERO ONE TVVO THREE PHOUR PHAEVE SAECS SEVEN EAEGHT NAENE TEN ELEVEN TVVELVE.

USE HH PHOR BLANCCS AND HHHH PHOR STOPS.

O N MAENOT

LECSAENGTON RESEARCH

A B C D E PH G H AE DG CC L M N O P CV R S T V V VV CS EE DS

2. From the Editor

MR O. N. MAENOT
LECSAENGTON RESEARCH

DEAR MR MAENOT

THANCC EEOU PHOR EEOUR STAEMULATAENG SUGGESTAEON OPH A HECSADECAEMAL ALPHABET. AE HOPE THAT VVE AT COMPUTERS AND AUTOMATAEON CAN DO SOMETHAENG AENTER-ESTAENG VVAETH AET.

EEOURS SAENCERELEE

EDMUND C. BERKELEEE

3. Neil Macdonald
Assistant Editor, Computers and Automation

Interest in ciphers has persisted probably for much longer than 3000 years. The first known historical instance of true cryptography — use of a cipher for purposes of secrecy — is contained in

> a tiny cuneiform tablet only about 3 inches by 2 inches dating from about 1500 B.C. and found on the site of ancient Seleucia on the banks of the Tigris. It contains the earliest known formula for the making of glazes for pottery. (from p. 75, The Code Breakers, by David Kahn, published by the Macmillan Co., New York, 1967, 1164 pp.)

The Seleucian scribe used cuneiform signs for syllables for enciphering, selecting rare meanings of the signs. His method resembles the method of George Bernard Shaw in spelling "fish" as "GHOTI", using "GH" as in "rough", O as in "women" and TI as in "nation".

Julius Caesar

In the first century B.C., Julius Caesar used a cipher in which each letter of the plaintext was replaced by the third letter down the alphabet. Thus the word "Gallia" would be changed into the word JDOOLD (using our alphabet, not the Roman one), since J is the third letter from G, D is the third letter from A, etc. The ciphers in which each letter is replaced by the same other letter are called substitution ciphers; they are regularly extremely easy to solve because they do not conceal the frequency with which letters occur. The commonest letter is almost always E; the next group is T A O N; the next group after that is I R S H; until finally the rarest letters are Q X J Z (See Table 3).

Disguising the Frequency of Letters

Now if we use an alphabet with less than 26 characters into which we put a message, we are compelled to make some conventions so that all the letters of the plaintext are expressed. And we have an intriguing possibility that we might be able to disguise greatly the frequency of the letters and thus enhance the security of the cipher. However we have to pay a cost: we incur the risk of giving the reader so much trouble that he cannot easily decipher what we are seeking to tell him.

For example in his hexadecimal alphabet, Minot proposes the digram AE for I. The digram AE is exceedingly rare in modern English words; so the reader would have almost no trouble guessing whenever he sees it that I is intended. But Minot proposes EE for Y. The digram EE is not rare in English; in fact, it occurs in many words such as "been", "meet" etc., and so the reader has the burden of determining from the context whether EE is intended or Y is intended; probably examples could be constructed in which a small neighboring context would not be sufficient to resolve the ambiguity.

The Minot Hexadecimal Alphabet has the following properties:

> 10 letters have gone: F I J K Q U W X Y Z
>
> 7 letters remain, unambiguous: B L M N O R T
>
> 9 letters have become ambiguous: A C D E G H P S V

Appearance

Probably the first question to be asked then is this: Suppose we use the Minot Hexadecimal Alphabet (MHA). What would the results look like in a number of passages? Would they be easily readable? Could the resulting ambiguities be easily handled by the recognizing capacity that ordinary human beings acquire?

As a test, we placed the MHA into an enciphering program on our DEC PDP-9 computer and encoded a number of sample passages. The results are shown in Table 1. (For the explicit decipherment of these passages, see Table 2). From inspection of the samples in Table 1, it seems that it would be relatively easy to communicate using the MHA.

Frequency of Letters

The next question to be asked is: How would this alphabet affect the frequency of letters, which is the key to deciphering a message? Table 3, columns (1) and (2) show the usual frequency of letters in English. This table is taken from a report published in "Elementary Cryptanalysis" by Helen Fouché Gaines, published by the American Photographic Publishing Co., Boston, Mass., 1939 (reprinted by Dover Publications, New York, 1956).

Using the frequency shown in Column (2), we can calculate the frequency that would result in long passages using the MHA. This is shown in Column (3) of Table 3. E would become much more frequent still, and the three least frequent letters would be B, G, and M. Probably, deciphering substitution ciphers would remain far too easy.

Expansion of the Principle of the Minot Hexadecimal Alphabet

When we abandon the one-to-one correspondence of the ordinary substitution cipher (which we do with the Minot Hexodecimal alphabet), we have the following general situation:

1. We choose n different letters to constitute the enciphering alphabet, $5 \leq n \leq 25$.
2. Some letters of the plaintext alphabet are represented by a pair of letters in the cipher alphabet, other letters by a single letter.
3. We can use the left-over letters for any purpose we desire including (1) random "nulls," letters which have no meaning or (2) alternatives to letters which have meaning.
4. We can have an exact deciphering or an ambiguous deciphering (as with the MHA)

The Macdonald Decimal Alphabet

We can extend the principles of the MHA in a number of directions. One example of its extension is what we might call the Macdonald Decimal Alphabet:

Table 1

THE MINOT HEXADECIMAL ALPHABET USED IN SOME SAMPLE PASSAGES

AT THE SAME TAEME THAT THAES MAAEN STREAM OPH AVTOMATAEC DAEGAETAL COMPVTAENG HAS BEEN DEVELOPAENG AND ECSPANDAENG, OTHER STREAMS OPH AVTOMATAEC HANDLAENG OPH AENPHORMATAEON HAVE ALSO DEVELOPED AND ECSPANDED.

THE MOST ADVANCED COMPVTERS OPH THE PRESENT DAEE ARE CALLED SOLAED STATE COMPVTERS, BECAVSE THEEE MACCE ECSTENSAEVE VSE OPH SOLAED STATE ELECTRONAEC DEVAECES SVCH AS TRANSAESTORS, GERMANAEVM DAEODES, AND MAGNETAEC SHAEPHT REGAESTERS, NOT ELECTRONAEC TVBES.

TO VSE PVNCH CARD MACHAENES, VVE PHAERST CONVERT THE ORAEGAENAL AENPHORMATAEON AENTO PATTERNS OPH HOLES AEN CARDS. THEN VVE PHEED THE CARDS AENTO THE MACHAENES. ELECTRAECAL AEMPVLSES READ THE PATTERN OPH HOLES AND CONVERT THEM AENTO A PATTERN OPH TAEMED ELECTRAECAL CVRRENTS.

VVHAT A COMPVTER DOES PHROM ONE OPERATAEON TO THE NECST AES DETERMAENED BEE THE CONTROL VNAET. THE CONTROL VNAET CONSAESTS BASAECALLEE OPH A REGAESTER VVHAECH CONTAAENS AN AENSTRVCTAEON, THE CVRRENT AENSTRVCTAEON VVHAECH SETS THE SVVAETCHES THROVGHOVT THE MACHAENE PHOR THE NECST TRANSPHER OPH AENPHORMATAEON.

Table 2

THE SAMPLE PASSAGES IN ORDINARY ENGLISH

AT THE SAME TIME THAT THIS MAIN STREAM OF AUTOMATIC DIGITAL COMPUTING HAS BEEN DEVELOPING AND EXPANDING, OTHER STREAMS OF AUTOMATIC HANDLING OF INFORMATION HAVE ALSO DEVELOPED AND EXPANDED.

THE MOST ADVANCED COMPUTERS OF THE PRESENT DAY ARE CALLED SOLID STATE COMPUTERS, BECAUSE THEY MAKE EXTENSIVE USE OF SOLID STATE ELECTRONIC DEVICES SUCH AS TRANSISTORS, GERMANIUM DIODES, AND MAGNETIC SHIFT REGISTERS, NOT ELECTRONIC TUBES.

TO USE PUNCH CARD MACHINES, WE FIRST CONVERT THE ORIGINAL INFORMATION INTO PATTERNS OF HOLES IN CARDS. THEN WE FEED THE CARDS INTO THE MACHINES. ELECTRICAL IMPULSES READ THE PATTERN OF HOLES AND CONVERT THEM INTO A PATTERN OF TIMED ELECTRICAL CURRENTS.

WHAT A COMPUTER DOES FROM ONE OPERATION TO THE NEXT IS DETERMINED BY THE CONTROL UNIT. THE CONTROL UNIT CONSISTS BASICALLY OF A REGISTER WHICH CONTAINS AN INSTRUCTION, THE CURRENT INSTRUCTION WHICH SETS THE SWITCHES THROUGHOUT THE MACHINE FOR THE NEXT TRANSFER OF INFORMATION.

