SCIENCE & TECHNOLOGY
April, 1973
Vol. 22, No. 4

computers and automation and people

COMPUTER INSTRUCTION BY DOING

INVENTORY OF THE 36 ISSUES OF — TITLES AND SUMMARIES

THE NOTEBOOK ON COMMON SENSE, FIRST YEAR

VOLUME 1

1. Right Answers — A Short Guide to Obtaining Them
   A collection of 82 principles and maxims. Example: "The moment you have worked out an answer, start checking it — it probably isn't right."
2. The Empty Column
   A parable about a symbol for zero, and the failure to recognize the value of a good idea.
3. The Golden Trumpets of Yap Yap
4. Strategy in Chess
5. The Barrels and the Elephant
   A discussion of truth vs. believability.
6. The Argument of the Beard
   The accumulation of many small differences may make a huge difference.
7. The Elephant and the Grassy Hillside
   The concepts of the ordinary everyday world vs. the pointer readings of exact science.
8. Ground Rules for Arguments
9. False Premises, Valid Reasoning, and True Conclusions
   The fallacy of asserting that the premises must first be correct in order that correct conclusions be derived.
10. The Investigation of Common Sense
11. Principles of General Science and Proverbs
    8 principles and 42 proverbs.
12. Common Sense — Questions for Consideration
13. Falling 1800 Feet Down a Mountain
    The story of a skimobiler who fell 1/3 of a mile down Mt. Washington, N.H., and was rescued the next day; and how he used his common sense and survived.
14. The Cult of the Expert
15. Preventing Mistakes from Failure to Understand
    Even though you do not understand the cause of some trouble, you may still be able to deal with it. The famous example of a cure for malaria.
16. The Stage of Maturity and Judgement
17. Doomsday in St. Pierre, Martinique — Common Sense vs. Catastrophe
    How 30,000 people refusing to apply their common sense died from a volcanic eruption.
18. The History of the Doasyoulikes
19. Individuality in Human Beings
    Their chemical natures are as widely varied as their external features.
20. How to be Silly
    71 recipes for being silly. Example: "Use twenty words to say something when two will do."
21. The Three Earthworms
    A parable about curiosity; and the importance of making observations for oneself.
22. The Cochrans vs. Catastrophe
    The history of Samuel Cochran, Jr., who ate some vichyssoise soup.
23. Preventing Mistakes from Forgetting
24. What is Common Sense? — An Operational Definition
    A proposed definition of common sense not using synonyms but using behavior that is observable.
25. The Subject of What is Generally True and Important — Common Sense, Elementary and Advanced
26. Natural History, Patterns, and Common Sense
    Some important techniques for observing.
27. Rationalizing and Common Sense
28. Opposition to New Ideas
    Some of the common but foolish reasons for opposing new ideas.
29. A Classification and Review of the Issues of Vol. 1
30. Index to Volume 1

VOLUME 2

31. Adding Years to Your Life Through Common Sense
32. The Number of Answers to a Problem
33. "Stupidity has a Knack of Getting Its Way"
34 and 35. Time, Sense, and Wisdom
36. Wisdom — An Operational Definition

. . . . 24 issues promised, 36 issues delivered, for good measure

Some Comments from Subscribers

I believe these to be the best, if not the most important, reading that I have had this year.
— Harold J. Coate, EDP Manager, St. Joseph, Mo.

Your concept is brilliant, and a welcome antidote to much which is passed off as useful knowledge these days. Keep up the good work.
— Charles E. Abbe, Data Systems Analyst, Pasadena, Calif.

Very good articles; something all managers should read.
— William Taylor, Vice President, Calgary, Alberta

As I am involved with systems work, I can always use one of the issues to prove a point or teach a lesson.
— Edward K. Nellis, Director of Systems Development, Pittsford, N.Y.

Thoroughly enjoy each issue.
— David Lichard, Data Processing Manager, Chicago, Ill.

All are good and thought-provoking — which in itself is worthwhile. Keep it up.
— Richard Marsh, Washington, D.C.

Especially like "Right Answers".
— Ralph E. Taylor, Manager of Research and Development, West Chester, Ohio

Your tendency to deal with practical applications is very rewarding.
— Jeffrey L. Rosen, Programmer, Toronto, Canada

PAST ISSUES: As a new subscriber, you do not miss past issues. Every subscriber's subscription starts at Vol. 1, no. 1, and he eventually receives all issues. The past issues are sent to him usually four at a time, every week or two, until he has caught up, and thus he does not miss important and interesting issues that never go out of date.

GUARANTEE: (1) You may return (in 7 days) the first batch of issues we send you, for FULL REFUND, if not satisfactory. (2) Thereafter, you may cancel at any time, and you will receive a refund for the unmailed portion of your subscription. —

WE WANT ONLY HAPPY AND SATISFIED SUBSCRIBERS.

cut here

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

To: Computers and Automation and People
815 Washington St., R1, Newtonville, Mass. 02160

( ) YES, I would like to try the "Notebook on Common Sense, Elementary and Advanced". Please enter my subscription at $12 a year, 24 issues, newsletter style, and extras. Please send me issues 1 to 6 as FREE PREMIUMS for subscribing.

( ) I enclose _____ ( ) Please bill me.

( ) Please bill my organization.

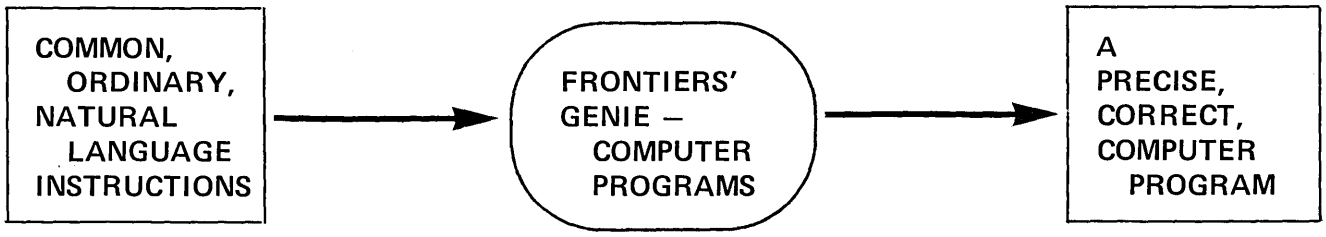
Name _____ Title _____

Organization _____

Address _____

Signature _____ Purch. Order No. _____

ARE YOU INTERESTED IN NATURAL LANGUAGE PROGRAMMING?



We believe we have discovered a set of automatic computer programs (we call them **FRONTIERS' GENIE**) that will take in natural language in the form of common, ordinary instructions for making a calculation regarding an application for computers, and will automatically convert those natural language instructions into a precise, correct computer program. The resulting program will work correctly on several or many sample problems illustrating the application, and an indefinite number of similar problems implied by the samples.

The same methods, we believe, ought to be expandible into many varieties of automatic translation from any programming language, any machine language, and any natural language to any other language within certain broad conditions. We are aware that the current consensus is that such translation is not possible (and not economic even if it were possible). But we think we have found some significant paths around the obstacles.

"The methods and principles of **FRONTIERS' GENIE** have been explained to us. We have seen the evidence offered and the demonstrations so far. Although the scheme is in its early stages, we believe that a significant breakthrough has been achieved, and we see no theoretical barriers to widespread application."

— Edmund C. Berkeley
Editor, *Computers and Automation*

— Jim Cryan and Ed Burnett
Advisory Committee

This discovery, we believe, has considerable implications, to say the least.

We are interested in making a business arrangement with a large, energetic organization, under which we would receive appropriate royalties on resulting sales (estimated to be over $20 million a year), and suitable advances against royalties.

If your organization is interested in further details and in a demonstration, and may be able to market programming in common, ordinary natural language, please write to us, making clear the nature of your interest.

FRONTIERS GROUP
Box 100
c/o "Computers and Automation"
815 Washington St.
Newtonville, MA 02160

Vol. 22, No. 4
April, 1973

Editorial Offices **Berkeley Enterprises, Inc.**
815 Washington St.
Newtonville, Mass. 02160
617-332-5453

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

"Computers and Automation" is published monthly, 12 issues per year, at 815 Washington St., Newtonville, Mass. 02160, by Berkeley Enterprises, Inc. Printed in U.S.A. Second Class Postage paid at Boston, Mass., and additional mailing points.

Subscription rates: United States, $9.50 for one year, $18.00 for two years. Canada: add 50 cents a year for postage; foreign, add $3.50 a year for postage.

NOTE: The above rates do not include our publication "The Computer Directory and Buyers' Guide". If you elect to receive "The Computer Directory and Buyers' Guide", please add $9.00 per year to your subscription rate.

Please address all mail to: Berkeley Enterprises, Inc., 815 Washington St., Newtonville, Mass. 02160.

Postmaster: Please send all forms 3579 to Berkeley Enterprises, Inc., 815 Washington St., Newtonville, Mass. 02160.

Change of address: If your address changes, please send us both your new address and your old address (as it appears on the magazine address imprint), and allow three weeks for the change to be made.

computers and automation and people

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

NOTICE

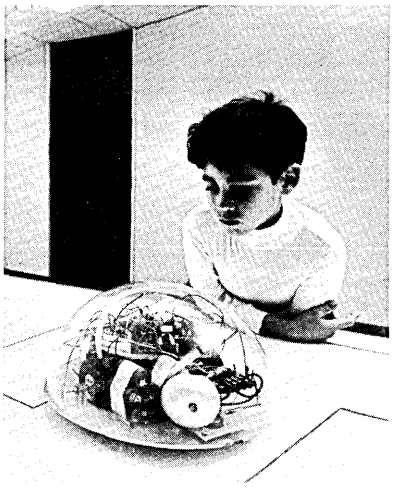
The official name of this magazine throughout 1973 is:

Computers and Automation

We expect to change the name officially as of January 1, 1974, to:

Computers and People

During 1973 from time to time, unofficially, and irregularly, we plan to use the name *Computers and Automation and People* as a way of informing our subscribers and readers of the intended change on January 1, 1974.



Front Cover Picture

The front cover shows a computer-controlled robot "turtle," which has been programmed to traverse a maze. The movements of the turtle are controlled by simple programs which children write for themselves. This research is part of a long-range project at Bolt Beranek and Newman Inc., Cambridge, Mass., aimed at bringing computers into the classrooms of elementary schools.

Departments

Key

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

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.

EDITORIAL

The Problem of Truth

St. Peter: (wearing a halo and sitting at the left hinge post of the Pearly Gates) Thou shalt not bear false witness. That's what I say.

Lucifer: (with his wings folded, sitting on a stone farther outside) I know, Pete, that's what's in the Good Book. But if you see a girl with a rip in the back of her dress – you don't tell her – you let her find it out when she gets home.

St. Peter: (dogmatically) There is only truth on the one hand and lies on the other, Lucifer, and I let truth through the Pearly Gates and I keep lies out.

Lucifer: Oh, Pete, Pete, wake up! That is so old-fashioned. What is true changes from generation to generation and from person to person. The Catholic Church tortured Galileo until he once more said that the sun went round the earth. And in these days the physicians have literally proved that one man's meat is another man's poison: did you never hear of allergies?

St. Peter: (stiffly) I have heard of eulogies, Lucifer. In fact, I have listened to some of them.

Lucifer: No, St. Peter, allergies. One man sneezes and sniffles from August to October from ragweed pollen in the air. The next man does not. That is an allergy. And individuals are different. What is bad, allergic for one man, makes no difference whatever to another one – he does not sneeze and sniffle.

St. Peter: (hesitating a bit) Well, Lucifer, even if there is some doubt about truth, I am against lies.

Lucifer: Pete, there are all sorts of lies. Of course, many lies go to hell, especially those that get found out. But how would a businessman sell a new product unless he made some glowing promises? How would revolutionists make a new society unless they held forth some golden visions? How would people have an opportunity to elect a progressive liberal or a staunch conservative down there on Earth (Lucifer points) without making some deals which the candidates conceal or deny? How would a president stay in the White House of the United States if he told the truth about all the bribery, burglary, eavesdropping, wiretapping, etc., he had been involved in and the connection of so many important politicians with it? Nowadays, truth is irrelevant. Beliefs, images, headlines, that's what counts.

St. Peter: Lucifer, lies is lies – even if that is ungrammatical.

Lucifer: I think you are almost hopeless, St. Peter.

Archangel Michael: (wearing no halo, coming out through the Pearly Gates, and observing the situation) What is all this discussion I hear? Peter, you look as if you had been losing an argument to Lucifer.

St. Peter: It is this way, Michael: Lucifer says truth is old-fashioned, not important, not relevant. Now I am for truth and I am against lies. But, to tell you the truth, Michael, that fallen angel Lucifer is confusing me.

Arch. Michael: (gladly taking part in the discussion, and sitting down at the right hinge post of the Pearly Gates) Granted that it is hard to distinguish truth from falsehood, still that is no excuse for not trying. Granted that what is truth often changes from generation to generation, still that is no excuse for not seeking the truth.

Lucifer: You can't prove that, Michael. That is just an assertion about the relation of truth to people – I should say, the relation of imaginary beliefs classified as truth to real existing persons trying to stay alive from day to day.

Michael: And how do people stay alive from day to day, Lucifer?

Lucifer: By solving problems, finding food, finding shelter, avoiding sickness, working with other people to make things they all need, and so on.

Michael: And if everybody were always telling lies to everybody else, would they be able to work together?

Lucifer: (aside) Hell! I must not argue with that angel – I can't win an argument if I have to answer questions. I am getting into hot water. (aloud to Michael) I refuse to answer the question. I plead executive privilege and national security, like the president of the United States. The business of hell cannot be managed if the executive in charge has to answer questions.

Michael: So you refuse to answer?

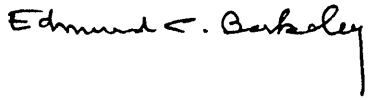
Lucifer: No comment.

Michael: (turning to Peter) Well, it is this way, Peter. Nobody can solve problems without trying to get the truth. Lies, falsehoods, statements that are not completely honest and true, do harm. They interfere with the solving of problems. Of course most problems are hard to solve. Of course most people have a lot of hard work ahead of them trying to get good answers that are verified in the real world. To get the truth is a most important process, and everybody should and must cooperate. To refuse to answer questions on the ground of national security or executive privilege is the earmark of the devil, Satan.

Lucifer: (his face black with rage) Don't you dare call me Satan – that's "instant analysis" and you insult me – I'm leaving to go to hell. (Lucifer abruptly flies off downward; Michael and St. Peter look after him)

Michael: (after a pause) To tell the truth, Peter, there are some exceptions to answering any question truthfully. One of them is this: if you are an investigative newsreporter, and your sources of information are confidential, then you have to refuse to reveal your sources.

St. Peter: (much relieved) Michael, thank you very much for helping me with that devilish argument. (They pass in together through the Pearly Gates)



Edmund C. Berkeley
Editor

Good Management of Computer Operations:

1. Managing Software Work: It Can Be Done

2. Data Bases: There Really is a Better Way to Manage Your Files

ADL Systems, Inc.
A Subsidiary of Arthur D. Little, Inc.
Acorn Park
Cambridge, Mass. 02140

Part I. Managing Software Work: It Can Be Done

"I don't think you can really manage software. It's like going off a diving board – you just have to hope."

Many senior executives share that feeling with the vice president of a steel company who used it to describe his view of software.

But the analogy is apt in two ways, and it indicates in fact that software management can be a highly developed skill.

First, because we know there is a vast difference between the rank amateur whose venture off a high board is at best chancy, or the natural athlete whose innate capabilities enable him to dive relatively well, or the Olympic champion who supplements his basic skills with constant concern for improvement and application of technique. Talents, attitudes and efforts might vary among these three – but they are in fact controllable and directable towards specific goals.

Second, our diving analogy points up the single most important factor in managing software: people. Unlike other forms of production which have a variety of elements to control, software production is exclusively rooted to the output of people.

In this issue of *The Casebook*, then, we will consider some of the structures, styles and techniques by which senior managers can improve their performance off the software management high board.

It Starts With An Attitude: Mature and Informed

Sufficient millions of lines of code have been written so that it no longer should seem remarkable when a program is written and works well. Software has matured as a discipline and as such is as manageable as any other production system. Yet our observations indicate that many senior managers, like the steel company executive, are still ambivalent about that fact. Their ambivalence often conveys a subtle but *de facto* standard to the software staff – that miracles are still possible.

A preferred attitude is one in which performance to stated standards is expected, and that deviation from those standards is a cause for concern and not an expectation.

A component of developing such an attitude is for senior executives to be well-informed. Software is a technical activity which requires management with the technical ability to establish appropriate initiatives and monitor activities in a knowledgeable fashion. Experienced management can quickly sense problems, lay down and adhere to "no surprises" guidelines, appreciate what is (or is not) being done, and lead the way in new directions.

This level of being informed is not nearly as difficult to reach as it might seem. We have been amazed at the number of senior managers who have come from non-computer backgrounds into positions of responsibility for software management and within several months have been fully able to manage effectively a large and complex software activity.

These executives have brought two attitudes to their new responsibilities – a commitment to active participation in their new role, despite the learning-curve problems implied by it, and a basic experience in applying conventional management techniques to the software problem. Active participation is a self-generated attribute, but the application of management techniques does require some modification in terms of software management.

What are some of these modifications, and how can a senior executive structure and apply them to his area of responsibility?

There are basically five stages in the execution of software projects, and in each there are many opportunities for management control. These five stages include:

- The systems plan
- Development of functional specifications
- The systems design stage
- The detailed design stage
- The implementation stage in which coding, testing and conversion to production is completed.

Let's look at each stage from the viewpoint of a senior manager, and isolate those factors in each which enable management to exercise its maximum control.

The Systems Plan: A Product Is Developed

This is the first step in creating a productive software entity. It is necessarily broad – establishing overall targets, the major application to be developed, the stages of that development, and the allocation of personnel and equipment resources to get the job done.

This is the first opportunity for management control, and demands maximum participation to understand, from the user department's point of

view, what is needed. In this stage, management can match resources to need, set priorities and authorize resources. Too often, however, systems plans are developed as a "general understanding" among various people, rather than as a specific document. If your systems plans exist in such a manner, you can be certain that different people have different "understandings," with predictable consequences.

Insure from the start that the product to be developed is clearly defined, with specific understanding by all concerned of the purpose and use of the system. In developing a written plan, be sure, too, that it is reviewable. That is, insist that it has built into it sufficient clearly identifiable milestones that progress can be reviewed objectively on a regular basis.

Such milestones imply development in major phases, and within each phase, sufficient detail to allow management to make good decisions based on complete information. Without cost, time, staffing and progress details, the senior executive is stymied, for he cannot review and decide on the basis of facts.

The precept of creating *reviewable* work plans extends into every other stage as well:

☐ **Functional Specifications**
This stage defines the system *from the user's point of view*, and includes outlines of inputs, outputs, major processing steps, and files. It must also include definition of both the development and operating requirements which the user will accept.

☐ **Systems Design**
This is the stage at which the user's specifications are converted to structures which can operate within the computer's capabilities. Details of the input, output, file structure and processing techniques are established, and the software techniques selected. It also sets forth the detailed schedule, and the equipment needed for system operation. In a sense, the systems design stage is the counterpart of an architect's design for a building after the basic structure has been approved. It sets forth the details and limitations within which the user and computer must work.

☐ **Detail Design and Implementation**
Just as the architect prepares engineering drawings and construction planning details, the systems designers must develop detail file designs, program flow charts, and perform coding, unit testing of finished programs, and finally testing of completed and integrated programs. These steps take place in the detail design and implementation phases. And it is usually at this point that improper planning starts to show up. If you have to add an additional floor to a half-completed building, you are bound to have problems. So it is with software development. Only computer systems are not as tangible as brick and mortar, so the problems are often elusive.

The Management Key: Minimize Uncertainties

As work progresses, there are numerous opportunities to anticipate and manage problems. One such opportunity is in the area of testing. There is a rule-of-thumb that states that 90 per cent of the processing requires 10 per cent of the code, and 10 per cent of the processing requires 90 per cent of the code. If your software testing seems to be progressing well, it may be that it is only "mainline" testing – of the broad ten per cent which is routine. Insure that unit and final testing covers the acute problem conditions of the system; if this is done, and tests out well, a major problem area will have been minimized.

Another control element is continuous and careful documentation as work progresses. This not only minimizes personnel fluctuations, but insures development of the proper blueprints before the bricks, boards and bulldozers arrive at the construction site.

Milestone Reporting: Memos Make It Easy

At each stage of development, if a careful systems plan was developed, there will be numerous milestones indicated. To simplify management review, a system of regular reporting on accomplishment of these milestones should be established and adhered to. Often, a system of memo reports can cover most of the minor milestones. More elaborate reporting is suggested for major achievements in which complex integrations are involved.

The goal of documenting and reporting on small-unit achievements is to make systems development as people-independent as possible.

In establishing detailed project plans, then, it is vital to have schedules and budgets that are realizable, and measurable against reality. Bar charts, network charts, and numerous other methods are used for plotting progress.

By breaking tasks into identifiable segments – no one of which represents more than 2-4 per cent of the total – you can avoid the trap of thinking that because 80 per cent of the budget has been expended, 80 per cent of the work has been done.

Anticipate the User's Situation

This is the most critical step in systems development. User expectations and needs will evolve, especially in projects which require lengthy development or involve numerous departments. Thus it is crucial that the data processing department finds out exactly what the user wants, specifies it to his satisfaction, and gives it to him.

In this process, user involvement is mandatory. Have him review specifications, look at sample outputs, and stay informed. Too many organizations attempt to develop a system based upon preliminary user information which they then shape and project as they see it, only to find when the job is completed that it is not at all adequate or desirable for the user department.

In this process, it is important to remember that the user frequently does not know or is unable to specify exactly what he wants – just as an architect's client is often unable to define the elements of the building he desires.

The challenge for software management, then, is to help him translate his needs openly, to support him as he does so, and to establish from the very start a workable, manageable, reviewable program to which he and the systems developers can commit.

Without such sensitivity and planning, the process of software development becomes an expensive and sterile exercise.

Data Management And Data Communications Challenge EDP Users

Our current activities indicate an increasing interest by computer users in two popular but challenging topics – data management systems and data communications.

In data management software, clients are encountering difficulty in determining when and when not to use systems that facilitate the storage and retrieval of information from complex files. Numerous software packages are available, but it is often difficult to assess the potentials and limitations of such systems. The principal problems center around file structuring, devising updating and retrieval modules and in throughput and recovery needs.

In data communications, a host of newly available software to provide message handling and support functions is also being marketed. Clients

have expressed concern that the use of such systems, while reducing development costs, is extravagantly costly in terms of resource requirements. They have also been concerned with implementing front-end preprocessing systems, built around minicomputers, because of their lack of knowledge of the problems inherent in such systems.

ADL Systems has had deep experience in both of these areas, having developed some of the nation's most intricate data management and retrieval systems, and elaborate data communications systems for over 20 clients. If you are investigating problems such as these, we would be happy to discuss them with you. Simply check off the appropriate box on the reply card if we can be of assistance.

Part 2.

Data Bases: There Really is a Better Way to Manage Your Files

"We became so bogged down with file changes that frustration led us to look at data base systems. It meant some pain, but we were pleasantly surprised with the results."

More and more senior executives share the view, expressed by the finance vice president of a Connecticut manufacturing firm, that data management systems are finally paying their way.

Like the Wright brothers' pioneering efforts, early data base systems were meticulously conceived and implemented but never developed much lift when applied to the practical realities of processing large files that had to be sorted, indexed and stored with live data.

Although memories of these earlier models still linger, today's data management – or data base, or data base management, or information management, as you prefer – systems have passed the prototype stage, and are in use at hundreds of sites.

What do these systems do? What are their characteristics? And how do you determine if they might be appropriate for use in your installation? In this issue of *The Casebook*, we will address these questions to provide a framework for your planning.

Many Parts Form A Whole

The data base system is relatively easy to understand. It consists principally of three parts that emphasize a single function: the efficient management of files of information.

The term *data base* refers to just the information file. *Data base software* is the set of programs whose function is to manage the data and the programs that operate on it. The *data base system* is the entire hierarchy of elements, files and applications programs that result in efficient management of information.

In its most basic form, a data base consists of a number of *data elements*, each of which is a unit of data that is complete in itself. A part number, for example, is a typical data element. These elements are organized into logically related groups called *data structures*. A common data structure is a part number, its description, its supplier code, and its inventory status.

Information files, or data files, are composed of a large number of data structures of the same type – for example, all of the parts data for a family of products.

The difference between data base systems and conventional files can be seen at this point. The data files in a data base system are organized in a fashion that permits their use in several applications, rather than a single application. Thus, in data base systems, the focus shifts from a particular application and its specific input and output needs to a more general requirement for the data files to serve a number of applications.

Take the case of the manufacturer of the product whose parts list is referred to above. Normally, the final products are made from many parts and subassemblies. In conventional systems, parts information would reside in several physically separated files – one for inventory control, another for warehouse location, another with pricing schedules, a fourth with vendor codes, and still another describing subassembly usage. A change in the data for any part would require modification of all five files. This is a common experience for thousands of computer users today.

With a data base system, all of this data is organized in a single file. Particular applications – such as inventory, engineering specifications, order handling and pricing – all use the same file, each selecting from it the information needed, often through a complex cross-referencing scheme using indexes, keys, and sophisticated software routines. Other examples of data base systems are cited in Figure 1.

SOME EXAMPLES OF DATA BASE SYSTEMS

- ☐ An automobile manufacturer is using data base systems for a dealer information system.
- ☐ An auto parts manufacturer uses a file management and reporting system for an order processing and inventory control system. The data base software has greatly facilitated the preparation of many one-time reports.
- ☐ Another large machinery manufacturer with extensive job-shop operations has developed an on-line system using data base concepts for the preparation of work orders and machine scheduling.
- ☐ A shipping firm is using data base systems to maintain information about ship movements, cargo, dock requirements, and space allocation.
- ☐ A bank is using a data base systems approach for a corporate client information system.
- ☐ Several insurance companies are using data base techniques for policy holder information systems.
- ☐ ADL Systems has developed a major system for the detailed structural design of naval ships, using a data base and program management system developed by us.

Figure 1

The logic of this central file concept seems indisputable, to the extent that one might wonder why every computer system isn't so organized. There are many positive and negative factors involved, however, and senior executives should be aware of them.

Let's Look At The Pros and Cons

Advocates of data base systems point to five major advantages that these systems offer over conventional processing techniques:

- ☐ **Program development** – Special file management software can simplify application program development by performing automatically many routine I/O and "housekeeping" software functions.
- ☐ **File structures** – Sophisticated file structures offer powerful cross-referencing capabilities that eliminate redundant data and make possible fewer files.
- ☐ **System design** – With data base systems, far fewer "overhead" programs for use with specific applications are needed. This cuts down on sorts, merges, file extracts, duplicate updating of files, and scanning of files.

☐ **Operations** – Data base systems usually require fewer files and programs, meaning less set-up time and less external manual management of programs and data, with potentially streamlined operations.

☐ **Flexibility** – A major advantage cited by data base proponents is the ease with which changes in data elements can be implemented in such systems.

There is a debit side, to be sure, and some of the cautionary factors to consider in data base evaluations are significant indeed:

☐ **Equipment** – Usually a significant amount of additional hardware – mostly memory and random access storage – is needed to support such systems.

☐ **Software** – Much more complicated software is required to manage data base files. Some of this can be purchased, but sophisticated skills are needed to use and maintain it.

☐ **Design and Start-Up** – Aside from being new, data base concepts are inherently complex, requiring a broad approach and very careful attention to planning, details and service goals.

☐ **Processing efficiency** – The nature of the file techniques implies that individual accesses to data elements must be made. These accesses, moreover, are often controlled by a hierarchy of indexes and keys, resulting in somewhat slower overall processing speed.

To generalize, data base systems can be a major help to users with large file management and updating problems, high demand for one-time accesses and a large volume of changing retrieval needs. They probably are not a viable approach for the small-scale user, or for an initial implementation effort.

Data Base Software Can Help

Specialized software can be a big help in implementing data base systems. A number of software products are commercially available to take on the basic tasks of program management, data access and related file management functions. Such software generally has the following capabilities:

- *Data Definition Language.* This fundamental capability defines how records will be logically connected and how and where they will be stored, enabling the system to generate index tables that support the automatic retrieval feature which is at the heart of data base software.
- *Access Language.* A user-oriented, easy-to-use method of retrieving arbitrary combinations of data elements, enabling users to access just the data required for a particular processing task.
- *Output Report Language.* This is used to establish quickly and easily the format of reports which list and summarize selected data retrieved from the data base.
- *Program Management.* A feature that coordinates the operation of particular application modules written by the user to operate on the data base, such as making updates, specialized analyses, etc.

Besides these basic capabilities, data base software may possess checkpoint/restart capabilities, security features, the ability to operate in both an on-line or batch mode, and various facilities for performing housekeeping functions on complex cross referenced files.

Packages differ widely in the degree to which they possess these capabilities and their relative efficiency. Indexing, for example, has traditionally been a huge consumer of machine time and software overhead. Yet the need to establish "pointers" which permit the cross-referencing of data from one file to another is fundamental in a data management system. An analysis of pointer indexing techniques can help a user assess, in the selection process, the likely indexing overhead factor he will later contend with in a processing mode.

It is also important to assess the capabilities of data base software to manage applications programs and the processing of transactions. Multithread processing of different transactions and the re-entrant management of the applications modules can do much to improve the efficiency of the system, but they may create certain internal interlocks.

Which Way To Go

Selection of the proper data base software depends to a large extent on your type of EDP operation and the priorities in terms of file organization and access dictated by your requirements.

There are three major features to consider in the selection process:

- *Complexity Of The Data Base.* This factor considers a system's logical capacity to handle complex cross-referenced file organizations. Some systems handle only a moderate number of simple files; others can handle several full network files.
- *Inquiry Capability.* This defines the ease with which a user can search or retrieve from a file. Some data base software systems possess rigidly defined inquiry languages, while some allow free-access inquiry, using almost vernacular English.
- *Throughput Or Response Time.* The speed of access to files and records, and the number of simultaneous inquiries possible, is a critical feature. Many packages allow only a single user inquiry at a time, while others permit several. Response times also vary widely. Some packages are for on-line use, while others operate primarily in a batch mode.

As Figure 2 suggests, every real data management system possesses these three dimensions. But there are trade-offs. The capabilities of any one system are often weighted towards peak efficiency in just one or two of the dimensions. In practical terms, then, a user must be willing to sacrifice efficiency in one or more functional areas in order to maximize efficiency in others.

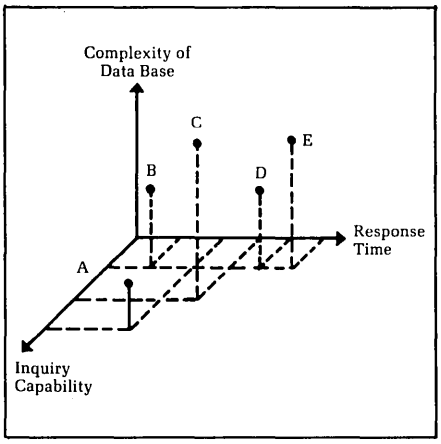


Figure 2. Data base software systems involve some trade-off within their three principal functions, as shown in this three-dimensional representation. Package "E", for example, offers excellent response time to a complex data base, but has poor inquiry capability.

Users of data base software should recognize that they will have to bend their approach to the structure of the package used, rather than modifying it to meet their desires. This stark statement is based on economics. The cost of developing data base software ranges from ten to 50 man years of effort, and involves exceedingly complex logic and programming steps. To attempt modification of existing software to make it more responsive to specific user needs is a burden few are able to justify.

Users must generally accept and adapt their standards to what is commercially available. More are doing so every day – some by using data bases for only a single major application; others by committing the entire direction of future programming and systems work to a data base management environment. □

Automation: Its Impact on the Delivery of Health Care

Ray M. Antley, M.D. and
Mary Ann Antley, M.A.
Indiana University Medical Center
1100 West Michigan St.
Indianapolis, Ind. 46202

"Many factors have combined to create a condition that necessitates the general use of automation in medicine."

Developments in technology in concert with recognition of the need for expanded medical care and compounded by the existent doctor shortage are powerful interacting forces that will structure the future application and development of automation in medicine. These forces will tend to channel technological application toward assisting the primary physician in the delivery of health care. Furthermore, the evolution of technology is such that the assisting phase will be transient and machines will be developed which will do what the physician does now. These innovations seem remote today, when only representative machines exist, but once these changes begin, they will develop quickly and the resulting readjustment in physicians' job function will be chaotic unless these changes are anticipated in medical education at this time.

Health Delivery

In the next two decades, health delivery will be approached by the application of automated processes which will perform tasks which are now carried out only by the primary physician:

1. The trend toward comprehensive third party payment medical service through either prepaid group health such as Kaiser-Permanente, or Federal Health Service, encourages large group practice situations that would make it economically sound to use computer technology;

2. Automation offers a readily utilizable solution to the chronic need for medical manpower;

3. The rate of increase in the number of efficient systems for aiding the physician in history taking, physical diagnosis, and diagnostic tests anticipates the widespread incorporation of these machines into health delivery structures.

4. The prospects of storing and processing medical data for over 60 million people causes politicians, administrators and physicians to look to automation as a solution for handling billions of bits of information.

It may be postulated that, as in other areas where technology has been extensively utilized, the adaptation of various services to computer technology will result in radical changes in the appearance and presentation of these services. The use of automation will also allow for second and third order changes in affected areas by the elimination of some jobs and the creation of others. It is necessary to anticipate the basic nature of these changes which the general use of computer technology in medicine will bring about so that the medical profession can realistically plan for medical education and health care delivery in the future.

Group Practice Encourages Medical Automation

Many factors have combined to create a condition that necessitates the general use of automation in medicine. Since World War II there has been a growing trend toward group practice in the United States. There are at least three reasons for this trend: medical specialization; the physician's desire to create a more satisfactory working situation for himself through group practice; and the public's demand for help in obtaining comprehensive medical care through some form of group health.[1] This demand for help has resulted in the public's participation in various health insurance programs, in the successful pre-paid medical care offered in the Kaiser-Permanente Plan, and in projected government financed comprehensive health service (National Health Insurance). These group health plans which are designed to enable the delivery and maintenance of better health for more people economically, encourage large clinic-type organizations. Since it is not unusual for a person to live as far as an hour away from his work, the idea of driving an equal distance to see a doctor makes the center-type practice an acceptable reality for patients. Clinic-

type medical practice is also in the ascendancy in the medical profession because it allows for more specialty care in fields of steadily increasing complexity. Large clinic practice situations make the introduction of computers economically realistic because of the shared expense and the central availability of the machines to many physicians. A major problem of the practicing medical doctor today is record keeping. Some physicians estimate that they spend one-half of their time filling out insurance forms and recording their findings. The record keeping for a group can be done more efficiently by machines, and the larger the number of clinics to be administrated, the less expensive and more necessary this service becomes. The burdensome problem of manually kept records, the adaptability to center practices, and the attractiveness of shared expenses will continue to encourage the introduction of automation into the administrative aspects of medicine.

Physician Shortage Demands Innovative Solutions

Underlying the physician's reasons for the growth of group practice, i.e., the desire to provide excellent specialty care and to plan his hours, one finds a very basic problem — the shortage of physicians. An AMA survey conducted in 1966 showed that this overall shortage is accentuated by the two to one frequency of medical personnel in urban areas at the expense of rural communities.[2] The majority of group practices at this time are not even located in the inner city or in rural areas — areas where the need for physicians continues to rise. This unequal distribution of manpower tends to negate any superficial gain in total number of physicians which can be shown from an increased enrollment in medical school. Even in prosperous suburbia, alternating night calls and weekend responsibilities are merely ways of insuring that the physician has some blocks of free time; they do not reduce the number of patients to be seen. When an increased supply of doctors and a reorganization of their work situation fails to bring about a meaningful improvement in the basic problems of physician shortage and work load, an investigation of available innovative measures is in order.

Doctors' Assistants

The use of doctors' assistants to perform semi-skilled functions that the doctor does today has been initiated by some physicians, and there are several active training programs at this time. Training programs have been designed to insure the acquisition of specific skills in obstetrics,[3] pediatrics,[4] and surgery.[5] Acceptance of these trained doctor's assistants by patients and the medical profession has been positive.

While it is anticipated that paraprofessionals would help solve the problem of the physician shortage, it is doubtful that their use would significantly reduce the cost of medical care. Two trained aids could demand salaries comparable to one physician. The word demand is especially appropriate here because whereas the physician, as a professional, has hesitated to strike, it may be foreseen that paraprofessionals will organize themselves to acquire better working conditions.

Automated Medicine Today

As a second innovative approach, the medical profession has looked to automation, which has been used so effectively in industry and business to increase production while reducing manpower. Automated histories, physical exams, and diagnostic tests have been devised which are capable of helping the physician deliver better medical care to more people. These systems, properly directed, can even replace the physician himself. Let us examine the machines available at the present time to help the physician give better medical care.

Medical History: Programming Insures Completeness and Retrievability

In the area of history taking, several low cost computers have already been successfully introduced. Slack et al[6] have reported the use of an inexpensive computer (Linc) with a computer terminal and cathode ray display tube which takes a detailed allergy history directly from the patient. The program contains 700 possible questions and statements. If a question is answered in the affirmative, a subset of questions follows. If the question is answered negatively, a question from the next major category appears. When a question cannot be answered, an alternative set of explanatory questions is asked. Each question must be answered by the patient before the next question appears. Using this format, a detailed allergy history can be obtained in about twenty minutes. A second workable automated history system has been described by Grossman and associates.[7] Once again, the history is obtained by means of a dialogue between the patient and the computer through a teletype terminal, and the patient's response to each question determines the next question. A third automated medical history system now in use at the Mayo Clinic has been reported by Mayne et al.[8] In all of these systems, the computerized history has been compared favorably with that taken by the individual physician. In fact, in certain areas, the peculiar abilities of the media make an automated history highly desirable. The breadth of the work-up and the objectivity of the data collection found consistently in automated histories are not present in those of the physician.[7,8] Grossman et al[7] postulates that "history taking as used by most physicians is to corroborate an hypothesis and more importantly to develop management and disposition plans for the patient".[7] The automated history is also more readily interpretable by another physician because of the uniformity and clarity with which its data is presented. The computers which have been developed to obtain these histories are capable of both data collecting and processing so that in this one area, it is possible to install the computer and completely eliminate the physician from taking routine histories. This would give the doctor more time for other areas of work, would allow him to concentrate on patient adaptive processes, and would result in uniformly careful data collection that is easily retrievable.

Physical Examinations: Machines Offer New Structure

Automation of the physical examination thus far has been limited to programmed physical examination for entry of the results into the computer. Kanner[9] has developed a branching questionnaire which the examining physician can expand from about 20 entries for a normal person to 1753 potential answers. This approach permits efficient use of the physician's time, while insuring a systematized physical examination that is recorded in a uniform pattern. This information in digital form is automatically available for data processing leading directly to a differential diagnosis. Statistical analysis of the information in the uniform data bank permits critical auditing for quality control of medical care. The former, coupled with the automated history taking, can assist the physician in the direct development of a treatment plan. The latter will permit

the delegation of the physical exam to paraprofessional individuals.

New, Scanning, Detection Devices

From these machines which help the physician record a better physical examination within the traditional system, we can go on to examine the possibility of machines that can eliminate the physical examination as it is presently conceived. For example, there are detection devices which could be harnessed to additional hardware for routine body scans. Sonar, with the power to discern a 1 mm irregularity in a smooth surface, is a number one possibility. For physical diagnosis this scan could be mounted on a contraption which would systematically scan the chest and abdomen of a patient who positions himself on the examining platform. The program would adjust the scanning procedure to the patient's body size and contour. Erickson and Brill[10] have already reported the digitalization of ultrasonic images. Software development for the analysis of digitalized ultrasonic images might be developed to discern the size of the visceral organs like the liver, the kidney, the heart and the spleen. In addition, there are other sensors such as a detector of thermal emission which would systematically traverse the body's surface, measuring difference in heat emission. From this data, inference could be made concerning normal and abnormal blood flows. A gastro-intestinal radiosensor has already been developed which can measure pH and gut motility.[11] Its signals can be monitored remotely and the signals directly transmitted from computer entry and analysis. An automated, expanded SMA can measure numerous serum electrolytes, proteins, and enzyme levels. The results from the SMA can be sent straight to the computer for evaluation as well as storage. Each of the diagnostic systems enumerated above are capable of producing electrical signals which can, in theory, be processed by the computer. With the development of analysis programs for each of these automated systems, the potential exists for detection of a more basic patho-physiology than any presently executed physical exam. These systems would be capable of automatically instructing the patient without medical personnel. They are not only able to replace various aspects of the physician's traditional physical examination, but their approach is capable of detecting a more basic cause of the disease.

Differential Diagnosis: Computers Aid Decisions

Differential diagnosis is another area where machines have been designed to help the doctor do a better job. As the body of information to be brought to any diagnoses has multiplied, the physician has had to master an ever-widening set of facts. The doctor's recognition of the increasing complexity of accurate diagnosis and treatment may be seen in the large percentage of physicians who choose to enter specialty practice where there is at least a potential for keeping up. For example, in 1900 when a patient was diagnosed as having dropsy, the physician had only one decision to make: how much digitalis leaf to prescribe. Today, the finding of pedal edema is only the beginning of a complex dicision-making process. The physician must determine if the fluid accumulation is due to congestive heart failure, renal failure, venous obstruction, or lymph channel obstruction. Determining the abnormally functioning organ is not enough; further pursuit leads to a subset of diagnoses with their unique form of treatments. The plan of recommended therapy has frequently changed in the past five years or less. Obviously, the once simple skill required for diagnosing and treating dropsy has mushroomed into almost a subspecialty.

Storage of Information

The computer's skills are peculiarly adapted to aiding the physician in the practice of modern medicine. It is able to store a large body of information in a manner that is easily retrievable and to quickly process new facts. Such a readily available source of information can be an invaluable aid to the physician in arriving at the causes and treatment of disease.

Baumeister[12] has graphically shown how this technique can help establish a surgical diagnosis. He emphasizes that the use of the computer forces the surgeon to follow a logical procedure in gathering diagnostic information. He further suggests that the computer checklist can help prevent precipitous surgery which may occur when a patient presents an acute abdominal pain. The computer, with its total recall of the differential diagnosis and with its application of statistical methods, increases the rigorousness in the diagnosis and lessens the opportunity for error.

This aid in decision making may be seen in the development of a program for electroencephalogram (EEG) analysis to diagnose brain injury. Here, an apparently healthy patient's complaint of difficulty in concentrating months after a head injury may be dismissed as neurotic by the conscientious physician but the computerized EEG analysis indicated that in the affected area there is a detectable contingent negative variation depression. The organic causes for the complaint will influence the doctor's decision as to the recommended treatment.[13]

Thus, it may be seen that the need for additional manpower and for aid in utilizing the burgeoning body of medical knowledge, coupled with today's tendency to "think technology" when problems of efficient delivery of services arise, will naturally lead to the increasing utilization of mechanical aids which have already been developed and which will continue to be improved upon. Just how extensively they will be used is more difficult to predict at this time.

Independent Diagnosis by Machine

It has also been shown that some of the machines which are now used as diagnostic aids can be readily adapted to make independent diagnosis in ways so different from the traditional approaches that what was done before becomes unrecognizable. These new approaches allow for second and third changes in health care as we now know it. Just as the greatest advance in radio technology was not achieved by making a better radio tube but by developing the transistor, so the most effective uses of computer technology in medicine will not come from computers which are designed to imitate the work of the physician as it is now carried out, but from machines which are designed to achieve basic medical goals in ways peculiar to their own abilities.

For example, if automated processes are developed which diagnose viral hepatitis directly from an SMA analysis with 99.7% confidence, then the necessity for the physician to determine the size of the liver by palpation may be superfluous. If treatment is prescribed without a physical exam (and often diagnosis itself may be bypassed for treatment[14]) then the structure of medical practice is in for major reorganization. The central focus on the importance of the physician's powers is removed when a technician or the patient himself can administer these machines.

Doctors' Roles Redefined by Technology

A proliferation of machines in medicine will effect a readjustment of the medical personnel and a reorientation of physicians so that what we will find is differently educated physicians doing different tasks in what are now unfamiliar situations. Obviously, when we acknowledge that we are working in an environment that is subject to rapid change, in which not only the means of health care but the goals themselves remain highly fluid, we must recognize that the present emphasis on an accumulation of data to be applied in specific ways in specific circumstances will be meaningless for the majority of the doctors that are being trained today.

As a result of automation, the factual history taking, physical examination, differential diagnosis and even the recommendation of treatment will no longer remain the sole prerogative of the physician.[15] With these previous areas of expertise largely relegated to computers, the physician will be called upon to redefine his role.

The redefinition of his role will necessitate a change in degree of his presently accepted skills. New skills will need to be developed in computer science, in administration and in counseling.[16] The development of software for the application of automation to medicine will be heavily dependent upon a segment of physicians who are trained in computer skills. Perhaps most medical academicians of the future will find themselves employed in research related to the utilization of computers in health delivery care. Already it is widely recognized that to practice medicine either privately, in a group, or in a large medical complex requires managerial skills.[16,17] As the practice of medicine becomes increasingly center-based, the need for physicians who can organize medical activities, delegate responsibility, and balance budgets is conspicuously increasing.

The Counseling Role

The counseling role of the physician has long been emphasized in the art of medicine. The ascendance of this role as a result of automation is natural. However, the change which this will require in the presently trained and practicing physician is brought into perspective by comparing the portion of medical education which is devoted to diagnosis and treatment with the portion devoted to developing the doctor's communicative skills. The degree is so great that it is practically different in kind. The role of the physician as counsellor and emphathetic helper, readjusted in relationship to the special needs of automation, will be the primary activity of the majority of clinicians in an automated world.[18]

In the aggregate, these changes emphasize both new technical competence which physicians as a group will be called upon to demonstrate, and antithetically, less training in specific skills, especially traditional ones of data collection, collation and processing for a differential diagnosis and treatment.

Today's Medical Education May Be Obsolete

Medical education therefore in the future must be geared to identification of these changes which can be anticipated and to preparing doctors to increase the adaptiveness of their response to changes which cannot be anticipated at the time of their education . Yet, what plans are being made on medical school campuses today in anticipation of these needs? Virtually none. While lip service is given to the idea that the doctor of the 1980's will fulfill different roles from the doctor in 1972, students continue to be trained in the same basic manner that they were trained ten or even fifty years ago, interns continue to pride themselves on the number of syndromes they can recite, and residents commit themselves blindly to three to seven years of post-internship training in traditional specialties, specialties that may be obsolete before they enter practice. Considering the length of time necessary to educate a physician, and the rapidly expanding integration of machines in medicine, it is imperative at this time that the entire present system of medical education undergo extensive reexamination and reevaluation.

Automation in medicine is no longer a fantastic speculation today; it is real.

References

1. Code, C. F. "Determinants of Medical Care — A Plan for the Future." New Eng. J. Med., 283:679-685, 1970.
2. Wilson, V.E. "Rural Health Care Systems." JAMA, 216:1623-1626, 1971.
3. "The Use and Training of Auxiliary Personnel in Medicine, Nursing, Midwifery and Sanitation. WHO Techn. Rep. Ser., 212:3-26, 1961.
4. Silver, H.K., Ford, L.C., Stearly, S.G. "A Program to Increase Health Care for Children: The Pediatric Nurse Practitioner Program." Pediatrics, 39:756-760, 1967.
5. Smith, R. A., Bassett, G. R., Markarian, C. A., et al. "A Strategy for Health Manpower." JAMA, 217:1362-1367, 1971.
6. Slack, W.V., VanCura, L.J. "Computer-based Patient Interviewing." Postgraduate Medicine, 43:68-76, 115-20, 1968.
7. Grossman, J.M., Barnett, G.O., McGuire, M.T., et al. "Evaluation of Computer-acquired Patient Histories." JAMA, 215:1286-1291, 1971.
8. Mayne, J.G., Weksel, W., Sholtz, P.N. "Toward Automating the Medical History." Mayo Clin. Proc., 43:1-25, 1968.
9. Kanner, I.F.: "The Programmed Physical Examination with or without a Computer." JAMA, 215: 1281-1291, 1971.
10. Erickson, J.J., Brill, A.B. "Digitalization of Ultrasonic Images." Radiology, 95:589-593, 1970.
11. Kitagawa, K., Nishigou, A., Maruata, N., et al. "Radiotelemetry of the pH of the G.I. Tract by Glass Electrode." Gastroenterology, 51: 368, 1966.
12. Baumeister, C.F. "Practical Everyday Uses for the Computer in Medicine." Med. Times, 98: 182-193, 1970.
13. Walter, W.G. Computers in Neurophysiology, Computers in Medicine. Edited by J. Rose, J. and A. Churchill Ltd., 1969.
14. Computers in Medicine, Proceedings of the Symposium held February 1968, edited by J. Rose, opening address: Wayne, E., pp. 2-3.
15. Menke, W.G. "Medical Identity: Change and Conflict in Professional Roles." J. Med. Educ., 46:58-63, 1971.
16. Schwartz, W.B. "Medicine and the Computer: The Promise and Problems of Change." New Eng. J. Med., 283:1257-1264, 1970.
17. Murray, R.H. "Technology in Ambulatory Health Care: Problems and Predictions." The Pharos, 34:13, 1971.
18. Antley. M.A., Antley, R.M. "Obsolescence: The Physician of Diagnostician Role." J. Med. Educ., 47:738, 1972. □

"People Mover" Automatic System At Seattle-Tacoma International Airport

J. N. Dravillas
Westinghouse Electric Corp.
Pittsburgh, Pa. 15222

" .... The two-mile route for an automated underground people-mover consists of two loops and a connecting shuttle, and there are nine automatic vehicles .... "

Air travellers at the Seattle-Tacoma International Airport will soon be receiving special treatment to relieve the agony of airport sprawl and its inevitable long walk or run to planes. Once it is opened, they will be riding an underground transit system, moving swiftly and comfortably to six stations conveniently located in the terminal building, concourses, and satellite buildings — with trains available for boarding about every two minutes.