1. The vowels A E I O U remain single letters and are replaced by C G K Q W respectively.

2. The remaining letters are grouped:
   group B is B C D;
   group F is F G H;
   group J is J K L M N;
   group P is P Q R S T;
   and group V is V W X Y Z.

3. The consonants from B to Z are expressed by pairs of letters as follows:

B — BB	F — FB	J — JB	P — PB	V — VB
C — BF	G — FF	K — JF	Q — PF	W — VF
D — BJ	H — FJ	L — JJ	R — PJ	X — VJ
		M — JP	S — PP	Y — VP
		N — JV	T — PV	Z — VV

The scheme of representation is quite evident. There is no ambiguity. The 10 letters that are used are B C F G J K P Q V W. The 16 letters that are not used are A D E H I L M N O R S T U X Y Z. These 16 letters are nulls. They can be sprinkled in the message in any desired or random fashion which might conceal the frequencies of the significant letters, which are the tell-tale indications by means of which decipherment may be achieved.

Table 3

RELATIVE FREQUENCY OF LETTERS

(1) Letter	(2) Relative Frequency in Ordinary English (percent)	(3) Relative Frequency in Minot Hexadecimal (percent)
A	7.81	12.81
B	1.28	1.12
C	2.93	3.70
D	4.11	3.89
E	13.05	20.08
F	2.88	0
G	1.39	1.62
H	5.85	7.67
I	6.77	0
J	.23	0
K	.42	0
L	3.60	3.16
M	2.62	2.30
N	7.28	6.40
O	8.21	7.21
P	2.15	4.42
Q	.14	0
R	6.64	5.83
S	6.46	6.02
T	9.02	7.92
U	2.77	0
V	1.00	0
W	1.49	0
X	.30	0
Y	1.51	0
Z	.09	0
Total	100%	100%

The results of using the Macdonald Decimal Alphabet but without inserting nulls on the passages given in Table 2 are shown in Table 4.

Comments

In the literature of cryptography and cryptanalysis, I have not seen any discussion of ciphering systems such as the Minot Hexadecimal Alphabet and the Macdonald Decimal Alphabet. With the advent of computers to produce ciphers, to perform enciphering and deciphering, and to solve ciphering systems, probably a new level of complexity in ciphering systems becomes thoroughly practical.

"Computers and Automation" invites discussion of enciphering, deciphering, and cryptanalytic systems using computer methods.