The route for the country's first automated underground "people mover", known as the Satellite Transit System (STS), consists of two loops and a connecting shuttle. The 4100-foot north loop links the main terminal with the north satellite building and Concourse C. The 3700-foot south loop links the main terminal with the south satellite and Concourse B. The intra-terminal shuttle links the main terminal stations of the north and south loops for interline passengers. (Figure 1)

When the newly-installed system enters service, nine vehicles will be in place. They are automatically controlled, electrically powered, air conditioned and rubber-tired, able to carry 400 passengers one way every five minutes with two single cars and a two-car train on each loop. When expanded to ultimate capacity, probably by 1980, a total of 25 vehicles will be used as three four-car trains to transport 1200 passengers one way every five minutes on each loop — with only a single car for the shuttle.

The Satellite Transit System was designed and built by the Westinghouse Electric Corporation. In addition to the vehicles, it includes an automatic vehicle control system, voice and video communica-

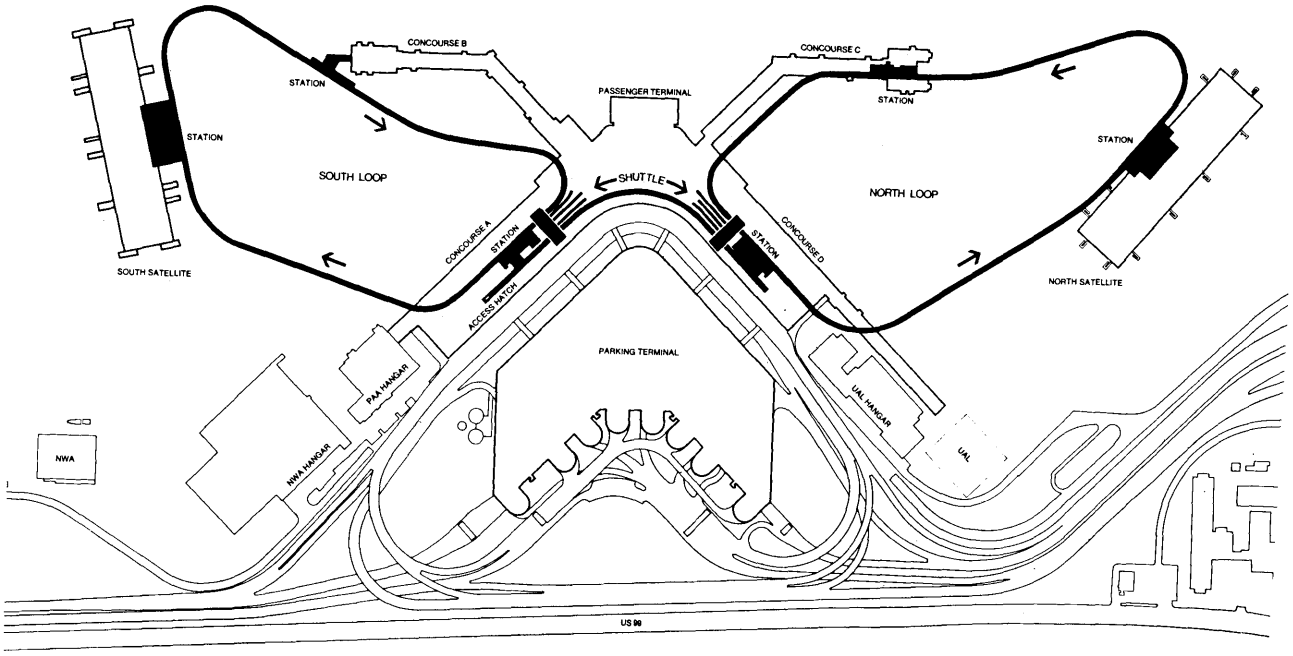


Figure 1

tions system, a power distribution system, automatic station doors, a guideway, two transfer tables, and maintenance facilities. A central control console with a display is used to monitor and control the operation of the entire system under the supervision of a central digital computer. (Figure 2)

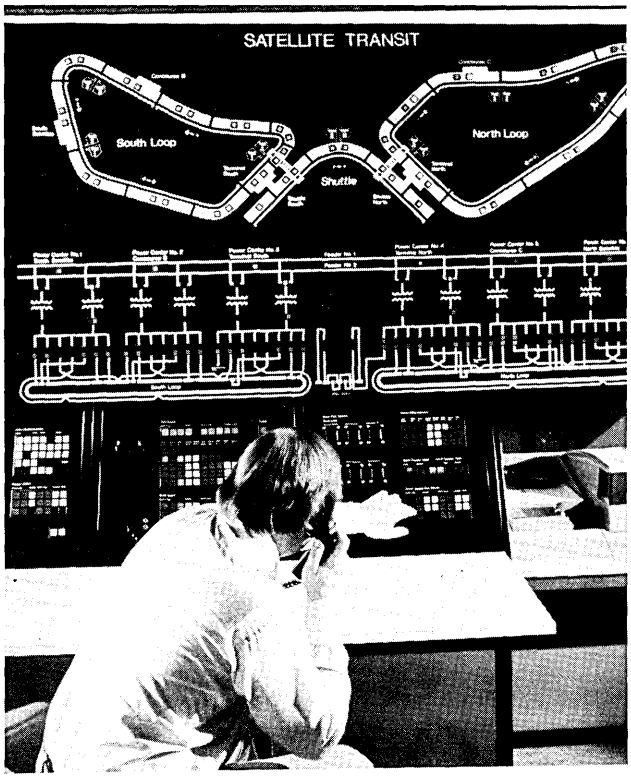


Figure 2

System Operation

At the main terminal a lobby directory shows the passenger his location in the terminal and the most efficient route to his boarding gate. Illuminated signs above the STS station doors tell the passenger which vehicles are in service and, after purchasing his ticket, he waits just as he would for an automatic elevator.

Figure 3

When a vehicle or train stops at the station, vehicle doors are automatically aligned with the station doors and both sets open simultaneously. Two eight-foot doors enable large numbers of passengers to move in and out of each car in a short period of time, and are especially convenient for those passengers in wheelchairs. (Figure 3)

Despite the varying passenger loads in the cars, the vehicle floors are always maintained at the same height as the station floor by a special leveling device for added safety and convenience. All doors are fitted with safety edges like those found on elevators so that they stop and reopen if an object touches them during the closing cycle. Before the vehicles begin to move, photo sensors check the area between the station and vehicle doors to make certain it's clear of obstructions.

Recorded verbal announcements coordinated with sequentially lighted graphic panels above the doors inside the car indicate where the passenger is and where he is going. Just before reaching the next station the automated announcement informs the passengers of gates and/or facilities served by that station. (Figure 4)

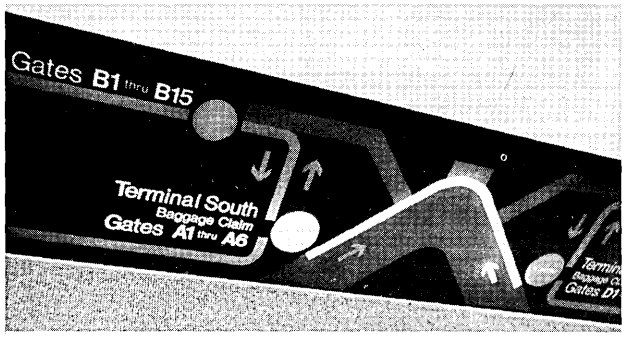


Figure 4

The trip time from the main terminal to the satellite station is about 60 seconds. The trip from the terminal to the concourse station takes about three and one-half minutes, including a 45-second stop at the satellite station. A round trip takes five to six minutes with stops at satellite and concourse stations. Under normal operations the dwell time at the main terminal is about 50 seconds.

The shuttle trip takes 45 seconds with a 60-second dwell time at each end. Should a passenger miss a train, his maximum waiting time is about 150 seconds.

The STS is the first such underground system (running below buildings and airplane ramps) in the world. The tunnels measure approximately 14 feet by 6 inches wide by 13 feet 10 inches high. Every portion of the tunnel contains a walkway for inspection, maintenance and emergency evacuation. If a train accidentally stops due to a power failure or malfunction, passengers can step from the vehicle to the walkway and vacate the tunnel. The trains are driverless, all movements being made under the control of fail-safe electronic equipment.

Two modes of automatic operation are used: the continuous mode and the on-call mode.

Continuous-mode operation is preferred. In this mode the trains operate continuously, stopping at each station for the standard dwell time and then moving on to the next station. Normally, the train moves from the terminal to the satellite, then to the concourse and back to the terminal. The shuttle operates continuously between the two main terminal stations.

In the on-call mode the trains wait in the stations with doors closed until called by a passenger who pushes a call button similar to that for an ele-

vator. The doors open, the passenger boards, and, after the proper dwell time, the doors close and the vehicle begins a complete round trip, stopping at each station. With the shuttle, the train opens its doors if it is at the station of call, and after the dwell period, closes its doors and proceeds. The shuttle makes one complete trip and then waits until an on-call button is again pushed.

Vehicles

The vehicles used on the STS are an adaptation of the Westinghouse Transit Expressway which has been operating on a demonstration transit system since 1966. The rubber-tired vehicles travel through transit tunnels under the plane ramps riding on concrete running surfaces and guided by a steel guide rail located in the center of the roadway.

The 106-passenger vehicle has been designed for the convenience and comfort of passengers. Two eight-foot doorways are provided for rapid movement of passengers in and out of the vehicles. Windows in the front and rear and vinyl-covered seats along the wall opposite the doors attract passengers in and away from the doors to facilitate loading. Windows in the vehicle doors add to the passengers' sense of motion and provide them with visual indication of station stopping.

Each vehicle is 37 feet long, 11 feet high and 9-1/3 feet wide.

The vehicle interiors are aesthetically pleasing and comfortable, providing an atmosphere in keeping with the bright and modern terminal interiors. They feature carpeted floors and walls, high-level fluorescent lighting and climate control. (Figure 5)

To offer security for the passenger in the operatorless cars, voice communications to and from the trains and closed-circuit television at the station platforms are included in the system. The voice communications system allows the dispatcher to talk with train passengers and, if there are problems, he can advise them of action to be taken. A push-to-talk handset is provided in the vehicle for two-way conversation with central control. A separate communications system hookup is available to contact airport security police from central control if necessary.

The closed-circuit TV monitor in central control gives the dispatcher a sequential display of station platforms and other strategic areas, with each picture segment lasting from one to 20 seconds. The dispatcher can also monitor particular platforms out of sequence for selective viewing.

A public address system is provided for making announcements from central control to the stations and vehicles.

The suspension, guidance, propulsion, auxiliary and braking systems are mounted on the undercarriage of the vehicle. The suspension features a combination of air bag and leaf spring, providing a ride comparable to that of a fine passenger car. The air bag also serves as the leveling device, keeping the vehicle floor at the height of the station platform as passenger load varies. The vehicle rides on pneumatic tires with two dual sets on each of the axles. It is steered by guide wheels on the tracks. These guide wheels, backed up by a steel safety disc, lock the vehicle to the guideway and steer the drive wheels by riding the web of the I-shaped guide beam.

Figure 5

Electric power is converted from ac to dc by a transformer and a full-wave thyristor control on the vehicle. The control delivers infinitely adjustable dc voltage to a 100-horsepower series-wound traction motor mounted on one of the trucks. It is applied through a jerk-limited automatic control for smooth acceleration and for fast response to propulsion commands. As the vehicles reach desired speeds, or if it is required to slow down for civil restrictions, the automatic control adjusts and maintains the motor torque and speed to the required operating level.

The braking system is also automatically controlled under jerk-limited conditions. The brakes are truck-type drum friction brakes, air operated, and equipped with fail-safe, spring-loaded emergency actuators. Each axle has a separate braking system to provide redundancy and to improve braking performance.

Automatic Train Control

Control of the Satellite Transit System vehicles is completely automatic, with three functions involved: (1) train protection, (2) train operation and (3) line supervision. Equipment for these control functions is located at central control, along the wayside, and on the cars.

Automatic Train Protection (ATP)

A "fixed block" arrangement is used for the STS automatic train protection system. Continuous train detection is achieved by monitoring a special transmission from each train through a receiving antenna located along the roadway. The vehicle transmission

is checked at each boundary to verify proper operation.

Speed commands are generated for each block according to block occupancy, civil speed limits, station stops and transfer-table operation. The speed signals are carried to the speed coding equipment on the cars by an antenna running the full length of each block along the wayside and by receiving antennas on each vehicle. The vehicle decodes the received signal and commands the propulsion and braking equipment accordingly. The fail-safe speed control and occupancy equipment controls speed for safe separation of the trains. In order to have the entire system as safe as possible, the operation of the transfer table is interlocked with fail-safe logic.

The train protection system, as indicated above, uses fixed lengths of track called blocks. Trains may travel at speeds up to a fixed maximum within a given block, the maximum determined by such factors as curves and stopping distance. Separation of trains is achieved by transmitting different speed commands to each block. A train automatically sets the allowed maximum speed of the block through which it last traveled to zero. Thus, if a train stops, the train traveling behind it in the same direction runs into the zero-speed limit block and stops within it, avoiding a collision with the train stopped ahead.

Automatic Train Operation (ATO)

Automatic train operation equipment controls the operation of the trains within the safety envelope of the train protection system. This equipment controls the acceleration and deceleration, station stopping, door control, reverse running, communications on the vehicles and train makeup.

Programmed stop equipment brings the train to a halt with a ±3 inches of a given point at the stations and on the transfer table. Programmed stop is implemented by car-carried equipment which receives a signal from a transposed antenna located along the guideway in areas where accurate stopping is required. A wired-logic digital and analog computer controls the stopping within an optimum deceleration profile and maintains a stopping pattern for single cars or for trains up to four cars in length. In the last three feet of the stopping program, a "flare out" circuit modifies the stopping profile to provide an extremely smooth stop. If station run-through is required the programmed stop antenna is turned off, allowing the block control speed code to be obeyed.

After the train has stopped, wayside signals open the vehicle and station doors. These signals are also used to reset the sequence of the annunciator in the vehicle and the vehicle graphics. At the same time, the vehicle sends signals to wayside giving information on the status of on-board equipment. It also sends a door signal that controls the station doors when the vehicle's safety door edge has been activated.

Unless modified by automatic line supervision, the dwell time at each station is 60 seconds. At the end of the dwell time the "door open" signal is removed and the programmed stop antennas are turned off. When the doors are closed and locked, the vehicles are allowed to accelerate under program control up to the block control speed.

Automatic reverse running is requested through the line supervision subsystem and is safely carried out by the block control speed generation equipment.

On request by line supervision, the ATO equipment controls the operation of the transfer table so cars can be switched from one guideway to another, for coupling into trains or for adding vehicles to the system.

Manual controls are located at both ends of each car. This permits moving the vehicles in the storage areas or operating trains manually in the event of an emergency that requires slow-speed operation or movement past an area in which maintenance work or construction is being carried out.

Automatic Line Supervision (ALS)

The automatic line supervision equipment monitors the system's operations, indicates its status on an operational mimic display board, and makes records of certain operations. Through manual input keying it requests changes in performance, modes and routing operations. It automatically makes requests for changes in performance or modes through the computer monitoring equipment — it is this function that makes possible the optimization of the system's operation. Most of the line supervision equipment is located at the central control facility.

Graphic illustration of train position and direction of travel and continuous supervision of the power supply system is provided at the central control display room. The display panel is part of the central control facility and is mounted behind the control console in the control room. The block location of each train in the system, the alarms associated with various monitored parts of the system, and the condition of the power system are presented through an electronic system which converts information gathered from wayside control equipment and electrical substations to illuminated graphics at pertinent positions on the display panel diagrams. A Westinghouse P-2000 digital computer in the central control room constantly monitors information from the wayside controls for instantaneous representation on the display panel.

Transfer Table System

The transfer table system is used to transfer vehicles to and from the loops, and between the loops and the shuttle. Transfer tables rather than switches were chosen because the terminal structural supports interfered with the proper placement of switches. Two transfer tables are used, one for each loop. Two filler tables move with each transfer table, one for the loop and the other for the shuttle, filling the gap when the transfer table is moved from the main guideway.

Power Distribution System

Power for the system comes from two main Port of Seattle substations located at the airport. Each of the substations provides a feeder line with 12.5-kV, three-phase, 60-cycle power to six power centers for distribution to the power rails. The south loop is served by three of the power centers, with the shuttle and north loop served by the other three. A 575-volt, three-phase, 60-cycle power supply is delivered to the vehicle through the three-phase rail system. Power is picked up by vehicle current collectors riding the underside of the power rail and is delivered to the propulsion, auxiliary and con-

(please turn to page 39)

Computers and Democracy

Anthony G. Ralston
SUNY, Buffalo
Computer Science Department
Amherst, N.Y. 14226

"Urban complexity, ecological complexity, political and social complexity require a growing body of administrative law if this planet is going to remain habitable at all. The inevitable result is a gradual restriction on personal freedom in the supposed interests of society at large. The issue . . . is not whether freedom must be restricted, but in which areas and how much."

The title I have chosen is clearly presumptuous. Why "Computers and Democracy" when one can hardly imagine a lecture entitled, for example, "Atomic Energy and Democracy" or "Molecular Biology and Democracy", to choose two areas of science and technology which clearly have large present or potential impacts on the social and political structure of nations? One possible answer to this question would be to say that, in fact, computers are a more significant development than either of the other two examples, and that, therefore, the impact will be correspondingly more significant. I shall not press this argument, however, because I think there are answers to the question which do not depend on the egocentricity of computer scientists.

A Complex Relationship

Because of the increasing daily contact which everyone has with computers or the results of their processing, it is easy for almost anyone to believe that computers are becoming ever more important. But how or whether there is any present or potential effect on personal freedom or, more generally, on political institutions is a much more subtle and complex matter. Incorrect bills from a store or the electricity board and — more important — the frustration of getting them corrected may bring a vague uneasiness that 1984 is closer than it seems. But it is certainly not obvious that there is any connection between such everyday commonplaces and possible threats to democratic government. By contrast, the military danger of atomic energy to any form of government is crystal clear to all.

Indeed, computers are here now and somehow, more and more, we are all involved with them. Molecular biology by contrast, whatever its implications through, for example, genetic engineering, is no more than a potentiality on the horizon, ill-understood and easy to dismiss in a world with so many immediate problems. Computers occupy a unique place today among all areas of science and technology because their immediacy, their unquestioned growing importance, is coupled with a complexity and subtlety which makes it both important and difficult to understand their role, present and potential, in all aspects of our lives.

Computers — Threat and Hope

The problems facing Western civilization today — political, environmental, urban, racial — however much some of them may have been caused by technology, can only be solved, if at all, by new applications of science and technology. And I submit that no technology offers more potential, more hope in the solution of these problems than digital computers. But, on the other hand, no technology poses more of a threat to the traditional operation of responsive, representative government than digital computers. This complementarity of good and evil is common with science and technology. Nuclear energy and molecular genetics are two other obvious cases. With these as with computers, our challenge is to withstand the threat without losing the hope.

Analysis of the effects of computers on the institutions of democratic government must, I believe, depend on the recognition that morality in almost all things is a relative matter. Or, as has been said, "the morality of an act is a function of the state of the system at the time it is performed". The biologist Garrett Hardin gave a simple example of this. One hundred and fifty years ago, a plainsman in the American West could kill a buffalo, cut out its tongue and have it for dinner and discard the rest of the animal without "in any important sense being wasteful". Today, with the American buffalo facing extinction, such behavior would appall us. Or, to take a more contemporary British example, the morality of driving around a roundabout the wrong way with no other car in sight is quite different from doing this when there is heavy traffic in the direction you are going in. I make this point because I think it is essential to view the morality of using computers in society and government in the context of the world as it is and not as we might like it to be.

Growth of Personal Freedom

Generally speaking, the past two centuries have seen a gradual, steady increase in the personal freedom of citizens in democratically governed countries. (Simultaneously, of course, there has been a steady increase in the effectiveness of totalitarian governments.) This increase of freedom has hidden the fact that the potential for personal freedom has steadily decreased over the last millenium. In the Middle Ages there was very little individual freedom except for a very small minority, but a great deal would have been possible in theory because of the relative lack of interrelationships and complexity within the social structure. One may indeed look at the increase of personal freedom over the past few centuries as giving to people those freedoms — speech, religion, assembly, etc.

Based on a lecture delivered at the University of London, England, May, 1972.

— which medieval man did not have because of the way his society was organized, but not because of the way it had to be organized.

Paralleling this increase of basic freedoms, however, has been a decrease in other aspects of freedom — most of which is enshrined in the growing body of administrative law in Western countries. No longer are people free to drive on public highways entirely as they wish, to burn any kind of fuel they wish, to dispose of their garbage in any way they wish. While it may be argued that criminal law indeed increases the freedom of the average citizen — the prohibition of extortion surely increases the freedom of all of us except would-be extortioners — it can hardly be argued that administrative law does so similarly. No, administrative law is the price we pay for the complexity, the increasing complexity of life which is the hallmark of late twentieth century civilization. Urban complexity, ecological complexity, political and social complexity require a growing body of administrative law if this planet is going to remain habitable at all. The inevitable result is a gradual restriction on personal freedom in the supposed interests of society at large. The issue, I believe, is not whether freedom must be restricted but in which areas and how much. I further believe an understanding of this is crucial to the assessment of the place of computers in the world of today and tomorrow.

Appropriate Applications and Privacy

Unquestionably, computers can be used to restrict personal freedom. Equally unquestionably, they must be applied if we are somehow to control rather than be controlled by our growing problems. The important questions are which are the appropriate applications and which not, and what can be done to safeguard personal freedom in necessary applications. For example, if the population explosion is to be controlled it may — I only say may — be necessary to have very accurate and complete information on family size, on abortions and even perhaps on the contraceptive habits of the population. Obtaining such data itself may be considered an unwarranted invasion of privacy but, if it is obtained, keeping it private is essential. And since reasonable use of such data without computers is unthinkable, the computers will have to be used in a way which will insure personal privacy as a prerequisite to insuring personal freedom. But can the privacy of such computerized data be assured? If so, is it worth the perhaps great cost? If not, does this mean we can't collect the data even if the societal need is very great? I raise these questions now only to indicate some aspects of the general scope of the problem.

The Computer as Organizer

Computers thrive on complexity. This more than anything else is responsible for their growth over the past quarter century. And this is not essentially because of their speed or their ability to store and remember large quantities of data, although both are necessary. Rather the essential feature of computers in dealing with complexity is their power to organize, that is to correlate, to analyze, to cross-reference, to digest data of virtually all kinds. If, while organizing it, computers themselves have also added to the complexity of our world, it is only because their great power in resolving complexity has enabled more complex systems to be designed and used. This power of organization lies at the heart of the value of the digital computer. However, their power to organize is also at the heart of the threat of computers to personal freedom.

The organizing ability of computers has a wide variety of applications in government, in industry, in business which make possible increased efficiency, more effective use of resources and, in general, improvements in the quality of life no matter what your value system. I would like to argue, however, that the organizing power of computers per se is a threat to democratic institutions as we know them today.

With the increasing complexity of modern civilization has come a steady trend toward centralization of functions — in central governments rather than local government, in large corporations rather small ones, etc. Yet at some point the inefficiencies of large organizations appear to outweigh the gain from having all aspects of a multifaceted system controlled from a single point. Thus the increasing calls for decentralization of governmental functions and of industrial management. The doubts many people have on this issue are reflected in a rule supposedly applied by management consultants: If the company has a centralized structure, the consultant automatically recommends decentralization, and vice versa.

Interestingly enough, a parallel trend is developing within computing itself. For many years computer scientists have believed in Grosch's Law which states that the effectiveness of a computing system, no matter how you measure it, is proportional to the square of the cost. This economy of scale argument has been used to justify centralization in many cases. Now, however, an increasing number of computer scientists feel that the trend to larger and larger hardware systems with more and more complex operating systems is approaching a dead end and the idea of distributed, decentralized systems of both hardware and software is receiving increasing support.

Nevertheless, the trend to increasing centralization is still very evident. And it is generally agreed that increasing centralization of government poses, at least theoretically, a threat to freedom. One response to this has been attempts to find ways for increased direct citizen participation in government, although in some areas at least, the efficacy of this is doubtful. Indeed, it is possible that instability might result from too much participation by a citizenry uninformed on technical issues. In any case, increasing centralization of government seems to have led to less actual loss of freedom or civil liberties than might have been predicted. Why is this?

Bureaucratic Inefficiency: Guardian of Civil Liberties

A partial answer is that, more than anything else, civil liberties and personal freedom are protected in this time of ever-increasing governmental power by the accumulation of that power into a bureaucracy of ever-increasing size and, more to the point, ever-increasing inefficiency. Bureaucracy has perhaps never been looked at as a great safeguard of democracy and assuredly it is a sad commentary on our methods of governing ourselves that this should be so. At best, bureaucracy is a triumph of tenacity over incompetence. But as I shall try to show, the effect of all this is to safeguard the freedom of all of us. And without doubt the organizing efficiency of computers is a threat to this protection.

Now bureaucracy is, of course, a feature of all governments, democratic or otherwise and, indeed, has been developed to even higher levels of wastefulness, tortuousness and impenetrability in totalitarian countries. Why then do I claim it as a safeguard to democracy in democratic countries when it so clearly serves opposite aims in non-democratic ones? I think the answer is that, when mobilized against civil liberty and freedom, bureaucracy can and does serve as a ponderous sledgehammer against individual liberty. But, when official policy is in favor of the enhancement of individual liberty, then it is very difficult, perhaps in most cases impossible to covertly use this immense, ambiguous machine for ends opposed to official policy. Or, to put it another way, a bureaucracy developed to serve certain needs, however badly it may in fact do so, is almost certain to be even worse at tasks it was not designed for. Bureaucracies are notoriously unadaptable. We see examples of this every day in a world which cries out for boldness in dealing with new problems but where governmental reaction is almost always to tinker a bit with the old system, a reaction whose persistent failure is clear to anyone who reads the daily press of Western Europe or the United States.

Information: The Critical Resource

It has often been said that information is power, at least potential power. Whereas for centuries land was the critical resource and, in the past two centuries, capital has been the critical resource, it can be argued that information — knowledge, if you will — is rapidly becoming the critical resource. As we enter what Daniel Bell calls the post-industrial society, with the economy becoming increasingly service-oriented, knowledge will become increasingly important. Thus, census data which may be innocuous in itself but combined with inland revenue data which also may be innocuous, combined with medical data, combined with motor vehicle license and registration data, combined with all the data on all the forms over all the years you have been filling them out, probably could provide, if analyzed appropriately, a rather complete picture of your strengths, your weaknesses, your beliefs and your prejudices. If centralized, analyzed and available, it could be used rather easily by unscrupulous politicians or civil servants to suppress opposition or to force compliance with their policies or desires.

But, for the moment at least, this should not worry you. This information is so scattered and so generally inaccessible that its correlation and use for nefarious purposes is extremely difficult if not impossible. (Indeed, it may even be that, perhaps subconsciously, the British government protects its citizens by maximizing the inaccessibility of data. I was bemused when I arrived at the Institute of Computer Science last year to discover that the tax office for the University of London is in Cardiff. Could it be policy to maximize the distance between each citizen and his tax office?) In any case, in return for the difficulty in resolving his problems, the citizen can be reassured that knowledge about him is diffused as widely as possible.

Centralization Means Increased Access to Data

Now, of course, this is where computers come in. It is traditional — if not always the case in practice — to treat all data as confidential unless it is explicitly intended for public use. Computers permit — too easily — a reversal of this position in which all data not explicitly designated as confidential becomes generally accessible to too many people. The ability of computers to organize, to centralize, to correlate, to interpret, and the immediacy with which all this can be accomplished, could very quickly change the relationship of the citizen to his government. Naturally, if the advantages of such centralization were not so clear — increased efficiency, faster and better decision making, avoidance of errors, etc. — the argument against centralized computer systems in government would be unassailable. But it is increasingly clear that the old methods are failing, that the old ways of running governments have led us into parlous times, that something must be done to at least enable government to know the relevant facts before it makes a decision, something which is clearly not the case nowadays and that, without the use of computers, no reform of current bureaucratic methods is possible (although, to be sure, the use of computers is no guarantee of success).

Many people, even if they accept my analysis of bureaucracy as a safeguard, through inefficiency, of democracy, will reject the argument that the increased use of computers in government presages a possible early coming of 1984. For they reject the image of the computer as an all-powerful, organizing, centralizing, efficiency-increasing tool. After all, if computers can't get our department store bills correct, why should we be worried that they can become the personification of Big Brother?

Yet the faults we tend to blame on the computer are not the computer's at all, but rather the fault of the systems analysts who designed the computer system or the programmers who implemented it or the operators who operate the computer or the clerks who deal with your correspondence — or all of them. But perhaps such problems are inevitable in large computer systems? Again fortunately or unfortunately, depending upon how you look at it, the answer is "no". Computing is an instance of a technology which has far outdistanced education about it. But this is a transient. Education about computers and of people who will design and operate computer systems is starting to catch up to the technology here in Britain, in the United States and elsewhere. We cannot count on the incompetence of computer people to replace the incompetence of bureaucrats as a safeguard of democracy. Computer systems will not forever be misdesigned or misused. The potentiality for accurate, complete, highly organized computer systems is there and it will be realized. When it is, it will place a tool of immense power and flexibility in the hands of government. Our challenge is to see that this threat is minimized. But not by forbidding the use of computers in certain instances, because this would be an example of throwing the baby out with the bath water.

Computers and the Loss of Individuality

A related aspect of the computers and democracy problem is the rather widely held fear that computerization means loss of individuality. The argument concerning computers and individuality goes something like this. Systems involving humans rather than computers, whatever their lack of efficiency may be, at least provide the "customer" with the personal touch, the feeling that he is being treated as an individual and not just a cog in a big machine.

Computerization on the other hand — so the argument goes — means homogenization, loss of individuality, loss of personal touches. Hence the fury

of the anti-digit-dialing league and similar organizations. Hence the equation of computerized government with Big Brother. Is there really some basis for this feeling of loss of individuality? What are the issues? On one level the issue is purely one of cost versus esthetics. All digit dialing or the use of numbers rather than names to represent people is demonstrably a more efficient, cheaper way to handle a variety of administrative problems, computer and otherwise. But, to claim that with all digit-dialing people are thereby reduced to ciphers is mere cant. At this level the issue is only one of balancing the monetary gains against the esthetic losses.

Another example is the application of computers to the collection of income taxes in the United States. Today every savings bank, every insurance company, every public corporation sends to the federal government a record of dividends or interest paid to any individual together, of course, with a copy of the record to the individual himself. Everyone who receives any such dividend or interest has had to fill out a form containing, in particular, that number by which all Americans are known to their government — the Social Security number. And, of course, all this data is fed to computers in Washington. The result of all this could be described as an increase in regimentation, a loss of individuality, reduction of the individual to a cipher — his Social Security number. But it also has unquestionably reduced the amount of income tax evasion in these areas almost to nil and has thus resulted in an increase of income to the government of some hundreds of millions of dollars per year. Perhaps I should add that this increase in income is not, in the main, the result of computers catching income tax evaders by their analysis of tax returns and the other information available to them. Rather knowledge on the part of the citizenry that the information would be available to the government was in itself sufficient to persuade almost all evaders to reform.

Individualized Systems: A Question of Design

Few people, I think, would claim that the gains to justice and equity in this example were offset by losses of individuality or freedom. Other cases of computerization are not so simple. Often it does seem that computerization makes a system less responsive, the individual more regimented than can be balanced by any gain in efficiency. And in this there is considerable irony. For, if it is true that computerized systems often appear less flexible, less individually-oriented than their predecessors, this is not because it must be so but rather because that is the way the systems have been designed or misdesigned. So it is hardly surprising that rather few laymen should realize that, in fact, the computer can cater to individuality as no other tool ever invented. It makes individual treatment possible at much less cost than with manual systems. But the rub is that the computer makes uniform treatment possible at no cost at all. The predictable result thus far has been to force everyone into the same mold in most systems. The "our computer can't handle that" which we have all heard in response to some request for individual service really means that "our system designers haven't bothered to provice that service". All sorts of special government services which might be provided to pensioners, to handicapped people, to users of the National Health Service are not provided, not because they cannot be, but because someone has deemed that the price of individuality is too high. It is, thus, not the computer which is the threat to individuality but rather the too often prevailing point of view in government and elsewhere that individuality has a low value.

In some areas the ability of the computer to provide personalized service has been recognized. The most obvious of these is computer-assisted instruction, in which pupils seated at computer terminals may be given individualized lessons based on their level of knowledge and past performance and these may be monitored by teachers and educators. The failure of computer-assisted instruction to advance nearly as rapidly as some of its enthusiasts hoped only a few years ago is not due to any failure to achieve individuality. Rather it is because the technical problems in developing good CAI systems have proved more difficult than anticipated and because the price of CAI is still too high for general use.

My conclusions then on loss of individuality through the use of computers is in line with my previous conclusions. There are potentialities in both directions. We may and too often do use computers to force people into a standard mold, but we can, if we choose and if we are willing to pay the price, use computers to achieve a level of individuality beyond what is possible with non-computerized systems.

Three Approaches to the Problem

Let me then sum up my position on the relation of computers to democracy and freedom. In his pioneering study, "Privacy and Freedom," published in 1967, Alan Westin identified three approaches to the problem of increasing computerization of data on individuals by government:

> One position, which he attributed to many civil servants and computer scientists, is that traditional administrative and legal safeguards together with the "expected self-restraint" of the managers of computerized systems will provide all necessary protection.
>
> A second position — the traditional civil liberties one — is to oppose the creation of data banks entirely, on grounds that their advantages do not outweigh the potential for increase of government power and control.
>
> The third or central position is that the needs for such systems on the one hand and their dangers on the other call for new legal and administrative protections. "A free society", Westin says, "should not have to choose between more rational use of authority and personal privacy".

Where then would I come down concerning these three positions? The first I reject as being unresponsive to the problem posed by this new technology. Our experiences thus far indicate that traditional methods are not sufficient. And "expected self-restraint" works, if it ever does, when the lack of it can have only rather small effects. This is emphatically not the case in government use of computers.

The second and third positions do not seem, indeed, to be in conflict. If we do not have to choose between more rational use of authority and personal privacy, then the appropriate legal and administrative safeguards should satisfy the concerns of civil libertarians about government power and the dangers of invasion of privacy. Ah, but there's the problem. I simply do not believe that a free so-

(Please turn to page 40)

Is the Press Being Hobbled?

Senator Sam J. Ervin, Jr.
Senator from North Carolina
U.S. Senate
Washington, D.C. 20510

"The First Amendment contemplates the search for truth among competing ideas, and it is the responsibility of the press to make sure that competing views are presented."

The First Amendment to the Constitution of the United States:
Article 1 of the Bill of Rights:
Religious Establishment Prohibited. Freedom of the Speech, of the Press, and Right of Petition.
Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble and petition the Government for a redress of grievances.

Two Basic Reasons for the First Amendment

It is my belief that the First Amendment was adopted by our Founding Fathers for two basic reasons. One reason was to insure that Americans would be politically, intellectually, and spiritually free. The other was to make certain that our system of government, a system designed to be responsive to the will of an informed public, would function effectively.

The scope of First Amendment freedoms, including freedom of press, is broad and was intended to be so. The First Amendment is impartial and inclusive. It bestows its freedoms on all persons within our land, regardless of whether they are wise or foolish, learned or ignorant, profound or shallow, and regardless of whether they love or hate our country and its institutions.

For this reason, of course, First Amendment freedoms are often grossly abused. Society is sorely tempted at times to demand or countenance their curtailment by government to prevent abuse. Our country must steadfastly spurn this temptation if it is to remain the land of the free. This is so because the only way to prevent the abuse of freedom is to abolish freedom.

Quest for Truth

The quest for the truth that makes men free is not easy. As John Charles McNeil, a North Carolina poet, said, "teasing truth a thousand faces claims as in a broken mirror". The Founding Fathers believed — and I think rightly — that the best test of truth is its ability to get itself accepted when conflicting ideas compete for the minds of men.

And, so, the Founding Fathers staked the very existence of America as a free society upon their faith that it has nothing to fear from the exercise of First Amendment freedoms, no matter how much they may be abused, as long as truth is free to combat error.

Is the Nixon Administration Shackling the Press?

Representatives of the press have been recently claiming that they are not free, that in effect the Nixon administration has shackled them with threats and restrictions that do not permit them to fulfill the role which the Constitution gives them. There is substance, I feel, to their claims. Newsweek magazine goes so far as to say that the recent clashes between the administration and the media are "without precedent in the history of the United States".

To some, this may be overstating the significance of the conflict. The press has typically played a critical role of government, and government has often responded with intemperate condemnation or simply with charges of irresponsibility. I cannot say that such responses have always been unjustified.

Efforts at Wholesale Intimidation

But the actions of the present administration appear to go beyond simple reactions to incidents of irresponsible or biased reporting, to efforts at wholesale intimidation of the press and broadcast media. I point to a few examples.

Example 1: "Imbalance or Consistent Bias"

Recently, we saw Clay Whitehead, director of the White House office of Telecommunications Policy, explaining a new administration proposal which would condition the renewal of broadcast licenses by the FCC on whether the local station management is "substantially attuned to the needs and interests of the communities he serves". He later made clear that what was really sought was control of network news: "Station managers and network officials," he said, "who fail to act to correct imbalance or consistent

Remarks made before the North Carolina Press Association, January 19, 1973, printed with permission from Senator Ervin

bias from the networks — or who acquiesce by silence — can only be considered willing participants, to be held fully accountable by the broadcaster's community at license renewal time."

Example 2: Challenge of Renewal of Station License

In a rather interesting sidelight which indicates how this plan might work, it was recently reported that the finance chairman of Mr. Nixon's campaign in Florida, George Champion, Jr., has challenged the license of WJXT in Jacksonville. WJXT was the station whose reporters discovered some controversial statements of Nixon Supreme Court nominee G. Harold Carswell, which contributed to his failure to receive Senate confirmation. To make matters worse, the station is owned by the Washington Post, which is a frequent administration critic.

Example 3: Cutting of Funds for Public Broadcasting

We also see significant inroads being made into public broadcasting. Under administration pressure, funds for the Public Broadcasting Corporation, which in turn provides funds for the Public Broadcasting Service, were slashed in the last Congress. As a result, the corporation board, a majority of which are administration appointees, has decided to withhold funds, but only for certain public affairs programming which had often included comment critical to the Executive. Programs such as William Buckley's "Firing Line", "The Advocates", "Bill Moyer's Journal", "Wall Street Week", and "Washington Week in Review" will not be seen after this season unless the corporation agrees to release these funds.

It was the intent of the Congress in enacting the Public Broadcasting Act of 1967 which created an intermediary corporation to receive funds for public television, to insulate control of programming from those who appropriated the dollars for it. It now appears that the intermediate agency is asserting the sort of political control which the Congress wisely denied itself.

Four More Examples

There are other examples of administration intimidation which come to mind: the early speeches of the Vice President harshly criticizing the press; the investigation of CBS newsman Daniel Schorr who had been critical of the administration in 1971; the recent exclusion of the Washington Post, particularly critical of the President's war policies, from coverage of White House social events; and, of course, the controversial Pentagon Papers case, which, whatever one may think of the circumstances, was the first time that the government sought to enjoin the publication of a news story.

The Intimidation of "Instant Analyses"

How many editorials have not been written, or critical comments not made, because of these incidents is not something which can easily be proved — I do recall the "instant analyses" which followed presidential addresses. Following considerable administration objection, we no longer have them. Decisions not to criticize are decisions which people keep to themselves. But the fact that intimidation cannot often be reaily shown does not mean it is not present.

Newsmen's Privilege Proposals

So we come to what was the announced subject of my presentation: the newsmen's privilege proposals. I wanted to give you this background because I believe that the threat of a subpoena to testify before a governmental tribunal is yet another means of governmental intimidation of the press. A newsman who publishes a story obtained from confidential sources which is critical or accusatory of public officials or programs now faces the threat of subpoena and a possible jail sentence if he refuses to reveal his source. If he decides to back off a controversial story, it is the public which has lost information which could lead to political and social improvement.

U.S. Supreme Court's Caldwell Decision

The administration's stance with regard to a statutory testimonial privilege has been one of rather passive resistance. Assistant Attorney General Roger Cramton, testifying before a House Committee last fall, said that while the administration favored a qualified privilege in principle, it felt that such a privilege was unnecesaary. He furthermore endorsed the Supreme Court's ruling in last June's Caldwell decision that the First Amendment's guarantee of a a free press does not entitle newsmen to refuse to reveal confidential sources of information.

I myself criticized the Caldwell opinion as failing to take into account the practical effect of such a ruling upon reporters and their sources of information. If sources of information cannot be assured of anonymity, chances are they will not come forward. If the reporter is willing to assure confidentiality, he must accept the fact that he may have to serve a jail sentence in order to fulfill his promise. It is rather ironic, I think, that the reporters themselves are the ones who ultimately are jailed for refusal to reveal sources of stories which the public would never have been aware of, had not the reporter himself decided to publish.

Memphis: Focusing on Reporter, Not on Hospital for Mentally Retarded

An example recently came to my attention which I feel illustrates the necessity of some type of privilege. It involves a reporter for the Memphis Commercial Appeal in Memphis, Tennessee — Joseph Weiler. An informant had contacted the paper with the information that children confined to the state-owned hospital for the mentally retarded in Memphis were being beaten and otherwise mistreated by supervisory personnel. After some investigating, Mr. Weiler wrote a story which corroborated these reports. An investigation by a committee of the state senate ensued, but curiously enough, the focus was upon who the state employee was who had tipped off the newspaper rather than the charges themselves. Mr. Weiler was subpoenaed and requested to bring whatever notes and correspondence he had concerning the case. He appeared before the committee but refused to identify his source. He was unanimously cited for contempt of the committee.

I submit to you that the losers here are not Mr. Weiler and his newspaper, but rather the people of Tennessee whose tax dollars support that institution, and the children of that hospital who are helpless to improve their lot.

The Drying Up of the Confidential Information that Leads to the Discovery of Shortcomings

It is this sort of case — where confidential information leads to the discovery of flaws and shortcomings in our social and political processes

— which makes the passage of some type of statutory privilege particularly compelling. Without the protection of anonymity, inside sources may simply "dry up". The stories will not be written. We all will be the losers. And nobody — culprit or reporter — will go to jail.

I am aware of the criticism that has been levelled at these proposals. A testimonial privilege will act as a shield behind which biased, or otherwise irresponsible, reporters will hide. Newsmen will be able to criticize unjustly and not be held accountable for it. I would answer by first having you note that most of the proposals creating a newsmen's privilege now provide that a newsman may not claim the privilege in a suit for defamation, which includes libel and slander. This means that the protection which we now have against irresponsible reporting, namely, a civil suit for defamation, would retain its vitality as a check.

Undoubtedly there are legitimate interests to be served by having newsmen testify as other citizens. Certainly it is desirable to have all the evidence possible before a court when a man's freedom of livelihood is at stake, or when society attempts to identify and punish an offender. The newsmen's privilege, as any testimonial privilege, must necessarily impede this search for truth to a degree. The question is whether, considering the effects on the flow of information to the public, it is worth it; and if so, can it still be drafted to accommodate the competing interests.

Newsmen's Privilege Bills

There are now three newsmen's privilege bills and one resolution pending in the Senate, and a multitude of bills introduced in the House. The Subcommittee on Constitutional Rights will hold hearings on the subject beginning February 20th.

The bills all concern themselves with four basic questions: First, should the privilege be a qualified or an absolute one. Those which provide a qualified privilege attempt to set standards which must be met by the person seeking the newsman's testimony in order for the privilege to be divested. The qualifications in all of the proposals, although differing in specifics, are intended to reconcile the competing interests involved. Those favoring an absolute privilege argue that it is impossible to accommodate the competing interests without critically limiting the newsmen's protection.

The second question is whether the privilege should apply to the states. While it is true that many of the recent cases involving a newsmen's privilege have come before state tribunals, one also must realize that to make the privilege applicable to the states, the Congress will be legislating a rule of evidence for use in state courts, and this would be an intrusion into an area of state responsibility which the Congress has not engaged in previously. It raises serious problems of federalism. No one, certainly not Congress, can assert an exclusive claim on wisdom. Here, as in so many cases, it is highly important to let all states make their own judgment on the balance of interests involved.

Who Is a "Newsman"?

A third area addressed by these proposals is the matter of who is a newsman. Who should be entitled to claim the privilege? The First Amendment applies to all citizens, and protects their right to publish information for the public. But the testimonial privilege can of course not be available for all. Thus, a serious problem of definition is posed. It must be broad enough to offer protection to those responsible for news reporting, and yet not so broad to shield the occasional writer from his responsibility as a citizen. Any attempt at defining the scope of the privilege is in effect a limitation on the First Amendment. It will confer First Amendment protection on some who deserve it and deny it to others with powerful claims to its mantle. Do we include scholars as well as reporters? The weekly and monthly press as well as the daily? Free-lance or just the regularly employed? TV cameramen? Underground papers? The radical press?

So difficult is this question that I would much have preferred the Supreme Court to adopt the wise and balanced approach of the 9th circuit in Caldwell. Some of these issues, if not the whole question of the newsmen's privilege, would be better left to a case-by-case development in the courts. Unfortunately that avenue is now closed for all practical purposes, and Congress must attempt to be as wise as the drafters of the First Amendment 200 years ago.

Procedural Mechanism for Asserting the Privilege?

Finally, there is the question of the procedural mechanism through which the privilege is claimed. As is often the case, the effectiveness of the substantive provisions may well depend on the method by which they are employed. In the case of the newsman, should the party who is seeking his testimony be required to show in advance of the issuance of a subpoena that the newsman is not entitled to protection under the statute? Should the newsman be required to answer a subpoena before he can claim the protection of the statute? And, if so, should he have the burden of showing that he is entitled to protection or should the party seeking the testimony have the burden of proving he is not entitled? The means by which the privilege is claimed or divested may, for all practical purposes, determine its effectiveness.

These, then, are the basic questions facing the Congress with respect to this legislation. The Subcommittee on Constitutional Rights, as I have mentioned, will receive testimony on the proposals during the last two weeks in February, and I am hopeful that the Subcommittee will be able to favorably report some sort of bill shortly thereafter.

The Threat of Ultimate Incarceration

A free press is vital to the democratic process. A press which is not free to gather news without threat of ultimate incarceration cannot play its role meaningfully. The people as a whole must suffer. For to make thoughtful and efficacious decisions — whether it be at the local school board meeting or in the voting booth — the people need information.

If the sources of that information are limited to official spokesmen within government bodies, the people have no means of evaluating the worth of their promises and assurances. The search for truth among competing ideas, which the First Amendment contemplates, would become a matter of reading official news releases.

It is the responsibility of the press to insure that competing views are presented. It is our responsibility as citizens to object to actions of the government which prevent the press from fulfilling this constitutional role. □

The People's Need To Know — I

Charles L. Whipple
Editor of the Editorial Page
The Boston Globe
Boston, Mass. 02125

"The American people's right to know is under the heaviest attack in our history."

Introduction

Recent Supreme Court decisions, the jailing of journalists, and much public rhetoric concerning the news media have all created considerable misunderstanding. These exaggerated viewpoints have had an unfortunate effect on the attitude of the press itself and of the public toward the press.

The Boston Globe thought it was time to take a careful, calm look at the controversy. This series of editorials is the result. Its conclusion: We need an unqualified Federal shield law. We believe we have presented a strong case for one.

The editorials were written by Charles L. Whipple, Editor of the Editorial Page, and originally printed in The Boston Globe January 21-27, 1973.

Davis Taylor
Publisher
The Boston Globe

A BILL OF COMPLAINT

How much do the people have a right to know? Merely to ask the question in the world's freest country is to answer it: Just about everything there is to know.

But some people in government and elsewhere would not agree. And so, today, the public's right to be informed by a free press under the protection of the First Amendment is under the strongest attack in our nation's history.

It is not only the press, which as we all know is far from perfect, that is under attack. Other basic liberties of the people are being eroded away also. And involved in them all is the well-being of the people, their ability to make a decent living, to speak freely and knowledgeably, to be able to tell whether they are treated fairly or are cheated, and if the latter is the case, to do something to change it. All this is basic in a democracy.

This was enunciated in the Bill of Rights, the first 10 Amendments to the Constitution, whose purpose was to protect the people from the power of government. They were written by men who remembered that, in the words of the Declaration of Independence, there had been under King George III "a long train of abuses and usurpations, pursuing invariably the same object . . ."