Table 4

THE SAME PASSAGES IN MACDONALD DECIMAL ALPHABET ARRANGED IN FIVE-LETTER GROUPS

```
CPVPV FJGPP CJPGP VKJPG PVFJC PVPVF
JKPPJ PCKJV PPPVP JGCJP QFBCW PVQJP
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VPJGC JPPPQ FBCWP VQJPC PVKBF FJCJV
BJJJK JVFFQ FBKJV FBQPJ JPCPV KQJVF
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GVJPB CJVBJ GBJ

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PVQWP PGPBW JVBFF JBFCP JBJJP CBFFJ
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JGJVP VPP

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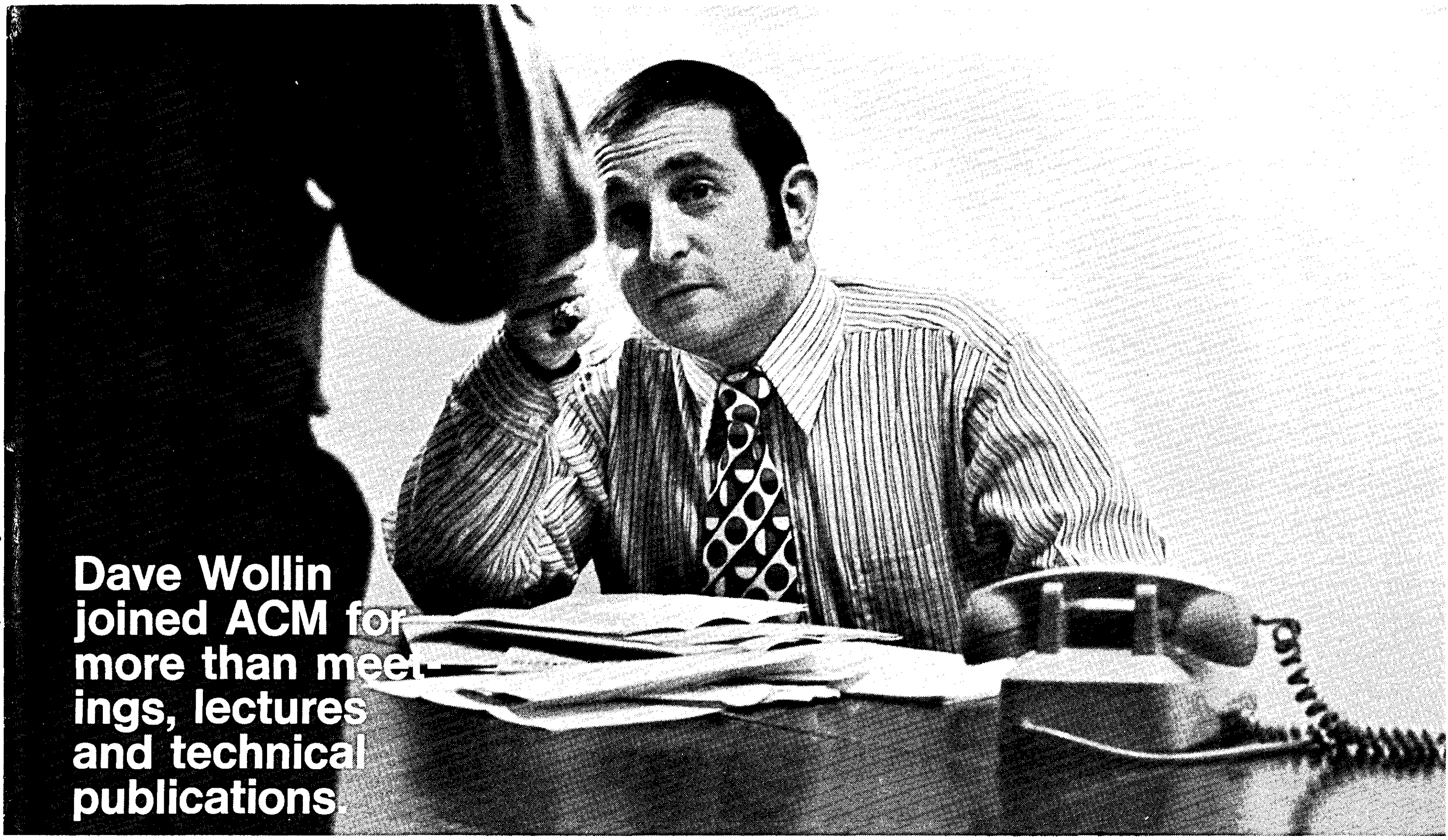

As "Grass Roots" Goals Committee Chairman, he's battling the blame-the-computer syndrome.

David Wollin, B.S. Engineering Science, is a Senior Systems Analyst with a ticket reservations systems service, developing application software. He joined ACM in 1966, fresh out of college. "After four years, I wanted more involvement as a computer professional," says Dave. "More than meetings, lectures and technical publications. ACM seemed sort of clannish. I felt the average member wasn't encouraged to participate.

"Last October I wrote ACM President Walter Carlson with some specific suggestions. Now I'm heading the newly-formed "Grass Roots" Committee. Our job is to critique ACM's proposed goals on membership development, special interest activities, EDP curricula and public education. And come up with other goals we think are just as important.

"This effort could mean a lot in the next few years. I've wanted to speak up on some things that have been bugging me. Things I see ACM taking a stronger stand on. Like people blaming mistakes on the computer. The need to cut down on hard copy to avoid waste. The privacy issue. The whole question of the computer's impact on society, I guess."

Dave is only one of 27,000 members of ACM, the oldest and most respected professional association in the computer field. He's enriching his career. Making a contribution to the computer profession. And being heard.

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ACROSS THE EDITOR'S DESK

APPLICATIONS

METALS INVENTORY SYSTEM BASED ON PRODUCT NAMES INSTEAD OF 10-DIGIT NUMBERS

Standard Brass & Manufacturing Co., Port Arthur, Texas, has installed an IBM System/3 Model 10 to handle a complex metals inventory system based on product description, rather than conventional product numbers. The Port Arthur company, a producer and wholesaler of aluminum, brass, copper and steel, devised the novel approach to simplify its method of accounting for stock.

"This significant departure from the traditional way of tracking our stock will improve our accuracy," said F. V. Wilson, company president, "and our people no longer will have to thumb through thick stock code books to code — or decode — items of merchandise."

Using numbers to account for its supplies, an order for a rectangular-shaped ingot of free-cutting brass would have had to be recorded as an order for a 0300110016. The IBM system, however, will accept the description "rectangular free-cutting brass," a standard term in the metals industry. The only numbers now involved will be the quantity and the dimensions desired. To further simplify the inventory procedure, the computing system is being programmed to accept abbreviations, such as "rect" for rectangular and "FC" for free-cutting.

The IBM system will keep up-to-date inventory reports for the firm's nine warehouses, located in Houston, Port Arthur and Beaumont, Texas, and New Orleans, Lafayette, Shreveport and Baton Rouge, La.

COMPUTER HELPS FIND UNDETECTED DISEASES

A new medical testing program for detecting diseases even before early symptoms appear, especially among inner-city residents, is underway at Good Samaritan Hospital (Cincinnati, Ohio). The federally-funded pilot project has enabled doctors, using an IBM computer, to uncover illnesses and diseases among people who didn't realize they were sick. The program, funded by a Regional Medical Program grant from the U.S. Department of Health, Education and Welfare, also is used in conjunction with neighborhood organizations to provide many inner-city residents free annual checkups.

"We have revealed 50 diabetics and hypertensive people, placed 300 overweight people on weight reduction programs and found several cases of elevated cholesterol, thyroid disease and breast cancer — all among people who were not aware they suffered from these problems but had been referred to the hospital for other reasons," explained Dr. George Shields, director of medical systems.

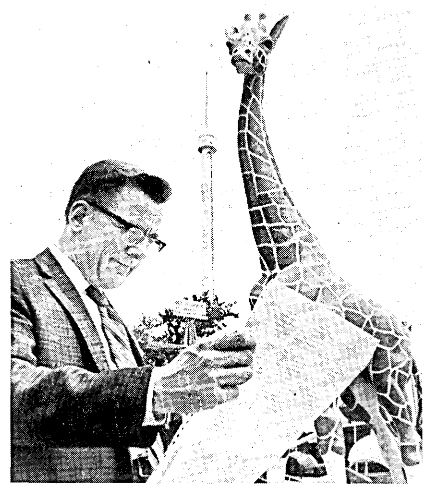
The program, called "multi-phasic testing", involves a series of basic tests which are administered to newly admitted patients by qualified professionals such as nurses and technicians. The testing procedure begins shortly after the patient is admitted. He fills out a preprinted computer form describing his medical history and specifies any health problems or complaints. Nurses then administer several routine tests. The results, analyzed automatically by the computer, are presented in a convenient format for quick reference by doctors. At present, only those patients whose doctors have specifically requested it are tested by the new system.

"A patient treated under the new program does not feel he is being subjected to anything different," Dr. Shields said. "The tests given are the same as before. But, because the patient's doctor is freed from routine testing responsibilities, he has more time for diagnosis and counselling."

IBM COMPUTER WORKS AT FUN CENTER

An IBM System/3 Model 10 computer has been put to work behind the scenes at Cedar Point (Sandusky, Ohio) so that visitors to the northwestern Ohio amusement park can have more fun. For the fiscal year ended March 31, 1971, visitors to Cedar Point took 41.5 million rides on such things as dodgems, double ferris wheel, antique cars, roller coasters and a variety of boats. The computer is enabling operating and administrative personnel to better manage the people and resources required for the park, which last year hosted some 2.5 million people.

Some of the requirements of the operation are unusual among businesses. For example, in preparation for the peak season, employment jumps from approximately 200 people to over 2,300. Processing of paychecks, hours worked and other employment considerations alone have been greatly reduced and simplified by the new system. The computer also produces accounts payable re-



— Controller Phil Lauser reviews computer printout

ports, controls inventory of souvenirs and other sale items, and tabulates such things as unit cost per ride. A reservation system for the park's "Breaker's" hotel also will be added to the system soon.

PUBLIC LIBRARY INSTALLS COMPUTER FOR PUBLIC USE

Simple mathematical or complex engineering and scientific problems can be solved on the coin-operated computer which has been added to the services offered by the Monterey Public Library in Monterey, Calif. It is the first coin-operated computer for public use in the United States, according to the library.

The installation operates the same as coin-operated telephones, typewriters, and copy machines. The user simply inserts a coin which allows him to use the computer for a predetermined amount of time. A red light comes on when less than 60 seconds remain which allows him to either complete his problem or insert additional coins.

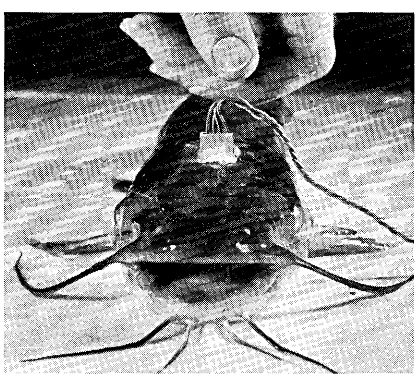
The computer, a Hewlett-Packard 9100 system, has 16 storage registers and a 196-step program memory. Operation and programming is simple as there is no programming "language" to learn. Data is entered through either the keyboard, magnetic card reader, or an attached HP-9160A Marked Card Reader. This enables the user to prepare his programs at the office, home or school. No key-punch equipment is required. Output is via a cathode ray display tube which displays three registers. A printer can also be added if desired.

Free key code cards, program cards and programming sheets are available at the computer. In addition, programs can be recorded on a wallet-size magnetic program card. Data can be entered and/or displayed in fixed or floating decimal point notation.