Only last fall, Harvard Law School Prof. Alan M. Dershowitz documented in The Globe what he called the erosion of liberties guaranteed by five of the 10 Bill of Rights Amendments.

— The First Amendment's "right of the people peaceably to assemble, and to petition the government for a redress of grievances," was involved when the government rounded up 12,000 war protesters in the 1971 May Day peace demonstration in Washington.

The courts later held that almost all of them were engaged in entirely legal behavior, but all were arrested and confined for up to 62 hours in a ballpark, in jampacked police cells, and in the Coliseum on vague charges or none at all, and without legal counsel except for government and other attorneys who themselves were caught in the net.

Attorney General Richard Kleindienst still believes these arrests were justified, citing Justice Oliver Wendell Holmes's dictum that freedom of speech does not include the right to yell "Fire!" in a crowded theater. But the courts dismissed the cases in wholesale lots, saying that "mass probable cause" was no cause at all and the whole proceeding had been "illegal," "injudicious" and "a charade."

— The Fourth Amendment's protection against "unreasonable searches and seizures" was involved when the Administration claimed to be exempt from a court warrant before it tapped or bugged conversations involving the national security.

More than 40,000 days of tapping and bugging were conducted without court approval in 1969 and 1970 alone, said Dershowitz. And last year a Senate subcommittee reported that "the number of wiretaps installed without court authorization is substantially greater than the Executive Branch has led the public to believe."

Here again the courts may have curbed the practice. In its last term the US Supreme Court held 5 to 4, the four dissenters being President Nixon's appointees, that a witness need not testify before a Federal

An Editorial Series, reprinted with permission from *The Boston Globe*, January 21-27, 1973.

Grand Jury if the government's investigation is based on illegal wiretapping. It was unanimous in overruling the Attorney General's claim that he needed no warrants to wiretap in cases of suspected domestic "subversion."

— The Fifth and Sixth Amendments' protection against self-incrimination and for right to counsel and a fair trial could vanish, said Dershowitz, if the Administration succeeds in trying to abrogate the rule under which illegally obtained evidence is excluded from trial.

— The Eighth Amendment's right to reasonable bail has been undercut, said Dershowitz, by the Administration's preventive detention law allowing imprisonment of suspects not because of what they have done, but because of what it is thought they might do. This year-old law, operative only in the District of Columbia, has been used only 20 times or so, but its implications of preventive imprisonment are frightening.

These areas of erosion of liberties do not perhaps concern the average citizen unless and until he gets into legal difficulties. But there is another area in which he is concerned all the time—his right to information. And here the erosion of his right to know is occurring almost daily.

Part of the blame, we feel obliged to say, lies with the press itself. It could too often have been more fair and more accurate, less sensational and more willing to admit its faults. Some newspapers are trying in this direction, but not all. Perhaps what is needed is a truly fair code of ethics for the press.

But a free press does not mean necessarily a press that is all good. It means a press in which the good has a fighting chance to correct the bad, because there is freedom for the truth to find its way. And pressure of any kind from government inhibits that freedom, and so keeps the truth from the people. Here are some examples of such pressure:

— Five newsmen in printed and electronic journalism have already gone to jail in the recent past for contempt of court in refusing to divulge their confidential sources of material. At least half a dozen others across the country face possible jail terms, and the number is growing.

— Vice President Spiro Agnew, in his Des Moines speech of Nov. 13, 1969, attacked the television networks for their "instant analysis and querulous criticism" of a speech by President Nixon, and warned that they enjoyed "a monopoly sanctioned and licensed by government."

It had its effect. A few days later there was only the spottiest television coverage of the largest march on the White House in American history—more than 500,000.

And also a few days later, White House Communications Director Herbert Klein, on the same day Press Secretary Ronald Ziegler was denying any attempt to suggest censorship, said Agnew's criticism should be extended to newspapers as well. It soon was.

— Mr. Agnew responded with his Montgomery, Ala., speech of Nov. 20, 1969, attacking the Washington Post and New York Times and the "trend toward the monopolization of the great public information vehicles and the concentration of more and more power over public opinion in fewer and fewer hands."

— Soon Dean Burch, Mr. Nixon's new chairman of the Federal Communications Commission, was asking the TV networks for transcripts of their commentaries on Mr. Nixon's speech.

— And at about this time, Federal investigators began subpoenaing the files and unused photos of Time, Life, and Newsweek on the Weathermen, a radical offshoot of the Students for Industrial Democracy.

— Three years and a month after Agnew's attack, Clay T. Whitehead, now Director of the White House Office of Telecommunications Policy, made a speech Dec. 18, 1972. (Like Agnew's, it had been written by White House aide Patrick Buchanan, himself a former editorial writer.)

Whitehead said new legislation had been prepared to make TV stations responsible for all network material they carried, and he added this warning:

"Station managers and network officials who fail to act to correct imbalance or consistent bias in the networks — or who acquiesce by silence — can only be considered willing participants, to be held fully accountable . . . at license renewal time."

The threat was all but explicit, for the requirement of balance and fairness already existed in FCC regulations as a factor in license renewal. It came as no surprise, then, that two rival groups, both with connections to the White House, applied at renewal time last month for the Florida TV station owned by the Washington Post. The station had helped block Mr. Nixon's nomination of G. Harrold Carswell to the Supreme Court by uncovering his 1948 pro-segregation speech.

All of the above are but some of the items in a bill of complaint showing that the American people's right to know is under the heaviest attack in our history. Others, as well as what can be done about it, will be discussed in later editorials.

THE PRESIDENT AND THE PRESS

How much should the American people be told by and about their President? The question is almost as old as the nation itself. Most Presidents have, at one time or another, disliked what the press said. Even Abraham Lincoln was maligned in print as "an ape" and in other unseemly ways.

Yet the people want to know all that is important about the man they send to the White House. And unless they are given all points of view about it, their knowledge is diminished and they are less able to judge.

One means of judging is the presidential press conference. President Nixon, though he almost always makes a strong and favorable impression at them, has held far fewer of them than any other President in four decades.

His total in four years is 27, while the average for his four predecessors (Truman, Eisenhower, Kennedy and Johnson) was from 24 to 36 a year. Franklin Roosevelt held them twice a week, then weekly during World War II.

To be sure, the latter had as an alternative only the "fireside chat" by radio, not television, whereas Mr. Nixon can command a nationwide TV audience any time at the press of a button. Also involved here is what President Nixon thinks a press conference should be.

And on this some light has been shed. Newsmen will never tire of recalling that in a moment of defeat and extreme fatigue, Mr. Nixon once

said; "You won't have Dick Nixon to kick around any more." Vice President Agnew once said, "I believe you should be able to have a press conference without having reporters key in on certain divisive issues."

This desire for national unity, with its corollary of suppressing dissent, is perhaps behind it all. President Nixon expressed it last May when he said, on resuming the bombing in Vietnam, "The great editors and publishers and television commentators and the rest have ... the necessity to stand by the President of the United States when he makes a terribly difficult and unpopular decision."

People may honestly differ about the need for healthy criticism at such a moment. We think that in a democracy such a decision should be widely discussed and debated. But in any case, what can be said to defend the request of the White House that FBI agents conduct security investigations of CBS reporter Dan Schorr and New York Times reporter Neil Sheehan, who had written his newspaper's Pulitzer Prize-winning stories on the Pentagon Papers?

Those papers concerned past history, events, and decisions in the Vietnam War only up to 1968, entirely prior to Mr. Nixon's entering the White House.

Their publication, and the prosecution of four newspapers for it, involved an historic test of freedom of the press under the First Amendment, and one that has been widely misunderstood. It was a blatant attempt to impose censorship, and it failed.

But what is not so well known is that the way was left open for later attempts to muzzle the press. Let us explain.

The US Supreme Court on June 30, 1971, held by a 6 to 3 decision that "prior restraint" — meaning a court order not to print something — was unconstitutional. And this was most important.

Under the Alien and Sedition Act of 1798, editors were jailed not for what they were about to print, but for what they had already printed. Even John Peter Zenger in 1735 was jailed for 10 months after he had published, not before, and then a jury of his peers acquitted him after his counsel pleaded truth as a defense.

The Pentagon Papers case involved, for the first time ever on such a scale, a serious and for two weeks successful court effort by the government to prevent publication. And while the effort failed in the end, enough of the Supreme Court's majority to turn the case around went out of their way to say in dicta that the newspapers might be prosecuted after publication.

Charles Rembar, a New York author and lawyer, wrote later, "The decision should have said: The press is free to publish the Pentagon Papers. Instead it said a lesser thing: the press is free from suit for an injunction. And, most of the Justices added, the publishers had better watch their step; they may very well go to jail after they exercise their freedom."

While inadequately publicized in our opinion, this point has not been lost on the Administration. In many ways, and capitalizing on the unfortunate belief of too many that the press seeks an elite and privileged position, it has moved to limit the freedom to inform the public.

In one area concerning classified information and a claim that national security is involved, it is moving to acquire more sweeping powers of secrecy and censorship than it ever had; in another it is moving to deprive the press of its secret sources of information and its right to print that information.

The former is an issue in the current West Coast trial of Daniel Ellsberg and Anthony Russo. Men may and do differ over whether Ellsberg was right in releasing the Pentagon Papers as he admits doing, but the case also concerns the making of new law on domestic dissent and publication.

The two are charged among other things with violating the Espionage Law, which until now has required for conviction an "intent or reason to believe that the information. ... is to be used to the injury of the United States or to the advantage of any foreign nation." But the indictment charges them with communicating the documents only to "persons not entitled to receive them."

Here the courts will have to decide, in essence, whether it is a criminal offense to violate an Executive Order rather than a statute of Congress. Ellsberg and Russo are charged with conspiracy to "defraud" the government of its "lawful function" of withholding classified information. But Congress has never put such a crime into the statute books nor made the withholding of classified information a lawful function.

On the contrary, Congress specifically wrote into an Espionage Law amendment the provision that "Nothing in this Act (18 USC 7I3) shall be construed to authorize, require or establish military or civilian censorship or in any way limit or infringe upon freedom of the press or of speech guaranteed by the Constitution of the United States, and no regulation shall be promulgated hereunder having that effect."

The goverment claims an inherent or implied power under which certain behavior is criminal. Many experts say that if the courts uphold it, the government can make it a crime to make public anything on which it chooses to place a classification stamp, and there will be almost no limit on government's capacity to do anything it chooses.

This poses a problem for both the press and a public which wants to know what the government is doing.

HOW BAD IS THE SECRECY?

Almost all Americans would agree that except for military secrets whose public disclosure would help an enemy, they have a right guaranteed in the Constitution to information about what is going on in their government.

But the fact is that a massive bulk of such information is being denied them, and the press is being increasingly hamstrung in its efforts to get it for them. And even the government itself has realized this.

That is why Congress passed in 1967 the Freedom of Information Act, which was supposed to open up such information. Instead the reverse has happened. Bureaucratic resistance continues to thwart the right to know even when secrecy is not a factor; requests for reports and records are denied as being too general, or outrageous fees are demanded to conduct searches for information.

Washington reporters say that even under the new law they are unable to obtain information concerning bids for government contracts — or even in one case, the guest list for a White House social function. The latter is, of course, pretty trivial, but what happens to the taxpayers' money is not.

And besides the bureaucratic obstacles, an increasingly vast segment of information is stamped "Secret" or "Top Secret." On June 25, 1971, the Defense Department's recently retired top expert on classification told a House hearing that 99½ percent of the Pentagon's 20,000,000 classified documents should not be classified at all.

Even a note saying that the "Top Secret" label was being misused was itself being marked "Top Secret," he testified. Other witnesses, not retired, who testified about the waste in government war orders or in other areas have been quickly fired or demoted and disciplined. Even Congress has trouble getting all the facts.

Government began to classify documents in a massive way in World War II. President Truman continued it under an Executive Order. President Eisenhower thought he was modifying and relaxing Truman's directive when he issued Executive Order No. 10501 in 1953. It might have worked. But he followed it with a letter to Secretary of Defense Charles E. Wilson on May 17, 1954, saying that records sought by Sen. Joseph McCarthy's investigating committee were not to be handed over and Congress had no right to compel disclosure of Executive Department documents.

And behind this blanket ruling the tinhorn bureaucrats and worse have been hiding and concealing information ever since. The public was told less and less. The press had to rely more and more on confidential sources.

Scholars, too, had more problems. To give one example, it took nine and 12 years respectively before two diligent authors, Jules Roy and Bernard Fall, could disclose in their books in 1963 and 1966 that in 1954 John Foster Dulles had offered French Foreign Minister Georges Bidault two atomic bombs to save Dien Bien Phu. (The offer was declined.)

Even then, their source was not the government in Washington, but the French national archives. Bidault himself confirmed it in 1965. Fall wrote in 1966: "It is now up to official American sources to confirm or deny that version." They have never done so.

Within the last year the Central Intelligence Agency persuaded a New York book publisher, Harper & Row, to turn over to it the galley proofs of a book alleging CIA connivance in the heroin traffic in Southeast Asia, but the publisher refused the CIA's request that portions of the book be changed or deleted.

The agency had better luck, however, with a novel on spy sleuthing and non-fiction articles about it by a former CIA employee, Victor L. Marchetti. Last May a Federal court ruled he must submit his manuscripts to the agency so secret information could be censored. Last Dec. 11 the US Supreme Court rejected his appeal based on the First Amendment.

Many academic people and almost all law professors do not believe a scholar can claim a First Amendment privilege. They say scholars are supposed to reveal their sources and that is what footnotes are for. One who tried to claim it, and failed, was Samuel L. Popkin, a Harvard assistant professor.

He claimed immunity to protect confidential sources in government. Though he had testified he knew nothing about how the Pentagon Papers became public, he refused to answer two questions before a Federal Grand Jury in Boston investigating the matter.

During an academic discussion of the case, the late Prof. Merle Fainsod of Harvard made an interesting point. One of his great books had been a study of Smolensk under Soviet Communist rule, based on archives which the Germans had captured and later fell into the hands of the US Army.

Fainsod said he had refused to study these archives until they were declassified. His point was that scholarship depends on open sources. Indeed, Harvard and many other universities have refused academic standing to classified research, and properly so — it is too apt to be loaded. Yet the problem would not exist at all if government were open.

As for Popkin, his claim of immunity was denied, and he became probably the first American scholar to be imprisoned for protecting his sources of information. He served eight days in jail for contempt over last Thanksgiving, and was released only when the grand jury was dismissed after Harvard's top administrative officials had supported him in court and gone to Washington in his behalf.

His jailing was not too surprising. Five months earlier the US Supreme Court had held that newspapermen have no legal privilege under the First Amendment to refuse to provide grand juries with confidential data. A fateful period had begun both for journalism and the people's right to know.

THE CALDWELL DECISION

A delicate balance between the people's right to know and government's need for information to prosecute was upset on June 29, 1972 by the Caldwell decision.

This was a 5-to-4 Supreme Court ruling that newspapermen had no legal privilege under the First Amendment to refuse to provide Grand Juries with confidential data. And whereas the high court a year earlier had held that newspapers cannot be ordered by a judge not to print the news, it now held in effect that newspapers can be prevented from obtaining much of the news in the first place.

Three cases were involved, two concerning race relations and the other, drugs. Earl Caldwell, a black New York Times reporter, had gained the confidence of the Black Panthers on the West Coast and done outstanding reporting on them. Paul Pappas of WTEV-TV, New Bedford, Mass., had been admitted to a Black Panther headquarters after agreeing to protect confidences. Paul Branzburg, then of the Louisville (Ky.) Courier-Journal, after promising to keep their names secret, had gotten photos and interviews of two youths making hashish from marijuana.

All three involved Grand Jury probes and refusals to testify. Caldwell had quoted in print Panther leader David Hilliard as saying "armed struggle" was the only solution to oppressive government.

As Justice Potter Stewart said in his dissent, this was the only "factual showing" of a probable or attempted commission of a crime, and even on this point "Caldwell was subpoenaed two months after an indictment was returned against Hilliard, and that charge could not, subsequent to the indictment, be investigated by a Grand Jury." In fact, the indictment itself was later dismissed after the government refused to disclose its logs on bugging Hilliard.

Justice Byron R. White, a Kennedy appointee, joined by the four Nixon appointees to the court, wrote the majority opinion. Justice Lewis F. Powell Jr. wrote a concurring and perhaps significant opinion. They and the two dissents are described in some detail here, for in one of its own failings they were too much ignored by the press itself last summer.

Justice White seemed to put the emphasis on newspapermen versus the public, rather than on informing the public.

"Newsmen are not exempt," he wrote, "from the normal duty of appearing before a Grand Jury and answering questions relevant to a criminal investigation ... We are asked to ... grant newsmen a testi-

monial privilege that other citizens do not enjoy. This we decline to do."

He said some informants wanted anonymity "presumably ... to escape criminal prosecution," and he denied that confidential sources "will in fact dry up." Quite often, he continued, such informants belonged to "a minority political or cultural group" wanting to "propagate its views."

"We cannot accept the argument," Justice White continued, "that the public interest in possible future news stories about crime from undisclosed, unverified sources must take precedence over the public interest in pursuing and prosecuting those crimes."

Congress and the states could, he said, "determine whether a statutory newsmen's privilege is necessary," and "at the Federal level the Attorney General has already fashioned a set of rules ... in connection with subpoenaing members of the press" which "may prove wholly sufficient ..." Any "official harassment of the press," he said, would "have no justification" and be controllable by judges.

Justice William O. Douglas wrote one dissent, attacking "the timid, watered down, emasculated versions of the First Amendment" advanced by both the government and the New York Times. "Today's decision will impede the wide-open and robust dissemination of ideas and counterthought which a free press both fosters and protects ...

"The function of the press is to explore and investigate events, inform the people what is going on, and to expose the harmful as well as the good influences at work. There is no higher function performed under our constitutional regime ... A reporter is no better than his source of information. Unless he has a privilege to withhold the identity of his source, he will be the victim of governmental intrigue or aggression ..., his sources will dry up and the attempted exposure, the effort to enlighten the public, will be ended ...

"The intrusion of the government into this domain is symptomatic ... Now that the fences of the law and the tradition that has protected the press are broken down, the people are the victims."

To many, the Holmes-Brandeis days were recalled by the other dissenting opinion by Justice Stewart, joined in by Justices William J. Brennan Jr. and Thurgood Marshall, which seems to have elicited Justice Powell's opinion concurring with the majority.

The first sentence set the tone: "The Court's crabbed view of the First Amendment reflects a disturbing insensitivity to the critical role of an independent press in our society." He conceded there was "some hope of a more flexible view in the future" in "Mr. Justice Powell's enigmatic concurring opinion," but said the court "invites state and Federal authorities to undermine the historic independence of the press by attempting to annex the journalistic profession as an investigative arm of government ...

"After today's decision, the potential informant can never be sure that his identity or off-the-record communications will not subsequently be revealed through the compelled testimony of a newsman. A public-spirited person inside government, who is not implicated in any crime, will be fearful of revealing corruption or other governmental wrongdoing, because he will now know he can subsequently be identified by use of compulsory process. The potential source must, therefore, choose between risking exposure ... or ... remaining silent."

Like legislative investigations, Grand Jury probes might be too broad, said Justice Stewart, and so the government must show probable cause to believe the newsman's information is clearly relevant to a specific probable law violation, that it can be obtained by no other means, and that there is "a compelling and overriding interest" in it. He predicted that "in the name of advancing the administration of justice, the Court's decision ... will only impair the achievement of that goal."

Now let us turn to Justice Powell's concurring opinion, in which Justice Stewart saw "some hope." Clearly nettled by his colleague's words, Justice Powell stressed "the limited nature of the Court's holding. The Court does not hold that newsmen ... are without constitutional rights ... in safeguarding their sources.

"Certainly, we do not hold, as suggested in the dissenting opinion, that state and Federal authorities are free to 'annex' the news media as 'an investigative arm of government.'" No harassment of newsmen would be tolerated, and where there was no legitimate need of law enforcement or the information bore "only a remote and tenuous relationship" to a probe, a newsman could go all the way to the high court.

The newsman's claim to privilege, said Justice Powell, "should be judged on its facts by the striking of a proper balance between freedom of the press and the obligation of all citizens to give relevant testimony ..." It must be done "on a case-by-case basis."

This could mean that in some future case Justice Powell, with the swing vote in the Caldwell case, might switch to the other side. But it hasn't happened yet, and with President Nixon almost certain to make more appointments to the Supreme Court by 1977, the prospect of reversing Caldwell is not bright.

Moreover, it is clear now that both the courts and the bar, to say nothing of prosecutors, are moving in other ways to restrict the press and thus the flow of information to the public.

SHOOTING AT THE PUBLIC

Every time a newsman goes to jail for refusing to disclose a confidence, a part of the truth goes with him behind the bars, and is kept from reaching the public. This is so because often only a confidential source will tell the truth.

The campaign against the press, and thus against information people want to know, so far has seen five newsmen in printed or electronic journalism go to jail (four of them since the Caldwell decision) for contempt in refusing to divulge their confidential sources or material.

And at least half a dozen others across the country face jail terms for this offense or for printing information about court cases that violate a judge's gag rule.

The jail terms served so far range from only two hours to 45 days. The five cases involved:

— Edwin A. Goodman, a New York radio station manager who in 1970 served 44 hours of a 30-day sentence for refusing to produce tape recordings of interviews made in a prison riot.

— William T. Farr, a former Los Angeles Herald-Examiner reporter, jailed for 45 days and now out on appeal, for refusing to tell who gave him information in violation of a judge's "fair trial" or "gag" rule.

— Peter Bridge of the now defunct Neward (N.J.) Evening News, imprisoned for 20 days last fall after refusing to answer certain questions about a bribe story before a county grand jury.

— Harry Thornton, a Chattanooga, Tenn., TV personality, jailed for several hours last Dec. 5 for refusing

to name a phone caller who said on the air that he was on a grand jury and its probe of a former judge had been a whitewash.

— John F. Lawrence, Washington bureau chief of the Los Angeles Times, jailed for two hours last Dec. 19 for refusing to give the court tapes of an interview involving the Watergate bugging case.

We must say in all candor that two of these cases (Bridge and Farr) involved sensationalized reporting, but this was not the issue. The issue was the people's right to know, and it went to jail along with Bridge and Farr. As the New York Times has said editorially, "The meanest cases often result in the most embracing and destructive trespasses on basic liberties."

Both cases involved a state "shield law" (18 states have them) giving newsmen immunity from being compelled to name confidential sources. But the courts ruled that Bridge had given up his immunity when he identified his source, and that Farr lost his when he ceased being a reporter.

Bridge, during a battle by Newark's Mayor Kenneth Gibson for control of the Housing Authority, had published that an Authority commissioner, Mrs. Pearl Beatty, told him "an unknown man offered to pay her $10,000 to influence her vote for the appointment of an executive director." The county prosecutor subpoenaed Bridge after Mrs. Beatty gave a different version. Bridge balked at answering five questions.

Some might say his story, lacking hard facts, was vulnerable. But we submit that his right to print it was unassailable. How else, if there were in fact a bribe offer, could the public learn of it? And if there were not, often only press freedom could bring that to light also.

The essence of freedom of the press is that it must always include the right to print stories that may be unwise or even wrong. If they are and there has been libel, a newspaper always is and should be held accountable in court—there is no special privilege here. But apart from libel, only thus can errors be corrected and readers learn, quickly or eventually, what the facts are.

William T. Farr's case involved a "fair trial" or "gag rule" in the Charles Manson murder case. Judge Charles H. Older invoked it during the trial, and after headlines telling how President Nixon himself had expressed an opinion that Manson was guilty (for which Atty. Gen. John Mitchell later issued an apology).

Under threat of contempt the judge barred all lawyers, defendants, witnesses, police and other court officers from giving information to the press. Two of the six lawyers and another person nonetheless gave Farr information including a witness's statement that was not going to be part of the testimony. It concerned the Manson family's alleged plans to kill movie stars Frank Sinatra, Elizabeth Taylor, and others.

The judge told Farr it would help a fair trial if it were not printed and it would be serious if the jury learned of it. He noted that the shield law covered Farr but asked him to reveal his source anyway. Farr refused, but did warn Judge Older before publication so the material could be kept from the jury. This enabled the judge to deny a motion for mistrial when the story appeared.

The judge's formal contempt hearing came seven months later. Farr declined to name his sources and was held in contempt. All of the six lawyers, who must have included two of the three sources, denied under oath that they had violated the judge's rule.

Farr was sent to jail after the state courts found that his immunity was canceled by his "wilful violation of a lawful court order," and the US Supreme Court let the finding stand. We believe the judge's order was justified when directed at lawyers, court officers and witnesses, but was an invasion of press freedom when it was twisted to send a reporter to jail.

For a long train of abuses can result from it. More than a score of press contempt cases are now pending across the country. Trials are now being held in secret on some occasions, one of them in California, and without any record of the secret proceedings being provided later. It is small wonder that William F. Thomas, editor of the Los Angeles Times, wrote recently: "The day judges sucessfully seized the power to say who shall speak outside the courtroom, and when, and about what, we should have heard echoes from the past."

Early last December, Federal Judge John R. Bartels in Brooklyn, N.Y., threatened to hold editors and reporters in contempt, during an extortion trial of a Teamsters Union official, if newspaeprs continued to print what he called prejudicial and irrelevant material that did not come out of the courtroom.

Specifically, he objected to a New York Daily News statement that the defendant had been "long a target of local and Federal low enforcement officials." The New York Times was criticized for having said the defendant "has a long criminal record" and his union members "handle cargo at Kennedy Airport."

Both papers argued that the people had a right to know more than just what went on in court, and the jurors had been warned not to read the news stories. The judge at one point suggested an independent body be set up to decide what information the public needed and wanted.

But not all judges want to gag the press. In a civil case, the three-man US Court of Appeals for the Second Circuit (New York) last Dec. 6 cited US Supreme Court Justice Powell's concurring opinion in Caldwell to uphold a journalist's right to refuse to disclose a confidential source. Alfred Balk, now editor of the Columbia Journalism Review, had refused to identify the source of a magazine article he wrote in 1962 about racial discrimination in real estate. But the case has not reached the Supreme Court.

Nor did another involving the Watergate bugging. The appeal last month of the Los Angeles Times's Washington bureau chief John Lawrence, jailed for two hours Dec. 19, ended when the news source — a key prospective witness — released the paper from its agreement to keep secret the tapes of an interview with him. The defense had wanted the tapes, most of whose information had been printed anyway, for use in cross-examination. The tapes were then handed over to the court for its own editing.

It was not, as the Washington Post observed, an occasion for bell-ringing by the press. But it was the first in which a newspaper editor went to jail, however briefly, for using the First Amendment privilege. In one sense we hope it sets a precedent.

Instead of sending reporters to jail for trying to do their job by informing the public, it would be fairer for their editors and publishers to suffer this unjust penalty — if indeed it must be imposed at all.

This latter question is still pending not only in other court cases, but in moves being made in the judiciary and Congress that are all but hidden from the public view.

(Continued in the next issue.)

The Monopoly by IBM of the Software Industry: Position Paper

J. L. Dreyer, Executive Vice President

ADAPSO: Assoc. of Data Processing Service Organizations, Inc.
SIA: Software Industry Association
551 Fifth Ave., New York, N.Y. 10017

"In some respects computer programs and hardware are interchangeable; hence one can say that a new computer program is similar to a new machine."

Introduction

ADAPSO/SIA is the trade association representing the software segment of the computer industry. Its members are engaged in the marketing of software products and software services to computer users and to hardware manufacturers.

We believe that IBM Corporation is currently, and has been since before the announcement of System/360, monopolizing in the area of software product development for IBM computers. This monopolization, which has resulted in the inefficient use of IBM hardware by the Government and by commercial users, is a major contributor to high cost and poor utilization of computers.

Consequently, this paper requests the Justice Department to eliminate what we believe to be unfair competition and illegal practices under the current law of the United States.

How IBM's Current Software Products Monopoly and Policies Hurt All Users of IBM Hardware

An extremely important and often overlooked factor contributing to poor computer usage is the cost and quality of the required software (programming) effort. The performance of hundreds of thousands of programmers is directly a function of the software tools available to them. Operating systems, computer languages, compilers, programming aids, performance measurement systems, sorts, data management packages, and other software are currently being given ostensibly "free" by IBM to users of IBM computers. ADAPSO/SIA believes that over the last fifteen years IBM has profited by this monopoly of the software industry to the detriment of all users of IBM computers.

It is well known that although IBM does market software capabilities, they normally price only their hardware. As a result, IBM is motivated to produce the minimal software necessary to sell computers, or to produce software that maximizes the utilization of its hardware. Each software expenditure is evaluated in terms of its contribution to selling more hardware. Under such conditions, the user is the loser, since independent software companies which cannot compete against ostensibly free or mispriced software are forced out of the market. Thus, less revolutionary computer software is developed and fewer innovations or improvements are made.

IBM's monopoly over the software industry, therefore, is a real contributor to the ineffective use of computers, rather than IBM's control of the hardware industry. Substandard software, as fostered by the current non-competitive climate, increases the cost of computer usage and the number of day-to-day problems encountered by computer users.

It is important to recognize that the efficient utilization of computer hardware is dependent on the software or data services being used. Good software, therefore, must not simply work, but it must work as effectively as possible to minimize overall operating expense. This objective is patently inconsistent with IBM's goal of maximizing the number of installed mainframe computers, which is particularly true of the manufacturer (IBM) which has captured more than majority of the market.

To the extent that a computer buyer uses the software and services so supplied by IBM, the user may experience poorer equipment utilization and excessive equipment requirements. There is less incentive to IBM — indeed, there is a penalty — to supply optimum software or services. Further, there is no incentive to IBM to cooperate with or contribute to the formulation of standards that would minimize in any way the computer run time necessary for widely used programs.

Finally, it must be recognized that, by virtue of its dominant position within the industry, IBM conditions that market so that both users and competitors are forced to react rather than initiate.

Problems in Competing with IBM

The difficulties in offering viable alternative sources of software to the computer-using community are compounded by IBM's marketing policies and practices. The obstacles to be confronted include:

(a) "Free" Competition
Software manufacturers must compete against "free" IBM products or services whose costs are actually buried in the price of hardware.

(b) Unfair Sales Practices
IBM offers "tied-in" products or services which are selectively priced and/or supported in such a way as to preclude potential competition.

(c) Inadequate IBM Product Information
Many software products or services must be developed with less than adequate background information necessary to interface with existing IBM systems — either hardware or software.

(d) Pre-announcements
IBM competition must cope with software which is pre-announced and not even available from IBM. Further, competitive software products and services must be continually modified to interface with IBM products and services that have been released prematurely or redesigned specifically to eliminate competition rather than to better serve the customer.

(e) User Descrimination
Finally, IBM's competitors who use IBM equipment frequently find themselves discriminated against by IBM — i.e., they do not require the same services as do other IBM customers, but they still must pay for such unused products and/or services due to semi-bundled prices.

(f) Pricing Advantage Due to Size of IBM
Due to the size of IBM's market base, they have a pricing advantage over competitors. The cost of a software (or hardware) product can be initially spread out over such a large potential base that a unit price can be set at a low enough level to exclude competition.

Vertical vs. Horizontal Separation

ADAPSO/SIA does not believe that the classical anti-trust relief of dividing IBM into several computer hardware companies (i.e., a vertical break-up) will be to the short- or long-term benefit of the public, of other users of computers, or of the software products industry.

This proposed vertical restructuring of IBM could result in incompatibility between IBM computer hardware and software and also in increased costs in the overall development of software products. Therefore, ADAPSO/SIA recommends, as an alternative structure to reduce IBM's influence over and share of the computer market, that IBM be separated into at least two organizations — a hardware organization and a software products/services organization.

Since IBM now controls the software products and service markets, ADAPSO/SIA further believes that the Justice Department must place special safeguards and restraints on IBM to prohibit their continued control over these markets.

Proposed Relief

If the Justice Department and the Government expect to improve and simplify the operational use of computers and to reduce the costs of programming for Government users and the business world, the following steps must be taken:

1) IBM may not directly or indirectly tie in its hardware and software marketing efforts. To that end, IBM must be required to separate its software development and marketing so as to be separate and independent from its hardware operations.

2) All IBM software, both existing and planned, must be priced on a basis which yields a return and reflects all associated costs, separate and apart from its hardware.

3) Safeguards must be implemented to insure that a competitive software industry, once established, will remain outside the domain of IBM. One such safeguard would be to require that the entire new IBM software organization receive information on new IBM developments only at the same time that it is released to independent software companies.

4) The IBM software organization would be required to release comprehensive software interface specifications to all interested independent software companies at the same time it releases it to its hardware organization.

5) Neither IBM nor its software organization should be allowed to announce any software products prior to availability for general use.

Separation of the IBM Software Organization from the IBM Hardware Organization

The new IBM software organization should be separate from the IBM hardware organization as follows:

1) Separate physical equipment purchased on an "arm's length" basis from any manufacturer, with no favored terms and conditions.

2) Separate physical facilities.

3) Separate personnel, with no standardized policy of transfer or promotion between organizations.

4) Separate accountability published and made available to the same extent as would be produced for a completely separate public corporate structure.

5) Separate name, which is not identified with IBM for advertising or marketing purposes.

6) Prohibited preferential references or recommendations to third parties by either organization, except on an objective basis fairly reflecting competitive terms and conditions.

7) No advances of capital or loans between divisions, except on terms available generally to third parties.

8) Exchange of services and products between divisions only on the "arm's length" basis as available generally to third parties.

The 1956 Consent Decree

ADAPSO/SIA believes that the Justice Department can quickly develop a competitive software products industry by applying the principle of the 1956 Consent Decree which states in part:

> "IBM is hereby enjoined and restrained from conditioning the sale or lease of any standard tabulating or electronic data processing machine (which shall include any machine unit on a separate base even if in normal use it is mechanically or electrically connected with another such machine unit) upon the purchase or lease of any other standard tabulating or electronic data processing machine."
>
> "Electronic data processing machine" shall mean a machine or device and attachments therefore used primarily in or with an electronic data processing system.
>
> "Standard tabulating machine" or "standard electronic data processing machine" shall mean a tabulating machine or an electronic data processing machine manufactured by IBM and made generally available to its customers.

IBM's own senior patent attorney spoke of the interchangeability of hardware or software in the following public statement:

> "First, in some respects computer programs and hardware are interchangeable; hence one can say that a new computer program is similar to a new machine."

ADAPSO/SIA respectfully insists that the principles of the 1956 Consent Decree be enforced relative to IBM's current and previous practice of tying together the computer software machine and the computer hardware machine.

In summary, we believe it is imperative that the Justice Department bring all legal weapons to bear in order to develop a competitive software products industry. □

The New Orleans Portion of the Conspiracy to Assassinate President John F. Kennedy

Article 1. Introduction

by Edmund C. Berkeley

On November 22, 1963 in Dallas, Texas, President John F. Kennedy, while riding in an open limousine through Dealey Plaza and waving to the surrounding crowds, was shot to death. Lee Harvey Oswald, an ex-Marine, and former visitor to the Soviet Union, was arrested that afternoon in a movie theatre in another section of Dallas; that night he was charged with shooting President Kennedy from the sixth floor easternmost window of the Texas School Book Depository Building overlooking Dealey Plaza. This act Oswald denied steadily through two days of questioning (no record of questions and answers was ever preserved). Two days later while Oswald was being transferred from one jail to another, he was shot by Jack Ruby, a Dallas night-club owner, in the basement of the Dallas police station, while millions of Americans watched on television. The commission of investigation, appointed by President Lyndon B. Johnson, and headed by Chief Justice Earl Warren of the U. S. Supreme Court, published its report in September 1964, and concluded that Oswald was the sole assassin and that there was no conspiracy.

The conclusion of the Warren Commission cannot be considered true by any person who carefully considers the crucial evidence — such as the physics of the shooting, the timing of a number of events, and many other important and undeniable facts. In other words, Oswald was not the sole assassin, and there was in fact a conspiracy.

Oswald played a role in the conspiracy, although there is conclusive evidence that on November 22, 1963, he did no shooting at President Kennedy, and that, just as he claimed when he was in the Dallas jail, he was a "patsy". At least three gunmen (and probably four) — none of whom were in the sixth floor easternmost window of the Texas School Book Depository Building where the Warren Commission placed Oswald — fired a total of six shots at President Kennedy.

One of these shots missed entirely; one hit Governor John B. Connally, Jr. of Texas, riding with Kennedy; and four hit President Kennedy, one in his throat, one in his back, and two in his head. The bulk of the undeniable evidence for these statements about the shots consists of: (a) the physics of the motions of Kennedy and Connally shown in some 60 frames of the famous color movie film by Abraham Zapruder, a bystander accidentally photographing at the crucial seconds; (b) the locations of the injuries in Kennedy and in Connally; and (c) more than 100 pictures, consisting of more than 30 still photographs and more than 70 frames of movies.

More than 50 persons were involved in the conspiracy at the time of firing the shots.

The New Orleans Trial of Clay Shaw

One of the largest additional installments of new public evidence came out of three weeks of court testimony given in New Orleans, Feb. and March, 1969, when District Attorney Jim Garrison charged Clay Shaw with having a part in the conspiracy to assassinate President Kennedy.

The trial was accurately and very fully reported in The Times Picayune, Feb. 7, 1969 to March 2, 1969, the leading daily paper in New Orleans, published since 1847. The record of the trial as published in The Times Picayune contains much solid evidence that:

1. Clay Shaw did know and meet with Lee Harvey Oswald (dead), David Ferrie (dead), and Jack Ruby (dead), and exchange money with them. Twelve witnesses saw them together in twos and threes, at various times and places.

(*Note:* Much of this introduction is based on the article "The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence" by Richard E. Sprague, published in *Computers and Automation,* May, 1970.)

2. There were at least three gunmen in Dealey Plaza firing at President Kennedy on November 22, 1963, from at least two directions, and therefore there was a conspiracy.

What Garrison failed to prove to the satisfaction of the New Orleans jury was that Clay Shaw was involved in the conspiracy in Dallas.

Prior to District Attorney Jim Garrison's trial of Clay L. Shaw in New Orleans in February and March, 1969, public opinion polls in the United States showed that over 75 percent of the people in the United States believed that there was a consiracy. The press, radio, and TV, however, almost everywhere in the United States reported Garrison's investigation and the New Orleans trial in a very distorted way. Furthermore, Garrison did not prove to the satisfaction of the New Orleans jury that Clay Shaw was involved in the conspiracy, even though he presented much solid evidence that Shaw knew and met Oswald. This Shaw denied, laying himself open to the charge of perjury.

The news media of the United States (except for two newspapers in New Orleans) reported the trial in such a way as to show that no conspiracy existed, and that Garrison was ridiculous. The media largely succeeded in changing U.S. public opinion, if we judge from the falling off of poll percentages.

Oswald's Message to the FBI

Among other evidence collected by Garrison is the fact that Oswald telephoned the Dallas, Texas, office of the FBI on November 20, 1963, and told them that President Kennedy was going to be assassinated on November 22. An FBI teletype message was sent that day to J. Edgar Hoover with that information. A repeat teletype message with that information was also sent on that day to the New Orleans office of the FBI, apparently because of Oswald's former presence in New Orleans.

A clerk in the New Orleans office of the FBI revealed the existence of the teletype message, and gave a deposition to that effect to Garrison. No statement about this message appears in the Warren Commission Report, in the twenty-six accompanying volumes, or in the Warren Commission Archives.

The Zapruder Movie Bootlegged

Probably one of the really important consequences of the 1969 trial of Clay Shaw by Garrison was an incidental byproduct — the bootlegging of copies of the Zapruder movie, a direct copy of which was subpoenaed by Garrison.

Of all the photographs taken in Dealey Plaza on that fateful day, the color movie sequence of some 480 frames taken by Abraham Zapruder is the most important. It shows from the right hand side of the motorcade the entire sequence of events, from President Kennedy rounding the curve from Houston St. into Elm St., through all the shooting, until the big presidential limousine left with the dead president going under the triple overpass off to Parkland Hospital. This film almost by itself, with careful, scientific analysis, establishes the times of five of the shots.

The Warren Commission received the original of the Zapruder film to look at, on loan from Life magazine, which bought it from Zapruder. From that time on, the film was never publicly shown, but remained in the locked files of Life. But a direct copy of the original was subpoenaed and shown NINE times by Assistant District Attorney Alvin Oser in New Orleans in February 1969, at the trial of Clay Shaw. The judge, the jury, the newspaper reporters, and the spectators in the courtroom all became convinced that Oser and Garrison had demonstrated a conspiracy to kill President Kennedy.

When one sees and studies in detail the Zapruder film in its clear version and examines the other photographs showing the effects of the shots, one becomes convinced of two statements:

1. There were six shots, of which five hit persons in the Kennedy car; of these five the first went through the throat of President Kennedy; the second struck Kennedy in the back; the third struck Governor Connally in the right shoulder; the fourth and fifth struck President Kennedy nearly simultaneously in the head and blew out a portion of his brains. The remaining shot missed and struck a curbstone on Main St.

2. The last of the five shots (coming from the grassy knoll area), and one of the two fatal shots, struck Kennedy from the front and to the right, hurling his head to the left and backwards with great force, in accordance with the laws of physics. (For a scientific analysis, see Six Seconds in Dallas, by Joseph Thompson.)

Either one of these statements renders impossible the Warren Commission Report's conclusion, that only three shots were fired, the second one missing entirely and striking the curb of Main St.

Obviously, if there was a conspiracy, it becomes vitally necessary to prevent the American people from seeing the Zapruder film, clear and complete, and especially in motion. From 1963 to 1973, almost ten years, except in New Orleans, this has been achieved. However, bootleg copies of the Zapruder film are on sale here and there in the United States at prices ranging around $10, available for private and illegal showings, since the successor to Life magazine, which is now defunct, owns the original and neither the successor nor Life magazine has ever given permission for copies of the film to be sold. Many of these bootleg copies, because of lack of clarity, do not demonstrate the first statement; but they do demonstrate convincingly the second statement, the backward thrust of President Kennedy's head at the time of the fatal shot.

Life magazine would have been able to earn millions of dollars from showing the Zapruder film. In three days of showing the Zapruder film, uncut, clear, and not tampered with, on national television, every person in the United States who watched television could see for himself that more than three shots were fired (which makes the Warren Commission conclusions nonsense) and could see that the fatal shot thrust Kennedy's head backwards with great force (proving that he was hit from the front, and not the back, which also makes the Warren Commission conclusions nonsense).

More and more people are seeing the Zapruder film. More and more people are becoming convinced that the Warren Commission report was a deliberate fraud and lie. Along with the Pentagon Papers released by Daniel Ellsberg, the true stories of the conspiracies that have resulted in killing President Kennedy and other leaders of the United States and

of other countries are likely to lead the American people to become finished with:

- A government that represents, protects, and pours money into the military industrial complex, an intelligence network, and a presidency that is their instrument;
- The myth and the lie that the "national security" of the United States depends on the military-industrial complex (it doesn't).

Article 2. Opening Statement to the Jury in the Trial of Clay L. Shaw

by Jim Garrison, District Attorney
Orleans Parish, La.

(Source: *The Times Picayune,* New Orleans, La. February 7, 1969)

The State of Louisiana is required by law in all criminal trials to make an opening statement to the jury. This statement is merely a blueprint of what the State intends to prove. It has no probative value and should not be considered as evidence in the case.

The defendant, Clay L. Shaw, is charged in a bill of indictment with having willfully and unlawfully conspired with David W. Ferrie, Lee Harvey Oswald and others to murder John F. Kennedy.

The crime of criminal conspiracy is defined in Criminal Code of Louisiana as follows:

Criminal Conspiracy

Criminal conspiracy is the agreement or combination of two or more persons for the specific purpose of committing any crime; provided that an agreement or combination to commit a crime shall not amount to a criminal conspiracy unless, in addition to such agreement or combination, one or more of such parties does an act in furtherance of the object of the agreement or combination.

As required by the definition of criminal conspiracy, the State will prove the following overt acts:

1. A meeting of Lee Harvey Oswald, David W. Ferrie and the defendant, Clay L. Shaw, in the apartment of David W. Ferrie at 3330 Louisiana Ave. Parkway in the city of New Orleans during the month of September, 1963.

2. Discussion by Oswald, Ferrie and the defendant, Shaw, of means and methods of execution of the conspiracy with regard to assassination of John F. Kennedy — particularly, the selection and use of rifles to be fired from multiple directions simultaneously to produce a triangulation of cross fire, establishing and selecting the means and routes of escape from the assassination scene, determination of procedures and the places to be used for some of the principals to the conspiracy so as to establish alibis on the date of the assassination.

3. A trip to the West Coast of the United States by Clay L. Shaw during the month of November, 1963.

4. A trip by David W. Ferrie from New Orleans, La. to Houston, Texas, on the day of November 22, 1963.

5. Lee Harvey Oswald taking a rifle to the Texas School Book Depository in Dallas, Texas on or before November 22, 1963.

The Criminal Code defines murder in the following terms:

Murder

When the offender has a specific intent to kill or to inflict great bodily harm.

The evidence will show that in New Orleans, in the summer of 1963, Lee Harvey Oswald was engaged in bizarre activities which made it appear ostensibly that he was connected with a Cuban organization, although in fact the evidence indicated that there was no such organization in New Orleans. This curious activity began on June 16 when he distributed "Fair Play for Cuba Committee" leaflets on the Dumaine Street Wharf. This distribution took place at the docking site of the United States Aircraft Carrier, the U.S.S. Wasp.

Later in June of 1963, the defendant, Clay Shaw, was observed speaking to Lee Harvey Oswald on the lakefront in the city of New Orleans. The defendant arrived at the lakefront in a large, black 4-door sedan, and was there met by Lee Harvey Oswald, who had walked to the meeting point along the lakefront from a westerly direction. The defendant and Oswald had a conversation which lasted approximately 15 minutes. At the conclusion of this conversation, the defendant gave Oswald what appeared to be a roll of money which he immediately placed in his pocket. In shoving the money into his pocket, Oswald dropped several leaflets to the ground. These leaflets were yellow in color with black printing and dealt with Cuba. The color, contents and size of these leaflets were identical with the "Fair Play for Cuba Committee" leaflet taken from Oswald earlier that month on the Dumaine Street Wharf by Harbor Police Patrolman Girod Ray.

The evidence will show that on August 9, 1963, Lee Harvey Oswald was arrested by members of the New Orleans Police Department as a result of his becoming involved in a fight with several Cubans who were protesting his passing out "Fair Play for Cuba Committee" literature. This literature was confiscated by the New Orleans Police Department. The State will offer into evidence three of the seized items, one of which is a yellow leaflet with black print entitled "Hands Off Cuba!" This is the same type of leaflet taken from Oswald at the Dumaine Street Wharf on June 16, 1963, and also the same as the leaflet dropped by Oswald at the lakefront in the latter part of June, 1963. The State will also introduce the bureau of identification photograph taken of Lee Harvey Oswald at the time of his booking.

A week later, on August 16, 1963, Lee Harvey Oswald was again distributing "Fair Play for Cuba" leaflets. Once again the distribution was done more as if to attract attention than to actually accomplish distribution. The actual distribution lasted only a few minutes, ending shortly after the news media departed. The State will introduce pictures and a television tape of this distribution, which took place in front of the International Trade Mart whose managing director at the time was the defendant, Clay Shaw.

The State will show further, that in the latter part of August or the early part of September, 1963, Lee Harvey Oswald went to Jackson, La., a small town located not far from Baton Rouge, La. While in Jackson, he talked to witnesses in reference to his getting a job at the East Louisiana State Hospital

in Jackson, La., and registering to vote in that parish, so as to be able to get the job. The State will introduce the witnesses who talked to Lee Harvey Oswald on this occasion.

The State will show that shortly thereafter, still in late August or early September, 1963, the defendant, Clay L. Shaw, Lee Harvey Oswald and David W. Ferrie drove into Clinton, La. — which is very close to Jackson — in a black Cadillac, parking the Cadillac near the voter registrar's office on St. Helena St. While the defendant, Clay L. Shaw, and David Ferrie remained in the car, Lee Harvey Oswald got out of the car and got in line with a group of people who were waiting to register.

The State will introduce witnesses who will testify that they saw the black Cadillac parked in front of the registrar's office and who will identify the defendant, Clay L. Shaw, Lee Harvey Oswald and David W. Ferrie as the individuals in that car.

The State will introduce a witness who talked to the defendant, Clay L. Shaw, on this occasion. In asking Mr. Shaw for his identification, he was told by the defendant that he (Shaw) was from the International Trade Mart in New Orleans, La.

The State will introduce a witness who will identify Lee Harvey Oswald as the person he talked to in the registrar's office and who will also identify the defendant, Clay Shaw, and David W. Ferrie as the two men seated in the black Cadillac that brought Lee Harvey Oswald to Clinton, La.

The State will also introduce into evidence a photograph of a black Cadillac car that the witnesses will identify as either the same car or one identical to the one that they saw in Clinton that day.

The evidence will show that in the month of September, 1963, the defendant, Clay Shaw, David Ferrie and Lee Harvey Oswald participated in a meeting in which plans for the murder of President John F. Kennedy were discussed and refined. This meeting took place in David Ferrie's apartment at 3330 Louisiana Ave. Pkwy. in the city of New Orleans. Shaw (using the name of Clem Bertrand), Ferrie and Oswald (using the first name of Leon) discussed details of the conspiracy in the presence of Perry Raymond Russo, after Ferrie gave assurance that Russo was "all right".