M. J. B. Flippin, Technical Director and founder of the Monterey firm, Computer Rental Service, which installed the computer, said, "... We feel there is a large segment of the population who would like to use a small computing system...Our installation is aimed primarily at those of today's society who are familiar with mathematics and the computer and what it can do for them...Typical users would be students, professional engineers, land surveyors and so forth." In addition to individual uses of the machine, it is recommended by the library for preliminary work to save time on larger computer services.

COMMON CATFISH AIDS RESEARCH INTO SENSE OF SMELL

Dr. Vernon A. Benignus, a Trinity University psychologist, is using an IBM computer, catfish and foul-smelling chemicals to learn more about the olfactory mechanism — or sense of smell — the least-understood of the five animal senses. When a fish is exposed to unpleasant odors, says Dr. Benignus, the electrical activity in its brain suddenly increases. He believes that smells are coded by an animal's brain into electrical signals. Understanding this code could reveal secrets of the olfactory sense and also provide valuable knowledge about how the brain works.



In his experiments, Dr. Benignus surgically implants tiny electrodes into the brains of catfish. He exposes the fish to very small doses of chemicals such as morphylene — which smells like dirty socks — and ethyl mercaptan — which smells like rotten eggs. He then records the resulting electrical activity in their brains.

The odor-induced changes in the brain's electrical activity cause the alternating current voltage to rise from a norm of 50-100 microvolts to around 500 microvolts. There also are significant changes in the electrical patterns and frequencies generated by the brain. By studting the statistical analyses produced by the IBM system, Dr. Benignus hopes to determine how the brain codes information from the sense of smell. The factors he uncovers also may apply to the other senses and to humans as well as lower animals. Some researchers suspect there may be connections between the sense of smell and such traits as learning and behavior.

HEART DISEASE TREATMENT AND RESEARCH AT REINGOLD ECG CENTER

The Reingold Electrocardiographic Center (Evanston, Ill.), an example of shared services in the Northwestern University-McGaw Medical Center, was organized in 1964 to provide complete electrocardiographic services on a 24-hour-a-day basis. Electrocardiograms are transmitted by common carrier telephone lines from Chicago Wesley Memorial and Passavant Memorial hospitals, the Rehabilitation Institute of Chicago, and the Northwestern Medical School clinics to the Center.

The installation of a new computer facility in the Reingold ECG Center provides virtually immediate interpretation of electrocardiograms. Previously, 24 to 48 hours were required for the participating hospitals to receive interpreted records.

The ECG Center also is devoted to basic and clinical research in the broad field of electrocardiology, including cardiac electrophysiology. Particular emphasis is placed on studies designed to find the causes of disturbances of cardiac rate and rhythm in patients with heart disease, the modes of action of drugs used to treat these disturbances, and on techniques for diagnostic and therapeutic use in patients. There are, currently on file in the Center, more than 125,000 electrocardiograms, recording over 6,000,000 heartbeats. Automation of data acquisition, processing and analysis accomplished by the new computer facilitates both teaching and research in the Center.

Northwestern's ECG system, the first of its type in the country, permits ready expansion of service to additional interested institutions irrespective of their distance to the University. All that is needed to install the system is an ECG transmitter and one or more standard telephone wall jacks.

COMPUTERIZED BUOY ENTERS FIGHT AGAINST POLLUTION

A giant, computerized buoy has entered the fight against water pollution in Massachusetts Bay. The 114-foot, 18,000-pound buoy was anchored this past July, at a point in the Bay four miles north of Boston Light Vessel, by a team of divers and crew riggers, for Professor Erik Mollo-Christensen of the Massachusetts Institute of Technology. The buoy's new research undertaking is being sponsored by the Office of Naval Research and the National Science Foundation. (The data also will be used in research programs sponsored by the National Oceanographic and Atmospheric Administration under the Sea Grant Program.)

The buoy is to be a key element in the Massachusetts Bay Area Study. The importance of the buoy's data to this study involves how pollutants and other properties of the water are transported in the Bay and adjacent waters by currents and eddies. Prof. Mollo-Christensen, who designed the buoy, says it will be used to do "research on air-sea interaction and transport and mixing processes in air and water". The buoy has been used in other air-sea interaction research for the past year at a point off the coast of Martha's Vineyard.

For its new undertaking in the Bay, the buoy is equipped with a variety of instruments. A forty-foot radio tower atop the buoy will beam the data from these instruments to a tower on the 20-story M.I.T. Center for Earth Sciences building in Cambridge (Mass.). The data then will be fed into a computer in the Earth Science Building, where it will be stored and available for recall and summarization.

EDUCATION NEWS

LEHIGH UNIVERSITY'S COMPUTER TO SERVICE 6 OTHER COLLEGES THROUGH REMOTE FACILITIES

Beginning this month, Lafayette College, Moravian College, Muhlenberg College, Cedar Crest College, Allentown College, and Wilkes College (all of Pennsylvania), will be linked to Lehigh University's CDC 6400 computer through a new computer network. Supported by an initial grant of $81,000 from the National Science Foundation, the Lehigh University-based network has been designed to increase the utilization of computers in the undergraduate educational processes of the 6 other colleges, which, together with Lehigh, will contribute approximately $150,000 to the project.

Dr. John E. Walker, associate professor of economics and Computer Center manager of user applications at Lehigh, will direct the Lehigh-based network, which will be known as the Lehigh Valley Regional Computing Network (LVRCN).

In preparation for the September start of the network, Lehigh University conducted an intensive, six-week seminar and workshop program this summer for 19 faculty members from the 6 other colleges. Related training programs will be held for them at Lehigh during the 1971-72 academic year and again next summer (1972). The training programs for the faculty members of the 6 participating colleges are being conducted at Lehigh to aid them in developing new computer-oriented curricula on their own campuses.

Similar college computer networks are being established in various parts of the country with funding by NSF, including those at the University of Pittsburgh and Pennsylvania State University. The three networks in Pennsylvania, including the one at Lehigh, will form the nucleus of PRISE (Pennsylvania's Regional Instructional System for Education).

SPECIAL B.S. PROGRAM IN COMPUTER SCIENCE FOR TRANSFER STUDENTS

Hofstra University, Hempstead, N.Y., is inaugurating a special Bachelor of Science program in Computer Science and Systems Analysis designed specifically for transfer students from two-year colleges who have majored in the computer science field.

This new program, not yet available to students who attend Hofstra from their freshman year, allows the transfer student who has taken a program of basic computer courses at a two-year institution, to apply those credits with full academic standing up to 64 credit hours, toward a Bachelor of Science degree from Hofstra. For information about this new program, contact: Dean Richard T. Bennett, Dean of Admissions and Financial Aid, Hofstra University, Hempstead, NY 11550.

PEPPERDINE UNIV. GRANTS DEGREE CREDITS TO HONEYWELL GRADUATES

Students completing a course in computer sciences at any of the Honeywell Institute of Information Sciences (HIIS) schools will be eligible to receive 20 credits toward a bachelor of science degree in administrative science at Pepperdine University in Los Angeles, it is announced by Honeywell and the university.

Pepperdine becomes the first university in California to award college credit to graduates of an industry-operated computer institute. Dr. Donald R. Sime, dean of the University's School of Business, said the agreement with Honeywell is part of the university's continuing policy of cooperating with industry in developing programs that relate to present-day requirements of the business community.

Stephen V. Tritto, manager of Honeywell's Institute in Southern California, said about 40 per cent of students attending the Institute's schools do not have college degrees and therefore can benefit from the new agreement with the university.

MISCELLANEOUS

COMPUTER PRINTS KANJI

IBM Japan, Ltd., recently announced the IBM Kanji Data Processing System. The system, designed to serve the linguistic needs of many East Asian peoples, can enter into a computer, or print out, any of approximately 10,000 Kanji characters, ideographs widely used in all forms of written communication in Japan and in the Chinese-speaking areas of Asia. The system consists of an impact printer, a Kanji keyboard attachment to the IBM 029 card punch and a matrix character generation program package.

The system's printer, the IBM 2245, operates at a speed of 330 lines a minute, with 16 Kanji characters to a line. Characters are printed by a series of overlapping "dots" which create straight or curved lines. The Kanji keyboard consists of an array of 3,600 selected characters or symbols. An additional 7,000 characters can be printed by use of 100 reference codes and character references.

The system is suited for computer applications in the printing of mailing addresses, stock and insurance certificates, bills, invoices and a wide range of financial documents. It also can be used in information retrieval applications and to provide proof copy in printing and publishing applications.

In addition to Kanji, the system also can print letters in the Japanese Hiragana and Katakana alphabets, the Roman alphabet, numerals and other symbols. The printer and Kanji keyboard attachment will be manufactured at the IBM Japan, Ltd. plant in Fujisawa, Japan.

BOSTON MUSEUM OF SCIENCE WILL DISPLAY COMPUTER PUBLIC CAN OPERATE

The Boston Museum of Science and Honeywell Inc. have announced that a computer exhibit "designed to cast aside the shroud of mystery surrounding these tools" will be the largest industry-sponsored exhibit in the Museum's new West Wing. (The museum is located in Boston, Mass.) Museum President D. Reid Weedon Jr. said the Honeywell gift, first for the Wing, will give visitors "an unequalled opportunity to get acquainted with one of the most widely used, and yet least understood, technological achievements."

At the meeting announcing the exhibit, C. W. Spangle, Honeywell executive vice president, said, "Today many people are afraid of computers. People think of computers as things that get credit card accounts into such a state that one's credit rating is destroyed. Or, worse yet, that computers are collecting dossiers on all of us and hence invading our privacy." Actually, he said, computers expand the capabilities of the human brain — and always at the direction of humans. Other tools have helped ease man's physical labor, but the computer "is helping man's mind," Spangle said.

The museum's exhibit will center on a working Model 316 with stations where visitors may try their hand at computer operation. A choice of programs will allow the visitor to solve mathematical problems, simulate a moon landing, play word games or test his knowledge of current events. It will be operative when the West Wing opens in a few months.

The second part of the exhibit, scheduled to be installed by mid-1972, will illustrate present and future uses of the computer with slide shows, films, pushbutton devices and recordings.

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
ITT Arctic Services, Inc., Paramus, N.J.	U.S. Air Force	Fiscal year funding for operation and maintenance of Distant Early Warning (DEW) System, a chain of radar and communications sites extending from Western Alaska across Canada and Greenland to the United Kingdom	$25.1 million
GTE Sylvania Inc., Communication Systems Div., Needham, Mass.	Air Force Space and Missile Systems Organization	Design, development of command and control system that will increase targeting and communications capabilities of Minuteman intercontinental ballistic missile system	$21.8 million
Federal Electric Corp. (ITT Service Associate), Paramus, N.J.	National Aeronautics and Space Administration	Extension (fifth year) of communications and instrumentation support contract at Kennedy Space Center bringing five year total to $93,993,844	$18,210,325
The National Cash Register Co., Dayton, Ohio	Sumitomo Bank, Osaka, Japan	Four NCR Century 300 computers expanding one of world's largest on-line banking networks; installation of two systems each in data centers in Osaka and Tokyo	$9.4 million
Singer Co., Librascope Div., Glendale, Calif.	U.S. Naval Ordnance Systems Command	Production of first units of improved anti-submarine warfare weapon-control system for deployment aboard submarines	$7 million (approximate)
The Ingersoll Milling Machine Co., Rockford, Ill.	Cummins Engine Co., Inc., Columbus, Ind.	An automated manufacturing system more than 700 feet in length	$6.5+ million
Data Products Corp., Telecommunications Div., Stamford, Conn.	Federal Aviation Agency	Addition to contract for Data Modems to be used in new nationwide FAA en-route air control system	$3.9 million
Burroughs Corp., Detroit, Mich.	Ohio Valley Data Control, Inc. Belpre, Ohio	100 Burroughs RT 2501 currency dispensers and a B 3500 computer system; firm performs data processing for 32 banks and several commercial concerns throughout Ohio Valley and West Virginia	$2.3 million
Computer Sciences Corp., Los Angeles, Calif.	NASA	Mathematical, analytical and operational support to Goddard Institute for Space Studies in New York City	$2.2 million (approximate)
NORTEC Electronics Corp., Santa Clara, Calif.	Omron Tateisi Electronics Co. of Japan	MOS/LSI calculator circuits for use in low cost "personal" calculators	$2 million
General Dynamics, San Diego, Calif.	Air Force Space and Missile Systems Organization	Development of major element of system that will overcome language barrier between different computers and permit pooling of computerized space launch vehicle guidance data	$1.75 million
Ampex Corp., Redwood City, Calif.	Illinois Dept. of Law Enforcement, Springfield, Ill.	A Videofile information system; will automate police records, expand state's fingerprint identification capability	$1.2 million
University Computing Co., Dallas, Texas	Taylor Publishing Co., Dallas, Texas	Electronic pagination service for production of college catalogs and bulletins	$1+ million
Digital Development Corp., San Diego, Calif.	Rohr Corp., Chula Vista, Calif.	DDC Model 7313 Disc Memory Systems for use in the Rohr Automotive Material Handling System	$1 million (approximate)
Computer Systems Engineering, Inc., North Billerica, Mass.	Federal Aviation Administration	Design, programming and operational testing of metering and spacing program at Atlanta, Ga. airport as part of FAA Automated Radar Terminal System (ARTS) advanced system	$831,000
Computer Communications, Inc., Culver City, Calif.	Boeing Computer Services, Inc.	Two CC-70 Computer Communicator Systems to serve as "front-ends" to large complexes of IBM and Control Data mainframes in Seattle and Philadelphia	$640,000
Trans-A-File Systems Co., Sunnyvale, Calif.	Colonial Penn Group Data Corp.	TRANS-A-FILE System for total automation of accident and health claim files and general correspondence/policy service files	$600,000
Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.	Federal Bureau of Investigation	Final phase in development and fabrication of prototype high-speed fingerprint reader	$391,248
SYSTEMS Engineering Laboratories, Fort Lauderdale, Fla.	Cummins Engine Co., Columbus, Indiana	Multiple SYSTEMS 810B computers for research and engineering testing of diesel engines	$285,000+
Conrac Corporation, New York, N.Y.	Continental Illinois National Bank and Trust Co. of Chicago	Computer-controlled bond board display system; replaces existing hand-operated board; will be controlled by firm's remote System 360	$150,000
Biochemical Procedures, North Hollywood, Calif.	U.S. Army	Conducting a drug identification program for servicemen in the Sixth Army and the Pacific Command except Vietnam and Thailand	—
ENTREX, Inc., Burlington, Mass.	Agricultural Records Cooperative, Madison, Wis.	System 480 equipment for use in preparation of input for ARC's "Dairy Herd Improvement Program"	—
Computer Identics Corp., Westwood, Mass.	General Trading Corp., Carlstadt, N.J.	An "IDENTIC" Information and Control System to "read" order picking labels, printed by computer, on moving cartons	—
Conrac Corp., Datex Div., Duarte, Calif.	Montreal International Airport, Dorval, Province of Quebec, Canada	An information display system including a "Greeter's Board"; gate signs directing passengers to proper baggage claiming areas; baggage dispenser signs; belt loading signs	—
Collins Radio Co., Dallas, Texas	State of Iowa Office for Planning and Programming, Cedar Rapids, Iowa	A communications oriented computer system to be used in state-wide data network TRACIS — for Traffic Records and Criminal Justice Information System	—

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B3500 system	Blue Cross of North Dakota, Fargo, No. Dakota	Processing Blue Cross, Blue Shield of North Dakota, and Medicare tasks such as enrollment, claims adjudication, provider payments, and general accounting (system valued at more than $1 million)
Digital Equipment PDP-10 system	Dept. of Energy, Mines, and Resources (EMR), Remote Sensing Center, Ottawa, Ontario, Canada	Essential part of a program to help Canada obtain more ecological and environmental information than was ever before feasible; system will let Canada share data from satellite with United States
Digital Equipment PDP-11 computer	United Bristol Hospitals, Bristol, England (2 systems)	Controlling clinical laboratory equipment; maintaining in-patient, and outpatient, laboratory records (system valued at $108,000)
Digital Equipment PDP-15/40 system	Y-ARD Consultants, Ltd. (Y-ARD for Yarrow Admiralty Research Department), Glasgow, Scotland	Upgrading EAI 680 analog computer to a full hybrid system to be used in marine and industrial control systems design
Honeywell Model 58 system	Gateway Press Inc., Monroeville, Pa.	Payroll, billing, general ledger applications; also service-bureau-type work for publisher of weekly newspapers and printer of advertising tabloids
Honeywell Model 200 system	Hibbing Area Technical Institute, Hibbing, Minn.	Student instruction in 2-year EDP course; also for administrative work
	The Levinson Steel Co., Pittsburgh, Pa.	Accounting and inventory applications
Honeywell Model 1250 system	First Federal Savings and Loan Association, Gary, Ind.	Savings account applications; will handle over 40,000 accounts
Honeywell Model 2015 system	Littlewoods Mail Order Stores, Liverpool, England	Inventory control, order processing and billing
Honeywell Model 6040 system	Fidelity National Bank, Lynchburg, Va.	Commercial banking applications
IBM System/3 Model 10	Lynch Corporation, Manchester, N.H.	Cost control; accounts payable, payroll and inventory control will be added soon
IBM System/370 Model 145	Franciscan Hospitals Datacenter, St. Clare Area House of Government, Cincinnati, Ohio	Hospital drug control for seven participating hospitals; helping to comply with tougher federal drug control laws
IBM System/370 Model 155	Brown and Root, Inc., Houston, Tex.	Design and analysis of large offshore oil platforms
	Collins & Aikman, Charlotte, N.C.	Variety of applications ranging from printouts of accounting statements, product schedules and inventory analyses to special simulation studies of profit projections, employee turnover and product mixes
	Richman Brothers, Cleveland, Ohio	Analyzing fast-shifting sales patterns in clothing style, fabric, size, even geographical variation among 300 retail stores nationally
IBM System/370, Model 165	Ohio State University, Columbus, Ohio	Upgrading main instruction and research computer facility
NCR Century 50 computer	Asbury Park, N.J., Board of Education	Payroll, appropriation accounting, and attendance and grade reporting
	Martin Zippel Co., Phillipsburg, N.J.	Inventory control and billing preparation
NCR Century 100 computer	H. A. Berkheimer Associates, Bangor, Pa.	Administering its operations and processing a wide variety of data
	Cumberland County, New Jersey	Variety of processing tasks; replaces smaller EDP system
	City of Oceanside, California	General accounting purposes; also for use by the Police Department and the Harbor District
RCA 2 system	Gulf Oil Co.-U.S., Atlanta, Ga.	Sales analysis, accounts payable, inventory control and general accounting for operations in 9 states
	Reader's Digest Inc., Pleasantville, N.Y.	Controlling large number of peripheral devices used in addressing bills and other documents
UNIVAC 1106 system	Rheinische Braunkohlenwerke A.G. (Rheinbraun) Cologne, West Germany	Profitability analysis of mining operations; processing engineering operations; analyzing aerial photograph measurements; also data processing for trading companies, marketing associations, and benefit associations providing assistance for home building (system valued at about $2 million)
UNIVAC 9200 system	Commercial Carriers Inc., Romulus, Mich.	Payroll processing, general accounting, financial statements, miscellaneous reports, expense ledgers and fixed assets accounting
	Computer Information SOP, Oklahoma City, Okla.	Preparation of financial statements for public accountants and general ledger work; also, making time available to students attending the Oklahoma School of Business and Technology
	Iowa State Education Association, Des Moines, Iowa	Processing enrollments and accounting tasks, and provision of statistical information
	Southern Mortgage Associates, Miami, Florida	Assisting firm in servicing some 4,000 mortgages
UNIVAC 9400 system	Chicago Museum of Science and Industry, Chicago, Ill.	Inventory control, purchasing, budget functions, and payroll processing
	Takashimaya Corporation, Tokyo, Japan	Inventory control, accounting and payroll processing
	Victor Company, Japan, Ltd., Tokyo, Japan	A material management system incorporating order entry, order history and inventory control

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 AUGUST 15, 1971

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE 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 1. United States Manufacturers								
Autonetics	RECOMP II	11/58	2.5		30	0	30	X
Anaheim, Calif. (R)(1/69)	RECOMP III	6/61	1.5		6	0	6	X
Bailey Meter Co.	Bailey 750	6/60	40-250	(S)	32	3	35	0
Wickliffe, Ohio	Bailey 755	11/61	200-600	(S)	6	0	6	0
(A) (8/71)	Bailey 756	2/65	60-400	(S)	16	6	22	2
	Bailey 855/15	-	50-400	(S)	0	0	0	2
	Bailey 855/25	4/68	100-1000	(S)	11	0	11	3
	Bailey 855/50	-	100-1000	(S)	0	0	0	12
Bunker-Ramo Corp.	BR-130	10/61	2.0		160	-	-	X
Westlake Village, Calif.	BR-133	5/64	2.4		79	-	-	X
(A)	BR-230	8/63	2.7		15	-	-	X
(7/71)	BR-300	3/59	3.0		18	-	-	X
	BR-330	12/60	4.0		19	-	-	X
	BR-340	12/63	7.0		19	-	-	X
	BR-1018	6/71	23.0	(S)	-	-	-	-
Burroughs	205	1/54	4.6		25-38	2	27-40	X
Detroit, Mich.	220	10/58	14.0		28-31	2	30-33	X
(N)	B100/B500	7/65	2.8-9.0		-	-	-	-
(1/69-5/69)	B2500	2/67	5.0		52-57	12	64-69	117
	B3500	5/67	14.0		44	18	62	190
	B5500	3/63	23.5		65-74	7	72-81	8
	B6500	2/68	33.0		4	-	4	60
	B7500	4/69	44.0		-	-	-	13
	B8500	8/67	200.0		1	-	1	5
Computer Automation, Inc.	108/208/808	6/68	5.0	(S)	165	10	175	110
Newport Beach, Calif.	116/216/816	3/69	8.0	(S)	215	20	235	225
(A) (6/71)								
Control Data Corp	G15	7/55	1.6		-	-	295	X