The plan brought forth was that the President would be killed with a triangulation of crossfire with at least two gunmen, but preferably three, shooting at the same time. One of the gunmen, it was indicated, might have to be sacrificed as a scapegoat or patsy to allow the other participants time to make their escape. No one indicated to Oswald at the meeting that he was going to be the scapegoat and there was no indication of any awareness on his part of such an eventuality.

They also discussed alternate routes of escape, including the possibility of flying to other countries. The defendant and David Ferrie agreed that as part of the plan they would make sure they were not at the scene of the assassination. Their plan for the day of the shooting was to be engaged in a conspicuous activity in the presence of as many people as possible. The defendant, Shaw, stated he would go to the West Coast of the United States. Ferrie, not as positive about his alibi, said he thought he might make a speech at a college in Hammond, La. As the State will show, Shaw made his way to the West Coast and Ferrie, after his long drive back from Texas, made his way to Hammond, La., where he slept, not in a hotel room, but on a bed in a college dormitory.

By a month after the meeting, Lee Oswald had moved into a rooming house in Dallas under an assumed name. By the following month when the time for the President's parade arrived, Oswald was on the parade route at the Texas School Book Depository, where a job had been found for him. By the night of Friday, November 22, the President was dead, Ferrie was driving through a thunderstorm to Huston, Texas, and the defendant, Shaw, was out on the West Coast. Lee Oswald, however, was in a Dallas jail ending up as the scapegoat.

As to the planning — the conspiracy — our jurisdiction is limited to New Orleans, although we will later offer evidence concerning the assassination in Dealey Plaza in Dallas because it confirms the existence of a conspiracy and because it confirms the significance and relevance of the planning which occurred in New Orleans. It is the position of the State of Louisiana that, regardless of the power which might bring about the execution of a President of the United States, whether it be initiated by a small group or the highest possible force, neither the planning of his murder nor any part of it, will be regarded in Louisiana as being above the law.

And so, with David Ferrie now dead and Lee Oswald now dead, the State is bringing to trial Mr. Shaw for his role — as revealed by evidence — in participating in the conspiracy to murder John F. Kennedy.

Returning our attention to the cluttered apartment of David Ferrie: the evidence will show that Perry Russo had been a fairly close friend of David Ferrie for some time prior to the meeting between the defendant, Ferrie and Lee Harvey Oswald.

The evidence further will show that Perry Russo first met Lee Harvey Oswald at David Ferrie's apartment shortly before the principal meeting between the named conspirators took place. At this meeting Oswald, who was cleaning a bolt-action rifle with a telescopic sight, was introduced to Russo by Ferrie as Leon. Perry Russo saw Lee Harvey Oswald at Ferrie's apartment at least once after the meeting of the conspirators. On this occasion, Oswald appeared to be having some difficulty with his wife and he gave Russo the impression he was leaving town.

Russo also had seen the defendant Shaw, once before the meeting. This was at the Nashville Street wharf at the time President Kennedy was speaking there in the Spring of 1962. The defendant, Shaw, also was seen by Russo with David Ferrie subsequent to the assassination at Ferrie's service station in Jefferson Parish.

In connection with the testimony of Perry Russo, the State will introduce into evidence pictures of the defendant, David Ferrie and Lee Harvey Oswald, as well as pictures of the exterior and interior of David Ferrie's apartment at 3330 Louisiana Ave. Pkwy., and other corroborating evidence.

The evidence will further show that the defendant in accordance with the plan, and in furtherance of it, did in fact head for the West Coast of the United States — ostensibly to make a speech — on November 15, 1963. He remained there until after President Kennedy's assassination on November 22,

1963, thereby establishing an alibi for himself for the day of the shooting.

The State will offer into evidence a ledger sheet of travel consultants and testimony which reflects the arrangements made by the defendant, Shaw, to go to the West Coast. This travel consultant firm — which in 1963 was located in the International Trade Mart — was the same firm which arranged for Lee Oswald to go to Europe, from which he went to Russia, several years earlier.

The State will show that Ferrie drove to Houston on the day of the assassination, departing from New Orleans on the evening of November 22 — some hours after the President was killed and two days before Lee Oswald was killed. Ferrie drove, with two young companions, through a severe storm for the ostensible purpose of going ice skating in Houston. Upon arriving in Houston, Ferrie and his companion went to the Winterland Skating Rink where Ferrie loudly and repeatedly introduced himself to the manager of the rink. Despite the fact that he had driven all the way from New Orleans to Houston for the purpose of ice skating, David Ferrie never put on any ice skates at all. While his young friends skated, Ferrie stood by the public pay phone as if waiting for a call.

The evidence will further show that earlier, after Lee Oswald's departure from New Orleans, he took a short trip to Mexico and then made his way to Dallas. On October 14, 1963, he rented a room at 1026 N. Beckley St. under the fictitious name of O. H. Lee. Two days later he went to work at the Texas School Book Depository, which was located at the intersection of Houston and Elm Sts. in Dallas, Texas.

At the Book Depository, Buell Wesley Frazier was employed in the order filling department. Frazier lived in Irving, Tex., a suburb of Dallas, and was a co-worker of Oswald's. Oswald's wife and baby daughter also lived in Irving with Mrs. Ruth Paine, a friend of the Oswalds. Frazier's sister, Linnie May Randall, was a neighbor of Mrs. Paine's in Irving.

Since Oswald had an apartment in Dallas, he made arrangements with Frazier to ride to Irving with him only on weekends. Oswald thereafter rode to Irving with Buell Frazier every Friday except the one immediately preceding the assassination. Oswald did not go to see his wife and daughter on that weekend because, he said, he was working on getting his driver's license. However, that next week Oswald once more broke his ritual with Frazier. On Thursday, November 21, 1963, Lee Harvey Oswald asked Frazier if he could ride to Irving that night for the purpose of picking up some curtain rods for his apartment. On Friday morning, November 22, 1963, Buell Wesley Frazier drove Oswald from Irving to the Texas School Book Depository. Oswald had with him a package wrapped in brown wrapping paper. When he inquired as to its contents, Frazier will testify, Oswald replied that the package contained the curtain rods he had returned home to pick up the night before. Frazier will further testify that Oswald told him that he would not be returning to Irving that night, Friday, November 22, 1963.

Buell Frazier will testify that he entered the Texas School Book Depository building that morning about 50 feet behind Lee Oswald. Oswald was still carrying the package. Frazier will testify that he saw Oswald a couple of times that morning, but never saw the package again. Around noon of that day, Frazier went to the front steps of the Texas School Book Depository to watch the presidential motorcade which was due to pass directly in front of the Book Depository as it made its turn off Houston St. onto Elm St. While the motorcade was passing, Frazier heard three shots which sounded like they came from the area of the underpass — near the grassy knoll — in front of the President.

At the conclusion of Frazier's testimony, the State will introduce into evidence pictures of a paper sack found in the Texas School Book Depository, as well as pictures of Dealey Plaza as it appeared on the day of the assassination.

Evidence will also indicate that a bolt-action Mannlicher-Carcano rifle was found at the Depository and that, based upon the testimony of Buell Wesley Frazier, this rifle had been brought there by Lee Oswald that morning when he arrived with Frazier.

With regard to the assassination itself, the State will establish that on November 22, 1963, President John F. Kennedy and Governor John Connally, who was riding in the same limousine, were wounded as a result of gunshots fired by different guns at different locations. Furthermore, the State will show that President Kennedy himself was struck by a number of bullets coming from different guns at different locations — thus showing that more than one person was shooting at the President. The evidence will show that he was struck in the front as well as the back — and that the final shot which struck him came from in front of him, knocking him backwards in his car. Once again, since Lee Oswald was in the Book Depository behind the President, this will show that a number of men were shooting and that he was, therefore, killed as the result of a conspiracy.

The State, in showing that a number of guns were fired during the assassination of President John F. Kennedy, will offer, in addition to eyewitnesses, various photographs and motion pictures of what transpired in Dealey Plaza on November 22, 1963.

First, the State will offer an 8mm color motion picture film taken by Abraham Zapruder, commonly known as the Zapruder film. This film, which has not been shown to the public, will clearly show you the effect of the shots striking the President. In this connection we will also offer slides and photographs of various individual frames of this film. The State will request permission from the court to allow you, the jury, to view this material. Thus, you will be able to see — in color motion picture — the President as he is being struck by the various bullets and you will be able to see him fall backwards as the fatal shot strikes him from the front — not the back but the front.

Also, the State will introduce as evidence certain other photographs and motion picture films, taken during the assassination, as listed below:

1. The "Moorman picture" which is a polaroid photograph taken by Mary Moorman in Dealey Plaza on Nov. 22, 1963. In addition to this picture, but in connection with it, the state will offer various blow-up prints of this photograph.

2. Various photographs taken by Mr. Philip Willis in Dealey Plaza on Nov. 22, 1963.

3. Various photographs taken by Miss Wilma Bond in Dealey Plaza on Nov. 22, 1963.

4. A motion picture film with slides and photographs taken by Mr. John Martin on Nov. 22, 1963.

The State will qualify Robert H. West, the County Land Surveyor for Dallas County, Tex., as a licensed registered public surveyor and thus competent to testify as an expert as to the geographical aspects of Dealey Plaza, Dallas, Tex. In conjunction with the testimony of Mr. West, the State will offer into evidence a certified survey, an aerial photograph, and a mock-up model of Dealey Plaza.

The State will also qualify Dr. Robert Shaw as an expert in the field of medicine, and in connection with this testimony we will offer X-rays and medical records concerning Gov. Connally's wounds and treatment at Parkland Memorial Hospital in Dallas, Tex.

The State will qualify and offer the testimony of Dr. John Nichols, a medical expert in the field of forensic medicine and pathology. In connection with his testimony, the State will offer certain exhibits and photographs into evidence.

Furthermore, during the presentation of this case, the State will qualify and offer the testimony of Special Agent Robert A. Frazier of the Federal Bureau of Investigation as an expert in the field of ballistics. Special Agent Lyndal Shaneyfelt, who is a photographic expert with the Federal Bureau of Investigation, will be qualified and will testify.

The State also will present eyewitness testimony, corroborating what is shown in the Zapruder film: that the President's fatal shot was received from the front and that he was thrown backward — not forward — from the force of this fatal shot. The eyewitness testimony will also show that the shooting came from a number of directions and that, therefore, the President was murdered, not by a lone individual behind him but as the result of a conspiracy to kill him.

We will then show that a few minutes after the shooting Lee Oswald came running down the grass in front of the Book Depository, that he climbed into a station wagon with another man at the wheel and that this station wagon pulled away and disappeared into the traffic on Elm St.

The evidence will show that shortly after the assassination of President Kennedy, on November 25, 1963, agents of the Federal Bureau of Investigation interviewed Dean A. Andrews, Jr. in his room at Hotel Dieu Hospital in New Orleans. As a result of this interview with Dean Andrews, a local attorney, the bureau began a systematic and thorough search for a "Clay Bertrand".

A man who identified himself as "Clay Bertrand" called Andrews the day after the President's assassination requesting him to defend Lee Harvey Oswald, who by then had been formally charged with the murder of John F. Kennedy. The State will introduce evidence in the course of this case showing that the defendant, Clay Shaw, and the "Clay Bertrand" who called Dean Andrews on behalf of Lee Harvey Oswald, are one and the same person.

The evidence will further show that some time during the year 1966 the defendant, Clay Shaw, requested the U.S. Post Office to deliver mail addressed to him at his residence at 1313 Dauphine St. to 1414 Chartres St., the residence of a longtime friend, Jeff Biddison. This change-of-address order was terminated on September 21, 1966. During the period that the change of address remained in effect, the U.S. Post Office letter carrier for that route delivered at least five letters to 1414 Chartres St. addressed to "Clem Bertrand," the name used by the defendant at the meeting between himself, David Ferrie and Lee Harvey Oswald in Ferrie's apartment in mid-September, 1963. None of the letters address to "Clem Bertrand" were ever returned to the postal authorities for any reason. The period during which these letters addressed to "Clem Bertrand" were delivered to 1414 Chartres St. preceded by at least six months the publication of the fact that the Orleans Parish district attorney's office was investigating the assassination of President John F. Kennedy. In fact, it preceded the start of the investigation by the district attorney's office. In connection with this evidence, the State will offer into evidence the U.S. Post Office forms reflecting the change of address initiated by the defendant and testimony showing the delivery to that address of mail addressed to "Clem Bertrand".

It will be shown that in December, 1966, the defendant, Clay Shaw, visited the V.I.P. Room of one of the airlines at Moisant Airport and that, while there, he signed the guest register in the name of "Clay Bertrand". Eyewitness testimony will be presented and the guest book which he signed will be introduced into evidence.

The State of Louisiana will ask you to return a verdict of guilty as charged against the defendant, Clay Shaw.

Articles 3 and 4 of "The New Orleans Portion of the Conspiracy to Assassinate President John F. Kennedy" will appear in a subsequent issue of *Computers and Automation and People.*

Dravillas — *Continued from page 18*

trol equipment. Protective covers run the entire length of the power rail system as a safety measure. Each vehicle is also positively grounded by brushes that ride a continuous ground rail welded along the top of the guide beam for positive body ground.

The Satellite Transit System is part of an 150-million dollar expansion program at the Seattle-Tacoma International Airport, including a new runway, high speed taxiways and new concrete aprons around the satellite terminals. The airport, owned by the Port of Seattle, serves both Seattle (13 miles away) and Tacoma (17 miles away). It is presently used by six million airline passengers; by 1980, this is expected to be 20 million.

The expansion program has utilized the existing passenger terminal where possible. It also includes new flight departure and arrival drives and sidewalk areas, new ticket lobby, ticket counters, air line office spaces, new concession facilities, a new baggage claim facility with associated services, new executive offices, and a complete series of service rooms.

Included in the terminal complex is a multilevel parking structure which holds as many as 4500 automobiles and a unique check-in baggage facility located on the third level.

In addition to the STS vehicles running between the terminals, electric moving stairs and elevators provide convenient pedestrian movement systems to various levels of the terminal complex. In short, the terminal complex is designed to promote the passenger's comfort during the "ground handling" portion of his trip. □

Ralston — *Continued from page 22*

ciety, as we have traditionally used that term, will not have to make the choice to some degree, between rational use of authority and personal privacy.

Legal Safeguards Insufficient

It is rather generally agreed now that no legal and administrative safeguards will be sufficient to totally safeguard personal liberty and privacy. Although our understanding of large data systems and their operation is still most imperfect, there is increasing evidence that it is impossible or nearly so to make them foolproof or, rather, burglar-proof. Clever people have been able to break through the security of any computer system when they have put their minds to it. And even though we may be assured that technical developments will make such breaches of security increasingly difficult in theory, we may be sure that, on the one hand, they will always be possible and, on the other hand, we simply cannot count on having any governmental computer system designed to incorporate all possible technical and administrative safeguards. It is only too clear that great pressure is often brought to bear against building in appropriate safeguards to very expensive, highly complex systems. Appropriate safeguards will be built into sensitive computer systems only if the penalties for not doing so are perceived to be significantly greater than the costs of doing so.

Where are we then? It is easy to be in favor of all possible legal, administrative and technical safeguards in large governmental data systems but we must accept that the results will be imperfect. Is then the civil libertarian's argument the right one? "Let us have no such systems because of their dangers." I am emotionally drawn to this argument having been a long-time civil libertarian; thus, it pains me considerably to reject this position. But, as perhaps I have implied earlier, the problems faced by Western democracy today — environmental, population, urban, racial — are just too complex and too demanding to allow the old, unfortunately simplistic solutions to still be accepted. If spaceship Earth is to remain habitable, I fear we, or at least our children, shall have to make more sacrifices than we yet realize. Among these will have to be a readiness to forego some traditional protections of democracy in favor of the general good. I once believed, but no longer do, that we can have our cake and eat it too in this respect.

Computers Must Help Solve Problems

Unquestionably if we are to succeed in resolving the problems that face us, computers must play a large, very large role. We cannot argue that the dangers in this role mean that it should not be played at all. To echo my earlier statement, we must retain the hope that computers offer us while at the same time minimizing a threat we cannot eliminate.

I am not optimistic that we shall be able to retain the appropriate balance. Indeed, such a balance may be unstable. The pressures toward the ends of the spectrum — little or no use of computers for large governmental data systems or too much use without appropriate safeguards — will be very great. But survival on the one hand and retention of the maximum amount of personal freedom on the other, dictate that we try to achieve this balance. □

c·a

NUMBLES

Neil Macdonald
Assistant Editor
Computers and Automation

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

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

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

Casper Otten
Newton High School
Newton, Mass.

NUMBLE 734

```
      H A L F      N = U
    x   T H E      G = O
    -------------  S = R
    R E N L G
  L S I T E
F L F F I
-------------
T E R I E A O

46049  26134  70516  754827
```

Solution to Numble 733

In Numble 733 in the March issue, the digits 0 through 9 are represented by letters as follows:

B = 0	O,N = 5
T = 1	S = 6
L = 2	I,Y = 7
A = 3	M = 8
E = 4	W = 9

The message is: Money is sweet balm.

Our thanks to the following individuals for submitting their solutions — **to Numble 732:** Marijoe Bestgen, Lenexa, Kans.; T. P. Finn, Indianapolis, Ind. — **to Numble 731:** Marijoe Bestgen, Lenexa, Kans.

Distrusting the Columbia Broadcasting System — Comments on the Romero Story

From Ivan Dryer
8608 Noble Ave.
Sepulveda, Calif. 91343

In his article, "Why I Distrust the Romero Story," Robert P. Smith of CTIA makes a valid case for accepting Romero's "confession" with less than total credulity. Right at the end however he destroys his own case by saying, "Why should I impugn the integrity of a large organization (CBS)...in favor of believing the story of one man..."

Disregarding the Romero issue for a moment, how can Mr. Smith have forgotten "why"?

Has it been that long ago that CBS spent four 1-hour special programs attempting to discredit Garrison's investigation — and support that of the Warren Commission — with some of the most incredible nonlogic ever broadcast? Such as: illustrating the FBI's explanation of Kennedy's head snap on impact of the fatal bullet by showing a bullet shattering a light bulb in slow motion; showing and discussing the target firing tests by FBI and other marksmen and adding that none of them was able to duplicate all the parameters of Oswald's alleged performance with the ancient Mannlicher-Carcano and then concluding that Oswald could have done it "because he was shooting at the President"!

And how can we forget CBS Newsman Dan Rather's display of "integrity" when he told the post-assassination CBS audience that Kennedy's head went forward with considerable violence" when in fact the film that that audience was not and is not allowed to see (by order of another "large organization," Time-Life) shows the head moving backward thus giving Mr. Rather — and the Warren Commission — the lie?

The question remains, whose money did the "large and competent news organization" spend to check out Romero? And, as Mr. Smith seems to ask somewhat half-heartedly, was it "influenced to arrive at this conclusion"?

Although Smith claims no possession of "any evidence either way," I suggest that CBS' credibility as demonstrated in its past reportage of details regarding the JFK assassination comes up "a flat zero" every time.

Our Subscriber List Is Confidential

1. From James E. Carter
Shaw Elliott Inc.
9 East 40th St.
New York, N.Y. 10016

One of our clients, Interdata Inc., has asked us to get a galley print-out of your circulation in several target companies in order that we may more accurately evaluate your publication as an advertising medium.

Unsettling, Disturbing, Critical . . .

Computers and Automation, established 1951 and therefore the oldest magazine in the field of computers and data processing, believes that the profession of information engineer includes not only competence in handling information using computers and other means, but also a broad responsibility, in a professional and engineering sense, for:

— The reliability and social significance of pertinent input data;

— The social value and truth of the output results.

In the same way, a bridge engineer takes a professional responsibility for the reliability and significance of the data he uses, and the safety and efficiency of the bridge he builds, for human beings to risk their lives on.

Accordingly, Computers and Automation publishes from time to time articles and other information related to socially useful input and output of data systems in a broad sense. To this end we seek to publish what is unsettling, disturbing, critical — but productive of thought and an improved and safer "house" for all humanity, an earth in which our children and later generations may have a future, instead of facing extinction.

The professional information engineer needs to relate his engineering to the most important and most serious problems in the world today: war, nuclear weapons, pollution, the population explosion, and many more.

If you have no objection, please arrange to provide it using the attached list:

Prospect List for Media Survey

Bell Telephone Labs., Holmdel, N.J. 07733
RCA, Camden, N.J. 08102
Hamilton Standard, Windsor Lock, Conn. 06096
Adage Inc., Boston, Mass. 02215
Eastern Airlines, Miami, Fla.
Datron, Falls Church, Va.
Robert Shaw Controls, Richmond, Va.
GM Corporation, Detroit, Mich. 48202
Amoco Production Co., Tulsa, Okla. 74102
E-Systems Inc., Dallas, Texas 75222
Ball Brothers Research, Boulder, Colo. 80302
Sierra Research Corp., Boulder, Colo. 80303
Profora, Inc., Denver, Colo. 80222
Systems Development Corp., Santa Monica, Ca. 90406
TRW Inc., Redondo Beach, Ca. 90278

The names should be forwarded to me; I'll see that they get to Interdata for study and comparison.

Many thanks for your help.

2. From the Editor

I have your letter of January 17 in which you ask for a galley print-out of portions of our subscribers.

Our subscriber list is confidential and the information for which you ask is not available to prospective advertisers on request, or to any other persons.

ACROSS THE EDITOR'S DESK
Computing and Data Processing Newsletter

Table of Contents

APPLICATIONS

ITALIAN SUPREME COURT OPENS NEW COMPUTER CENTER

Michael M. Maynard
Sperry Univac
P.O. Box 500
Blue Bell, Pa. 19422

A computer center, which is the core of a legal information system serving local magistrates throughout Italy, has been placed in operation at the Supreme Court of Cassation in Rome.

The heart of the center is a UNIVAC 1106 real-time computer system which is linked to Olivetti display terminals equipped with printer attachments located in various offices of the Supreme Court in Rome and in Courts of Appeals in Milan, Turin, Florence, Bologna, Naples and Palermo. A UNIVAC 9200 computer and a DCT-500 terminal at the National Library in Rome are also connected to the UNIVAC 1106.

Designed by officials of the Supreme Court of Cassation, headed by Dr. Renato Borruso, one of its magistrates, the system will provide information instantly on the precedents of the Supreme Court, the dates of the judgements of the Constitutional Court and the contents of the most important law tomes. The computer center can supply 50,000 precedents from civil sections of the court, 15,000 from the penal sections, plus 3500 facts relating to the judgements of the Constitutional Court and information from 2400 volumes of jurisprudence.

To obtain this information, no special expertise is required nor is any complicated code necessary. Information retrieval has been made as simple as possible by the group of magistrates who worked on the project together with Univac experts.

The designers discarded the conventional "key word index" approach because it implies a predetermined association for each word and would restrict freedom of movement through the system. In addition, it would mean compiling a massive dictionary of keywords, and a team of experts to classify all data prior to its inclusion in the system. Instead, an automatic system of document classification was adopted whereby the computer identifies concepts as distinct from merely collecting identical words.

In operation, a complete text of each maxim is contained in the computer file. To date, this totals about 60,000 maxims. Using predetermined criteria, the computer breaks down the maxim texts, removing all insignificant words. Each remaining word is compared by the computer against a special dictionary or thesaurus held in storage. The thesaurus, composed of about 40,000 words, was analyzed and reduced to language "seeds" which are compiled in a special index. Each "seed" is labelled with the location of every document that contains the seed word itself or derivatives.

To retrieve information, the inquirer simply enters a random combination of language seeds. The computer then finds the location numbers common to all named seeds (in other words it selects the maxims containing all the words entered by the inquirer). On request, it prints the text of all or any of these maxims.

GTE SYLVANIA'S EXPERIMENTAL SYSTEM TRANSMITS FREEWAY ADVISORY INFORMATION

Public Affairs Department
GTE Sylvania Inc.
370 Third Ave.
New York, N.Y. 10017

A computerized control station, designed and produced by GTE Sylvania Inc., to transmit advisory traffic messages for an experimental freeway sign system has begun operating in Los Angeles, Calif. GTE Sylvania is a subsidiary of General Telephone & Electronics Corp.