Minneapolis, Minn.	G20	4/61	15.5		-	-	20	X
(R)	LGP-21	12/62	0.7		-	-	165	X
(7/71)	LGP-30	9/56	1.3		-	-	322	X
	RPC4000	1/61	1.9		-	-	75	X
	636/136/046 Series	-	-		-	-	29	-
	160/8090 Series	5/60	2.1-14.0		-	-	610	X
	924/924-A	8/61	11.0		-	-	29	X
	1604/A/B	1/60	45.0		-	-	59	X
	1700/SC	5/66	3.8		-	-	425-475	0
	3100/3150	5/64	10-16		-	-	83-110	C
	3200	5/64	13.0		-	-	55-60	C
	3300	9/65	20-38		-	-	205	C
	3400	11/64	18.0		-	-	15	C
	3500	8/68	25.0		-	-	15	C
	3600	6/63	52.0		-	-	40	C
	3800	2/66	53.0		-	-	20	C
	6400/6500	8/64	58.0		-	-	108	C
	6600	8/64	115.0		-	-	85	C
	6700	6/67	130.9		-	-	5	C
	7600	12/68	235.0		-	-	8	C
								Total: 160 E
Data General Corp.	NOVA	2/69	8.0	(S)	-	-	911	-
Southboro, Mass.	SUPERNOVA	5/70	9.6	(S)	-	-	169	-
(A) (8/71)	NOVA 1200	12/71	5.4	(S)	-	-	502	-
	NOVA 800	3/71	6.9	(S)	-	-	56	-
	SUPERNOVA SC	6/71	11.9	(S)	-	-	15	-
Datacraft Corp.	6024/1	5/69	54-300	(S)	12	0	12	3
Ft. Lauderdale, Fla.	6024/3	2/70	33-200	(S)	42	6	48	46
(A) (6/71)	6024/5	12/71	16-50	(S)	0	0	0	5
Digiac Corp.	Digiac 3060	1/70	9.0	(S)	45	-	-	7
Plainview, N.Y.	Digiac 3080	12/64	19.5	(S)	16	-	-	0
(A) (7/71)	Digiac 3080C	10/67	25.0	(S)	8	-	-	1
Digital Computer Controls, Inc.	D-112	8/70	10.0	(S)	115	15	130	300
Fairfield, N.J. (A) (7/71)								
Digital Equipment Corp.	PDP-1	11/60	3.4		48	2	50	X
Maynard, Mass.	PDP-4	8/62	1.7		40	5	45	X
(A) (2/71)	PDP-5	9/63	0.9		90	10	100	X

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Digital Equipment Corp. (cont'd)	PDP-6	10/64	0.5	C	C	23	X
	PDP-7	11/64	0.4	C	C	160	X
	PDP-8	4/65	0.3	C	C	1440	C
	PDP-8/1	3/68	0.4	C	C	3698	C
	PDP-8/S	9/66	0.3	C	C	1024	C
	PDP-8/L	11/68	-	C	C	3902	C
	PDP-9	12/66	1.1	C	C	436	C
	PDP-9L	11/68	-	C	C	48	C
	PDP-10	12/67	8.0	C	C	145	C
	PDP-11	3/70	10.5 (S)	C	C	546	C
	PDP-12	9/69	-	C	C	475	C
	PDP-15	-/69	17.0	C	C	377	C
	LINC-8	9/66	-	C	C	134	C
							Total: 1350 E
Electronic Associates Inc.	640	4/67	1.2	100	60	160	6
Long Branch, N.J. (A) (7/71)	8400	7/67	12.0	21	6	27	0
EMR Computer	EMR 6020	4/65	5.4	C	-	-	C
Minneapolis, Minn.	EMR 6040	7/65	6.6	C	-	-	C
(A)	EMR 6050	2/66	9.0	C	-	-	C
(2/71)	EMR 6070	10/66	15.0	C	-	-	C
	EMR 6130	8/67	5.0	C	-	-	C
	EMR 6135	-	2.6	-	-	-	-
	EMR 6155	-	-	-	-	-	-
							Total: 1350 E
General Automation, Inc.	SPC-12	1/68	-	-	-	900	-
Anaheim, Calif.	SPC-16	5/70	-	-	-	70	-
(R) (7/71)	System 18/30	7/69	-	-	-	70	-
General Electric	GE-PAC 3010	5/70	2.0	2	0	2	16
West Lynn, Mass.	GE-PAC 4010	10/70	6.0	7	0	7	30
(Process Control Computers)	GE-PAC 4020	2/67	6.0	186	52	238	46
(A)	GE-PAC 4040	8/64	3.0	45	20	65	X
(8/71)	GE-PAC 4050	12/66	7.0	23	2	25	X
	GE-PAC 4060	6/65	2.0	18	2	20	X
Hewlett Packard	2114A, 2114B	10/68	0.25	-	-	1182	-
Cupertino, Calif.	2115A	11/67	0.41	-	-	333	-
(A) (8/71)	2116A, 2116B, 2116C	11/66	0.6	-	-	1171	-
Honeywell Information Systems	G58	5/70	1.0	-	-	-	-
Wellesley Hills, Mass.	G105A	6/69	1.3	-	-	-	-
(A) (2/71)	G105B	6/69	1.4	-	-	-	-
	G105RTS	7/69	1.2	-	-	-	-
	G115	4/66	2.2	200-400	420-680	620-1080	-
	G120	3/69	2.9	-	-	-	-
	G130	12/68	4.5	-	-	-	-
	G205	6/64	2.9	11	0	11	-
	G210	7/60	16.0	35	0	35	-
	G215	9/63	6.0	15	1	16	-
	G225	4/61	8.0	145	15	160	-
	G235	4/64	12.0	40-60	17	57-77	-
	G245	11/68	13.0	3	-	3	-
	G255 T/S	10/67	17.0	15-20	-	15-20	-
	G265 T/S	10/65	20.0	45-60	15-30	60-90	-
	G275 T/S	11/68	23.0	-	-	10	-
	G405	2/68	6.8	10-40	5	15-45	-
	G410 T/S	11/69	11.0	-	-	-	-
	G415	5/64	7.3	170-300	70-100	240-400	-
	G420 T/S	6/67	23.0	-	-	-	-
	G425	6/64	9.6	50-100	20-30	70-130	-
	G430 T/S	6/69	17.0	-	-	-	-
	G435	9/65	14.0	20	6	26	-
	G440 T/S	7/69	25.0	-	-	-	-
	G615	3/68	32.0	-	-	-	-
	G625	4/65	43.0	23	3	26	-
	G635	5/65	47.0	20-40	3	23-43	-
	G655	12/70	80.0	-	-	-	-
	H-110	8/68	2.7	180	75	255	0
	H-115	6/70	3.5	30	-	30	-
	H-120	1/66	4.8	800	160	960	-
	H-125	12/67	7.0	150	220	370	-
	H-200	3/64	7.5	800	275	1075	-
	H-400	12/61	10.5	46	40	86	X
	H-800	12/60	30.0	58	15	73	X
	H-1200	2/66	9.8	230	90	320	-
	H-1250	7/68	12.0	130	55	185	-
	H-1400	1/64	14.0	4	6	10	X
	H-1800	1/64	50.0	15	5	20	X
	H-2200	1/66	18.0	125	60	185	-
	H-3200	2/70	24.0	20	2	22	-
	H-4200	8/68	32.5	18	2	20	-
	H-8200	12/68	50.0	10	3	13	-
	DDP-24	5/63	2.65	-	-	90	X
	DDP-116	4/65	0.9	-	-	250	-
	DDP-124	3/66	2.2	-	-	250	-
	DDP-224	3/65	3.5	-	-	60	-
	DDP-316	6/69	0.6	-	-	450	-
	DDP-416	-	-	-	-	350	-
	DDP-516	9/66	1.2	-	-	900	-
	H112	10/69	-	-	-	75	-
	H632	12/68	3.2	-	-	12	-
	H1602	-	-	-	-	-	-
	H1642	-	-	-	-	-	-
	H1644	-	-	-	-	-	-
	H1646	-	-	-	-	-	-
	H1648	11/68	12.0	-	-	20	-
	H1648A	-	-	-	-	-	-

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IBM	System/3 Model 6	3/71	1.0	-	-	-	-
White Plains, N.Y.	System/3 Model 10	1/70	1.1	-	-	-	-
(N) (D)	System/7	11/71	0.35 and up	-	-	-	-
(1/69-5/69)	305	12/57	3.6	40	15	55	-
	650	10/67	4.8	50	18	68	-
	1130	2/66	1.5	2580	1227	3807	-
	1401	9/60	5.4	2210	1836	4046	-
	1401-G	5/64	2.3	420	450	870	-
	1401-H	6/67	1.3	180	140	320	-
	1410	11/61	17.0	156	116	272	-
	1440	4/63	4.1	1690	1174	2864	-
	1460	10/63	10.0	194	63	257	-
	1620 I, II	9/60	4.1	285	186	471	-
	1800	1/66	5.1	415	148	563	-
	7010	10/63	26.0	67	17	84	-
	7030	5/61	160.0	4	1	5	-
	704	12/55	32.0	12	1	13	-
	7040	6/63	25.0	35	27	62	-
	7044	6/63	36.5	28	13	41	-
	705	11/55	38.0	18	3	21	-
	7020, 2	3/60	27.0	10	3	13	-
	7074	3/60	35.0	44	26	70	-
	7080	8/61	60.0	13	2	15	-
	7090	11/59	63.5	4	2	6	-
	7094-I	9/62	75.0	10	4	14	-
	7094-II	4/64	83.0	6	4	10	-
	360/20	12/65	2.7	4690	3276	7966	-
	360/25	1/68	5.1	0	4	4	-
	360/30	5/65	10.3	4075	3144	7219	-
	360/40	4/65	19.3	1260	498	1758	-
	360/44	7/66	11.8	65	13	78	-
	360/50	8/65	29.1	480	109	589	-
	360/65	11/65	57.2	175	31	206	-
	360/67	10/65	133.8	9	4	13	-
	360/75	2/66	66.9	14	3	17	-
	360/85	12/69	150.3	-	-	-	-
	360/90	11/67	(S)	5	-	5	-
	370/135	5/72	14.4	-	-	-	-
	370/145	7/71	23.3	-	-	-	-
	370/155	2/71	48.0	-	-	-	-
	370/165	5/71	98.7	-	-	-	-
	370/195	4/71	232.0	-	-	-	-
Interdata	Model 1	12/70	3.7	45	10	55	70
Oceanport, N.J.	Model 3	5/67	-	N/A	-	200	X
(A) (6/71)	Model 4	8/68	8.5	200	100	300	90
	Model 5	11/70	10.5	25	15	40	50
	Model 15	1/69	20.0	40	24	64	13
NCR	304	1/60	10.0	10	2	12	X
Dayton, Ohio	310	5/61	1.0	8	0	8	X
(A) (7/71)	315	5/62	7.0	350	375	725	-
	315 RMC	9/65	9.0	125	50	175	-
	390	5/61	0.8	290	440	730	-
	500	10/65	1.0	1100	1800	2900	-
	Century 50	2/71	1.6	75	-	75	-
	Century 100	9/68	2.6	1400	450	1850	-
	Century 200	6/69	7.5	405	155	560	-
	Century 300	2/72	20.0	0	0	0	-
Philco	1000	6/63	7.0	16	-	-	X
Willow Grove, Pa.	200-210,211	10/58	40.0	16	-	-	X
(N) (1/69)	2000-212	1/63	52.0	12	-	-	X
RCA	301	2/61	7.0	140-290	100-130	240-420	-
Cherry Hill, N.J.	501	6/59	14.0-18.0	22-50	1	23-51	-
(N)	601	11/62	14.0-35.0	2	0	2	-
(5/69)	3301	7/64	17.0-35.0	24-60	1-5	25-65	-
	Spectra 70/15	9/65	4.3	90-110	35-60	125-170	-
	Spectra 70/25	9/65	6.6	68-70	18-25	86-95	-
	Spectra 70/35	1/67	9.2	65-100	20-50	85-150	-
	Spectra 70/45	11/65	22.5	84-180	21-55	105-235	-
	Spectra 70/46	-	33.5	1	0	1	-
	Spectra 70/55	11/66	34.0	11	1	12	-
Raytheon	250	12/60	1.2	115	20	135	X
Santa Ana, Calif.	440	3/64	3.6	20	-	20	X
(A)	520	10/65	3.2	26	1	27	X
(7/71)	703	10/67	12.5 (S)	172	31	203	2
	704	3/70	8.0 (S)	100	35	135	50
	706	5/69	19.0 (S)	60	14	74	0
Scientific Control Corp.	650	5/66	0.5	23	0	23	X
Dallas, Texas	655	10/66	2.1	137	0	137	0
(A)	660	10/65	2.1	41	0	41	0
(8/71)	4700	4/69	1.8	18	0	18	-
	DCT-132	5/69	0.9	41	0	41	-
Standard Computer Corp.	IC 4000	12/68	9.0	9	0	9	4
Los Angeles, Calif.	IC 6000	5/67	16.0	9	0	9	-
(A) (6/71)	IC 7000	8/70	17.0	5	0	5	4
Systems Engineering Laboratories	810	9/65	1.1	24	0	24	X
Ft. Lauderdale, Fla.	810A	8/66	0.9	111	5	116	32
(A)	810B	9/68	1.2	75	1	76	26
(6/70)	840	11/65	1.5	3	0	3	X
	840A	8/66	1.5	36	2	38	X
	840MP	1/68	2.0	31	0	31	2
	Systems 86	-	10.0	0	0	0	2
UNIVAC Div. of Sperry Rand	I & II	3/51 & 11/57	25.0	23	-	-	X
New York, N.Y.	III	8/62	21.0	25	6	31	X
(A) (2/71)	File Computers	8/56	15.0	13	-	-	X
	Solid-State 80 I, II, 90, I, II, & Step	8/58	8.0	210	-	-	X

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UNIVAC (Cont'd)	418	6/63	11.0	76	36	112	20 E
	490 Series	12/61	30.0	75	11	86	35 E
	1004	2/63	1.9	1501	628	2129	20 E
	1005	4/66	2.4	637	299	936	90 E
	1050	9/63	8.5	138	62	200	10 E
	1100 Series (except 1107, 1108)	12/50	35.0	9	0	9	X
	1107	10/62	57.0	8	3	11	X
	1108	9/65	68.0	87	114	201	75 E
	9200	6/67	1.5	1051	822	1873	850 E
	9300	9/67	3.4	387	49	436	550 E
	9400	5/69	7.0	8	0	8	60 E
	LARC	5/60	135.0	2	0	2	-
Varian Data Machines Newport Beach, Calif. (A) (7/71)	620	11/65	-	-	-	75	X
	620i	6/67	-	-	-	1300	400
	R-260i	4/69	-	-	-	50	30
	520i	10/68	-	-	-	150	330
	520/DC	12/69	-	-	-	25	25
	620/f	11/70	-	-	-	60	40
	620/L	4/71	-	-	-	12	250
Xerox Data Systems El Segundo, Calif. (R) (2/71)	XDS-92	4/65	1.5	10-60	2	12-62	-
	XDS-910	8/62	2.0	150-170	7-10	157-180	-
	XDS-920	9/62	2.9	93-120	5-12	98-132	-
	XDS-925	12/64	3.0	20	1	21	-
	XDS-930	6/64	3.4	159	14	173	-
	XDS-940	4/66	14.0	28-35	0	28-35	-
	XDS-9300	11/64	8.5	21-25	1	22-26	-
	Sigma 2	12/66	1.8	60-110	10-15	70-125	-
	Sigma 3	12/69	2.0	10	0	10	-
	Sigma 5	8/67	6.0	15-40	6-18	21-58	-
	Sigma 6	6/70	12.0	-	-	-	-
	Sigma 7	12/66	12.0	24-35	5-9	29-44	-
	Sigma 9	-	35.0	-	-	-	-

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 719

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          H U M A N
      × L I F E I S
      -------------
        E E A I L N
      F H N I E E
      U A H K S            CFM = KHS
    C K E I U L
  H F N I E E
K A D S H E
---------------------
= C N A U M A L D U S N     49125   158042
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Solution to Numble 718

In Numble 718 in the August issue, the digits 0 through 9 are represented by letters as follows:

B,V = 0	A = 5
Y = 1	D,H = 6
M,T = 2	S = 7
R = 3	E = 8
F,L = 4	O = 9

The message is: Eyes are the ambassadors of love.

Our thanks to the following individuals for submitting their solutions — **to Numble 717**: A. Sanford Brown, Dallas, Texas; Twite S. Emerick, Harrisburg Pa.; T. P. Finn, Indianapolis, Ind.; Abraham Schwartz, Jamaica, N.Y.; and David P. Zerbe, Reading, Pa. — **to Numble 716**: Vaughn E. Mers, Hazelwood, Mo.; and G. P. Petersen, St. Petersburg, Fla.

CORRECTION

In the July 1971 issue of Computers and Automation, the following correction should be made:

Page 6, Editorial: Col. 2, eighth line: replace "nineteen hundreds" with "nineteenth century"

ADVERTISING INDEX

CALENDAR OF COMING EVENTS

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. 6-10, 1971: DISCOP Symposium (IFAC Symposium on Digital Simulation of Continuous Processes), Gyor, Hungary / contact: The Organizing Committee, Synposium on Simulation, Budapest 112, P.O.B. 63, Hungary

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

Sept. 9-10, 1971: Third Annual Conference of the Society for Management Information Systems, Denver, Colo. / contact: Gerald M. Hoffman, Secy., Society for Management Information Systems, One First National Plaza, Chicago, Ill. 60670

Sept. 14-17, 1971: Canadian Information Processing Society (CIPS) Annual National Conference, Royal York Hotel, Toronto, Canada / contact: Jack McCaugherty, James Lovick Ltd., Vancouver, British Columbia, Canada

Sept. 15-17, 1971: Canadian Computer Conference and Show, Royal York Hotel, Toronto, Canada / contact: Conference Chairman, P.O. Box 343, Toronto Dominion Centre, Toronto 111, Ontario, Canada

Sept. 27-29, 1971: Elettronica '71 — 1st International Conference on Applications of Electronics in the Industry, 21st International Technical Exhibition, Turin, Italy / contact: Dr. Ing. Giovanni Villa, Elettronica 71, Corso Massimo d'Azeglio 15, 10126 Turin, Italy

Oct. 4-6, 1971: International Electrical & Electronics Conference & Exhibition, Automotive Bldg., Exhibition Park, Toronto, Ontario, Canada / contact: Conference Office, 1819 Yonge St., Toronto 7, Ontario, Canada

Oct. 4-7, 1971: 26th Annual ISA Instrumentation-Automation Conference & Exhibit, McCormick Place, Chicago, Ill. / contact: Daniel R. Stearn, Public Relations Manager, Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222

Oct. 6-8, 1971: Conference on "Two-Dimensional Digital Processing", Univ. of Missouri-Columbia, Columbia, Mo. / contact: Prof. Ernest L. Hall, Dept. of Electrical Engineering, Univ. of Missouri-Columbia, Columbia, Mo. 65201

Oct. 10-12 1971: First Annual ASM Southwest Division Conference (sponsored by Assoc. for Systems Management, Div. Council 18), Jung Hotel, New Orleans, La. / contact: Albert J. Krail, 636 Baronne St., New Orleans, La. 70113

Oct. 11-13, 1971: Input/Output Systems Seminar '71, The Regency Hyatt House-O'Hare, Chicago, Ill. / contact: C. A. Greathouse, Exec. Director, DPSA (Data Processing Supplies Assoc.), P.O. Box 1333, Stamford, Conn. 06904

Oct. 14-20, 1971: Interkama '71, Dusseldorf, Germany / contact: I. A. Stader, Dusseldorfer Messegesellschaft mbH — NOWEA — 4 Dusseldorf, Messegelande

Oct. 18-20, 1971: 27th Annual National Electronics Conference and Exhibition (NEC/71), Pick-Congress Hotel, McCormick Place, Chicago, Ill. / contact: NEC, Oakbrook Executive Plaza #2, 1211 W. 22nd St., Oak Brook, Ill. 60521

Oct. 18-20, 1971: International Computer Forum & Exposition, McCormick Place-On-The-Lake, Chicago, Ill. / contact: International Computer Forum & Exposition, Oak Brook Executive Plaza #2, 1211 West 22nd St., Oak Brook, Ill. 60521

Oct. 20-22, 1971: ACM/IEEE Second Symposium on Problems in the Optimization of Data Communications Systems, Palo Alto, Calif. / contact: Dr. P. E. Jackson, Room 2B-434, Bell Laboratories, Holmdel, N.J. 07733

Oct. 21-22, 1971: ADAPSO 33rd Management Conference-Annual Meeting; 1st Software Management Conference (concurrently), Brown Palace Hotel, Denver, Colo. / contact: Association of Data Processing Service Organizations, Inc., 551 Fifth Ave., New York, N.Y. 10017

Oct. 25, 1971: Second Annual SIGCOSIM (ACM Special Interest Group on Computer Systems Installation Management) Symposium, Washington, D.C. / contact: I. Feldman, Wiley Systems, Inc., 6400 Goldsboro Rd., Bethesda, Md. 20034

Oct. 25-29, 1971: IEEE Joint National Conference on Major Systems, Disneyland Hotel, Anaheim, Calif. / contact: Institute of Electrical and Electronics Engineers, Inc., 345 East 47th St., New York, N.Y. 10017

Oct. 25-29, 1971: Systems Science & Cybernetics Conference & 1971 ORSA (Operations Research Society of America) Meeting, Disneyland Hotel, Anaheim, Calif. / contact: Dr. Michael W. Lodato, Xerox Data Systems, 701 So. Aviation Blvd., El Segundo, Calif. 90245

Oct. 29, 1971: Sixth Annual ACM Urban Symposium, New York Hilton Hotel, New York, N.Y. / contact: Gerald M. Sturman, Parsons Brinckerhoff, 111 John St., New York, N.Y. 10038

Nov. 1-2, 1971: Computer Science and Statistics: Fifth Annual Symposium on the Interface, Oklahoma State University, Stillwater, Okla. / contact: Dr. Mitchell O. Locks, Oklahoma State Univ., Stillwater, Okla. 74074

Nov. 4-5, 1971: 1971 American Production & Inventory Control Society (APICS) International Conference, Chase Park Plaza Hotel, St. Louis, Mo. / contact: Henry F. Sander, American Production & Inventory Control Society, Inc., Suite 504 Watergate Bldg., 2600 Virginia Ave. N.W., Washington, D.C. 20037

Nov. 7-11, 1971: 34th Annual Meeting of the American Society for Information Science (ASIS), Denver Hilton Hotel, Denver, Colo. / contact: Miss Sheryl Wormley, ASIS, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036

Nov. 16-18, 1971: Fall Joint Computer Conference, Las Vegas Convention Center, Las Vegas, Nev. / contact T. C. White, AFIPS Headquarters, 210 Summit Ave., Montvale, N. J. 07645

Nov. 30-Dec. 3, 1971: Systems '71, Munich, Germany / contact: Andre Williams, BIC-938, Commercial Exhibitions Div., U.S. Department of Commerce, Washington. D.C. 20230

Dec. 16-18, 1971: IEEE Conference on Decision and Control (including the 10th Symposium on Adaptive Processes), Americana of Bal Harbour, Miami Beach, Fla. / contact: Prof. J. T. Tou, Univ. of Florida, Gainesville, Fla.

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

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

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

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

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

May 22-26, 1972: Fifth Australian Computer Conference, Brisbane, Australia / contact: K. Arter, Honorary Secretary, Australian Computer Society, Inc., P.O. Box 63, Watson, A.C.T. 2602 Australia

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

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

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