The station and electronic sign controls were provided under a contract from Federal Sign & Signal Corp. which supplied the 35 signs along an 11-mile stretch of the Santa Monica Freeway median strip. Data from roadway sensors and television-equipped

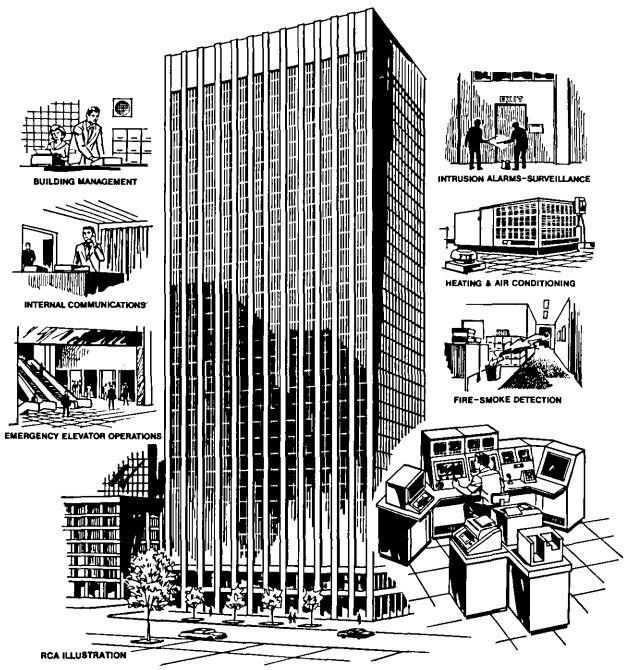
helicopters is transmitted to the control station and displayed on its console (bottom). The operator then selects appropriate advisory messages and displays them on the signs (top).

One-hundred pre-set messages, such as "left lane blocked ahead," "ten-minute delay ahead," or "accident ahead" can be sent from the console. The operator also can type in additional messages by teletypewriter. This part of the freeway was chosen for the signs because it is the busiest in the Los Angeles area.

AUTOMATED WATCHMAN FOR NEW 38-STORY WELLS FARGO STRUCTURE

Joe Nahil
RCA Aerospace Systems Division
Bedford Rd.
Burlington, Mass. 01803

RCA is installing a computerized Building Management System (BMS) in a new 38-story office building at 525 Market Street in San Francisco, Calif. Under a contract with Wells Fargo Bank, the major tenant, RCA will provide the "automated watchman". The artist's rendering shows some of the building maintenance functions that RCA's new system will oversee. The BMS employs two computers that will survey and regulate such building facilities and equipment as air conditioning and heating, internal communications, safety, energy usage and other functions, as well as provide management information. Information will be displayed as a code on a TV-like screen in a master control center.



Stanley S. Kolodkin, Division Vice President and General Manager of RCA's Aerospace Systems Division, said the system will go beyond detecting a fire and pinpointing the location. "It also will be able to automatically inform the console operator what procedures to take in the emergency and will command selected elevators to the ground level to pick up fire fighters and their equipment."

Mr. Kolodkin pointed out that development of the system introduces the concept of a general automation contractor into the construction industry. "In this role, RCA will provide Wells Fargo and the building owner with a single integrated system that will meet key building operating needs...." The Building Management System is an example of how computer technology can be used to cut costs by eliminating subsystem duplications and reducing energy usage and unscheduled maintenance, Mr. Kolodkin emphasized. He added that the lower energy usage also will mean less air pollution.

The RCA system is capable of controlling operations of several structures, even when they are not in close proximity to each other. Buildings hundreds of miles apart can be tied into the system via telephone lines.

The 38-story structure is being built by the Cahill Construction Company, San Francisco, for the Tishman Realty and Construction Company, Inc., Los Angeles and New York. Completion is scheduled this year.

COMPUTERS HELP FIGHT FIRES IN SCOTLAND

Kurt Van Vlandren
Honeywell, Inc.
80 Walnut St.
Wellesley Hills, Mass. 02181

Glasgow, Scotland plans to link its fire engines with a computer to fight blazes more efficiently. Small facsimile printers installed in the cabs of 40 fire engines will receive by radio and print out detailed information on floor plans of the burning building and its known fire hazards while the firemen are on their way to battle the blaze.

George Cooper, Glasgow's firemaster, said the Honeywell system is believed to be the most advanced fire-fighting system of its kind in the world. He said his crews "will both be better equipped to tackle the job and their safety better protected."

The system, based on two Honeywell 316 computers due to be installed in June or July, will ultimately contain data on 10,000 properties. The information, to be updated daily, would include building plans and layouts, known hazardous materials in the building, and a special file of 1,000 hazardous substances and how to handle them in the case of fire.

Glasgow intends later to link 400 fire alarm boxes directly to the computer. When an alarm is signalled the computer would dispatch the nearest fire crew directly, without any human intervention.

BRAILLE FOR NATION'S SIGHTLESS IS PRODUCED WITH AID OF COMPUTER

Robert Haynes
American Printing House for the Blind
1829 Frankfort Avenue
Louisville, Ky. 40206

A computer at the American Printing House for the Blind, Louisville, Ky., already has translated 1,000 books and magazines from English into Braille for the nearly half-million sightless persons in the United States. Donated by the IBM Corporation, the computer has produced more than 398,000 Braille plates from which more than 30 million pages of Braille have been printed.

Finis Davis, Vice President and General Manager of the 114-year-old, non-profit organization said,

"We not only are producing literature in Braille with the help of the IBM 7040, but also are conducting intensive research into using it to produce musical and mathematical notation so that we can offer computer translation of musical scores and math formulae in Braille, expanding opportunities for sightless persons in these two fields."

The computer conversion routine — involving several complex programs, or sets of instructions — produces from 12 to 13 pages of Braille text per minute, compared with 20 to 25 pages per day produced manually by experienced Braille encoders. Last year 381 titles were produced by computer, ranging from cookbooks and magazines to foreign language textbooks and reference works. "We even translated 'The Godfather' and several other best-selling novels for the enjoyment of sightless persons," said Robert Haynes, data processing manager. "However, our most technical work was the production of textbooks for the more than 22,000 visually-handicapped youngsters in grades 1 to 12 throughout the nation." Each book is first recorded, word for word, by a staff of 22 keypunch operators. The English text, encoded on IBM cards, then is fed into the computer. Using a 32,000-item program, the computer compares the English words with a list of 80,000 English words which, when translated by the final program, produce the proper Braille words. If some words don't match the 80,000 preapproved words, the computer notifies specialists who supply the appropriate Braille codes, thus avoiding misrepresentations in Braille.

The oldest and largest service printing house for the Blind, American Printing House offers thousands of items of literature, educational aids, recordings and tape recordings to the blind. Its inventory of Braille volumes now numbers 150,000 volumes and it also supplies a wide range of textbooks in large type. Among the more popular items in the organization's production are the weekly editions of Newsweek Magazine and the monthly Reader's Digest. The all-time best-seller has been the King James version of the Holy Bible, the original plates for which were worn out and replaced by computer-produced plates in 1969.

The Printing House is not a government institution, but it is the primary source of educational materials for blind children throughout the United States, its territories and possessions, through a federal appropriation under the Department of Health, Education and Welfare. As a national non-profit agency for the blind it also has responsibilities as a private organization to the publication of literature and the manufacture of educational aids for all blind people.

APPOINTMENTS FOR PATIENTS AT UNIVERSITY OF IOWA HOSPITALS MADE BY COMPUTER

University of Iowa News Service
700 Jefferson Building
Iowa City, Ia. 52242

When you have a quarter of a million visitors a year, with 30,000 of them spending the night and eating meals with you, help is needed in making the arrangements. Maybe a computer.

That is the case at University Hospitals and Clinics in Iowa City where 30,000 patients were admitted to the hospital last year and another 260,000 visited the clinics.

A computer is now making appointments and making sure everything is ready to serve the patient when he arrives. It all begins long before the visit. Doctors referring patients with complex medical problems to University Hospitals telephone ahead to get an appointment. The computer is notified and within seconds displays a list of open appointment times. The computer is also asked to see if that patient has another future appointment. If so, attempts will be made to schedule them on the same day to save the patient an additional trip to Iowa City.

The mechanical brain then prepares appointment notification letters and pre-registration forms for the patient to fill out at home. An appointment confirming letter is also sent to the patient's home physician. Four days before the appointment, the computer "recalls" the approaching visit by "reminding" the medical records department to send the patient's record to the physician with whom the appointment is scheduled. If a new identification plate — something like a plastic credit card — is needed, the computer punches a tape to be fed into another machine to print the card. And, on the day of the patient's arrival, a list of appointments that day is provided by the computer, listing patients to be seen by each physician.

Matthew Norman, director of the University of Iowa Hospitals Systems Development Department, says, "We eventually will have data on file that will provide physicians with a computer record of all meaningful medical treatments, orders, laboratory results, medications, diagnoses and other information on every patient who comes here". Who knows, eventually a patient may get to tell the computer whether he wants steak or ham for dinner.

RESEARCH FRONTIER

FIRST HOLOGRAPHIC OPTICAL COMPUTER MEMORY SYSTEM CAPABLE OF FULL-CYCLE OPERATION DEMONSTRATED BY RCA

RCA News
30 Rockefeller Plaza
New York, N.Y. 10020

The first demonstration of a holographic optical computer memory able to perform the full-cycle data processing operations of write, store, read, and erase was conducted recently at Princeton, N.J., by RCA. The experimental optical system employs a laser, liquid crystals, electro-acoustic deflectors, and holograms stored on thermoplastics. It could be the forerunner of a new generation of mass memories equal in capacity to, but 1,000 times faster than the largest disc systems achieved to date, according to Thomas O. Stanley, Staff Vice President of Research Programs at RCA Laboratories.

In addition to their capacity and speed, future holographic memories could be more reliable and perhaps less expensive per data bit than mechanical systems presently used to store and process large quantities of information. The holographic memory has the potential, when fully developed, to replace the entire hierarchy of core, drum, and disc systems now used, and thereby to simplify the whole architecture of computers and many other information systems. It would be particularly suited to the many and growing applications where large volumes of data are handled. RCA Laboratories developed the holographic memory with partial support from NASA's Marshall Space Flight Center, Huntsville, Ala.

Dr. Jan A. Rajchman, Staff Vice President, RCA Information Sciences, under whose direction the memory was developed, called the demonstration model "a significant milestone." Dr. Rajchman explained that the RCA memory capitalizes upon the ability of holograms to store large quantities of data in a small space, and upon the electronic speed at which light from a laser can be deflected and modulated. A fully developed holographic memory could combine into one unit the features and advantages of the two types of data storage devices, i.e., the high capacity of the peripheral storage devices and the speed of the internal memories.

The optical memory stores data in holograms formed by a laser beam on a thermoplastic storage medium. Enroute to the storage medium, the beam strikes liquid crystal cells, which can be controlled electronically to scatter light or to be transparent. The cells introduce digital information into the laser beam in the form of tiny areas that are dark (where the cells are scattering) and light (where they are transparent). This pattern of darkness and light, recorded in the hologram, corresponds to the "zeros" and "ones" of the binary code — the language of computers.

Once the data is stored in the holograms, it can be retrieved by passing the laser beam through the hologram. The beam projects the holographic information onto a light sensitive array which "reads" the optical data and converts it into electronic signals. The laser beam, in both writing and reading the data, is directed by electro-acoustic deflectors. In the experimental holographic memory, the array is connected to a panel of lights to determine if the data has been stored and read out correctly. To erase the data in a hologram, heat is applied to the thermoplastic storage medium. A new hologram with new information can then be written in its place.

Robert D. Lohman headed the RCA Laboratories team that developed the holographic memory. Scientists working with him included Louis S. Cosentino, Dr. Reuben S. Mezrich, Eugene M. Nagle, Dr. Wilber C. Stewart, and Frank S. Wendt.

MISCELLANEOUS

ADAPSO SEEKS PERMANENT EXCLUSION OF IBM FROM DATA CENTER ACTIVITIES

J. L. Dreyer
ADAPSO, Inc.
551 Fifth Avenue
New York, N.Y. 10017

The following "Statement of Position" was approved February 2, 1973 by the Association of Data Processing Service Organizations' (ADAPSO) Data Center. The Association, founded in 1961, represents more than 650 firms and branches offering computer products and services.

Statement of Position

The data center segment of the computer industry was in large part created as a direct consequence of the entry of the 1956 antitrust consent decree against IBM Corporation. That decree separated out IBM's data center services business into a separate corporation, Service Bureau Corporation (SBC). The decree was twice modified thereafter and continues in effect. Although separation of IBM's data center services from its other businesses was not complete and some tie-ins persisted, separation has accordingly been a characteristic of the independent data center segment from its inception and "tie-ins" and economically unjustified joinders of activities have therefore presented a relatively lesser problem to it than to other segments of the computer industry.

For whatever reason, the effect of the recent private settlement by IBM of the antitrust litigation against it by Control Data Corporation (CDC) has been to completely sever IBM's data center business from IBM by transferring it to a competitor, CDC. The data center segment believes that this transfer should resolve the special tie-in problems of its segment, provided that (a) the complete separation is formalized by court decree, so that it is not subject to later change by private action; (b) it is made permanent and not limited to the six years which IBM has consented to stay out of the data center segment, and (c) it is made clear that IBM's exclusion from the furnishings of data center services is complete and includes commercial and scientific data processing services; batch processing; remote job entry processing; timesharing services; data preparation services; and facility management operations. Such exclusion should also prohibit the supply of any support activities which would, in effect, represent a "back door" entry into the data processing services industry.

EASTERN AIRLINES PURCHASES BENDIX X-RAY FOR SCREENING PASSENGER BAGGAGE

Harry A. Arnott
The Bendix Corporation
Bendix Center
Southfield, Mich. 48076

A new X-ray system, designed to further tighten airport security while at the same time speeding passenger anti-hijack screening, has been purchased by Eastern Airlines from The Bendix Corp. The equipment, used to inspect luggage, carry-on bags and parcels, is part of Eastern's total security and anti-hijack program which includes 100 per cent inspection of passenger carry-on luggage. Because quantity and location of such equipment is a security matter, details on the number of units ordered and their location cannot be disclosed.

John E. Shields, director of operational safety at Eastern, said, "The Bendix X-ray system will permit more thorough and faster screening of hand luggage and will eliminate the need for security guards to open each carry-on article".

The Bendix system, also known as a radiographic system, uses an extremely low-dose, short-pulse X-ray to detect items in luggage which would be illegal for passengers to carry aboard aircraft such as guns, explosives, oversized knives and other dangerous objects. The device instantaneously produces an X-ray image of a suitcase and its contents on a television screen.

Although the X-ray image appears instantaneously, a manual control feature enables the image to be retained for several minutes if desired. The operator also can activate a built-in zooming device to secure greater image detail of any portion of the parcel.

(please turn to page 47)

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Logicon, Inc., Torrance, Calif.	Huntsville Division, U.S. Army Corps of Engineers	Computer process control systems in the 21 bulk mail centers (BMC) being established across U.S.; contract calls for use of about 180 minicomputers	$14.5 (approximate)
System Monitoring Division of Rockwell International Corp., Pittsburgh, Pa.	Potomac Electric Power Co. (PEPCO)	Development of a computer-based energy control system which will monitor and allow for centralized control of entire generation and transmission network	$10 million
ITT Space Communications, Inc., Ramsey, N.J.	Western Union Telegraph Co.	Supplying major electronic equipment for earth stations in Western Union's domestic communications satellite system	$6.6 million
Burroughs Corp., Detroit, Mich.	Inmont Corp., New York, N.Y.	A B 6700 computer system, 17 B 1700 small scale systems, 63 TC 500 terminal computers to establish corporate data base and nationwide data communications network	$6 million
National Cash Register Co., Dayton, Ohio	Korvettes, New York, N.Y.	1500 NCR 280 point-of-sale terminals; Phase 2 of point-of-sale conversion involves 2-year installation program in 20 metropolitan area stores; firm operates 51 stores in nine states	$6 million (approximate)
Compagnie Internationale pour l'Informatique (CII); Siemens (Germany); LOGICA (UK and Netherlands); SESA (Germany)	European Space Research Organisation (ESRO), Darmstadt, West Germany	A real-time computer system for European Space Operation Centre (ESOC); system will be dedicated to operations and control of Geos satellite and will be based on 2 CII 10070 computers and 6 Siemens 330 systems; SESA-Deutschland and LOGICA are responsible for project management and software and special purpose hardware	$5 million
National Cash Register Co., Dayton, Ohio	Kyoto Chuo Credit Bank, Kyoto, Japan	Two Century 300 systems and 87 NCR 270 financial terminals; scheduled to be in operation in spring of 1975; system will be processing over 1,000,000 accounts	$3.5 million
Consolidated Computer Inc., Don Mills, Ontario, Canada	Fujitsu, Tokyo, Japan	KEY-EDIT data entry equipment which will be adapted to accept the Kana characters of written Japanese	$2.6 million
Aerospace Division, Honeywell Inc., St. Petersburg, Fla.	Space Div., North American Rockwell Corp., Downey, Calif.	Preliminary work on the Space Shuttle orbiter's flight control subsystem	$1.9 million
Trans-A-File Systems Co., Sunnyvale, Calif.	Strong Memorial Hospital, University of Rochester, N.Y.	An all-digital, medical record filing and retrieval system	$1.5 million (approximate)
INCOTERM Corp., Natick, Mass.	Iberia Airlines, Spain	Installation of SPD 10/20 computer display terminals at over 24 locations throughout Iberia's passenger reservation network in Spain	$1+ million
Intel Corp., Santa Clara, Calif.	Univac Div. of Sperry Rand Corp.	Semiconductor memory systems	$1+ million
Medlab Computer Services, Inc., Salt Lake City, Utah	Dept. of Defense	Installation of a clinical laboratory information system (known as PATHLAB) at the Bethesda (Maryland) Naval Hospital	$1 million (approximate)
Raytheon Company, Lexington, Mass.	Nippon Electric Co., Ltd., Tokyo, Japan	Air traffic control display equipment to be installed in new area control centers in Okinawa and Tokyo; Nippon is prime contractor for Japan Civil Aviation Bureau	$400,000+
Interdata, Inc., Oceanport, N.J.	Adage, Inc., Boston, Mass.	A 2-year OEM agreement; 5 Model 70 systems already have been shipped; 61 Model 74s will be delivered to be incorporated in the Adage/200 Graphic Display Systems	$270,000+
Logicon, Inc., Torrance, Calif.	Air Force Aeronautical Systems Div. (ASD), Wright-Patterson AFB, Ohio	Technical assistance and software validation and verification (V&V) services on the B-1 supersonic bomber program	$185,000
Dr. David Klahr, Carnegie-Mellon University, Pittsburgh, Pa.	Spencer Foundation	Computer studies of how a child's learning capacity develops; involves building computer models of a child at various levels of development; goal to determine what is needed to stimulate a child to move from one developmental stage to the next	$130,500
Bunker Ramo Corp., Trumbull, Conn.	Dean Witter & Co., Inc., New York, N.Y.	An automatic communications and information system in firm's 76 domestic offices; equipment will include some 1300 Bunker Ramo System 7 computer terminals, 100 printers, and a CCP (Communications Control Processor)	——
Transit Systems Division, Keene Corp., Chicago, Ill.	Kansas City Area Transportation Authority (K.C.A.T.A.), Kan.	A complete Automatic Fare Collection & Revenue Processing System to use with its fleet of 300 buses; includes both vacuum revenue processing as well as ARCOM automatic EDP revenue, mileage and passenger count reporting system	——
Daconics, Sunnyvale, Calif.	Dept. of Commerce	3 minicomputer systems (with option to purchase 95 more) for use at National Weather Service (NOAA) stations located nationwide and in Caribbean and Pacific Islands; systems utilize Nova minicomputers and analyze atmospheric data transmitted from weather balloons	——
Computer Machinery Corp., Santa Monica, Calif.	Manufacturers Hanover Trust Co. Inc., New York, N.Y.	Lease of $500,000+ worth of CMC 9 KeyProcessing™ Systems to improve computer operations	——

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B5500 system	Headquarters Military Traffic Management and Terminal Service, Washington, D.C.	Providing additional in-house capability to release current equipment and discontinue an annual $400,000 ADP contract support at Headquarters
Data General Nova 1220 system	Graphics Systems, Inc., Lowell, Mass.	Use in Graphics Systems' System 1 (a phototypesetting system with an optical character reader; system is for The Composing Room Inc., New York, N.Y.
Honeywell Model 58 system	Society for the Preservation and Encouragement of Barber Shop Quartet Singing in America, Kenosha, Wisc.	Maintenance of over 34,000 membership records
Honeywell Model 716 system	The Kiewit Computation Center, Dartmouth College, Hanover, N.H. (2 systems)	Increasing number of available simultaneous access ports utilized by Dartmouth Time-Sharing System from 173 to 192; replaces two Datanet-30's
Honeywell Model 2050 system	Amsterdam Printing and Lithography Co., Amsterdam, N.Y.	Order processing; sales forecasting; accounting, inventory control, and purchasing functions; and data processing services for local firms
Honeywell Model 6040 system	Commercial Banking Company of Sydney Limited (CBC), Sydney, Australia	First phase of on-line banking system; will be linked to 3 Honeywell 316 satellite systems and, initially, will handle communications to terminals in 104 of the bank's 500 branches
NCR Century 100 system	Tollemache and Cobbold Breweries, Ltd., Ipswich, England	Handling Value Added Tax accounting
NCR Century 300 system	Automated Systems Corp., Houston, Texas	Replacement of smaller computer used in on-line data services to distributors and manufacturers in area
	Sumitomo Bank, Tokyo, Japan (4 systems)	On-line system which includes over 4,000 NCR units of various types; data captured by teller terminals is transmitted to the computers in two large, interconnected data centers in Tokyo and Osaka (systems valued at $9,400,000)
	Tomin Bank, Tokyo, Japan (2 systems)	Handling over 54,000 transactions daily, including savings, checking, time deposits, and loan accounts; systems include 178 NCR 270 terminals linking bank's 58 branches with headquarters (systems valued at $5,200,000)
	United Banks Service Company, Denver, Colo.	On-line handling of corporate trust programs and stock transfer functions; also services such as payroll preparation for bank customers
Univac 1110 system	Arizona State University, Tempe, Arizona	All educational and administrative requirements of the University, and capacity for additional services unavailable using previous computers
	Toyota Motors Co., Nagoya, Japan	Use in design of new car models, mechanical system simulation, various statistical analysis and program development
	Zenkyoren, Tokyo, Japan	On-line processing of all changes and additions to policies, all policy inquiries, management information, statistical work, varied customer services (system valued at $6 million)
Univac 9200 II system	Chaplin, McGuiness & Co., Inc., Pittsburgh, Pa.	Customer confirmations, daily activity listings, and management reports; other applications planned
Univac 9400 system	Interstate Brands, Los Angeles, Calif.	Sales analysis, route accounting, payroll and general accounting services for eight plants
	Jacobson-York Division, York, Pa.	Order processing, cut/sold analysis, inventory allocation, piece goods inventory, booking order analysis, picking papers and invoicing
Univac 9700 system	Grosseinkaufsgenossenschaft Österreichischer Consumvereine (GÖC), Vienna, Austria	Billing, preparation of delivery notes, sales statistics, inventory status, general accounting and payroll processing; later a Management Information system will be based on the 9700
	Regional Health Insurance Organization for Upper Austria Province (Oberosterrechische Gebietskrankenkasse, OÖGKK), Linz, Austria	Processing employee and employer contributions into health insurance program; also benefits paid out by OÖGKK and all other programs formerly processed on a UNIVAC UCT computer

Across the Editor's Desk — *Continued from page 45*

Developed by the Bendix Aerospace Systems Division, Ann Arbor, Mich., the X-ray can inspect a parcel or piece of luggage in less than five seconds. In 40 billionths of a second, an X-ray pulse penetrates the parcel and is converted to light. The light is then intensified and an image is received and stored in a miniature camera for presentation on the video screen.

Radiation dose is not harmful to humans or animals and is so low that luggage containing photographic film, magnetic recording tapes or pharmaceuticals can be inspected without damage to them.

The Bendix-Ray inspection system looks inside such articles as purses, aerosol cans, radios, umbrellas, gift-wrapped packages, shopping bags, plastic containers and even steel suitcases, disclosing their contents with little or no embarrassment to the passenger and without triggering sophisticated detonating devices.

Use of the Bendix-Ray inspection system by airlines could result in a cost saving when compared to the hand-search method. The Bendix Aerospace Systems Division has been demonstrating the Bendix-Ray inspection system to representatives of numerous airlines, airport authorities, state and federal agencies, as well as several foreign countries.

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 MARCH 15, 1973

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)		NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Part II. Manufacturers Outside United States								
A/S Norsk Data Elektronikk	NORD-1	8/68	2.0		0	101	101	21
Oslo, Norway	NORD-2B	8/69	4.0	(S)	0	20	20	X
(A) (Mar. 1973)	NORD-5	-	-		0	1	1	0
	NORD-10	-	2.0		0	0	0	30
	NORD-20	1/72	3.5	(S)	0	13	13	7
A/S Regnecentralen	GIER	12/60	2.3-7.5		0	40	40	0
Copenhagen, Denmark	RC 4000	6/67	3.0-20.0		0	19	19	3
(A) (Jan. 1972)								
Elbit Computers Ltd.	Elbit-100	10/67	4.9	(S)	-	-	325	10
Haifa, Israel								
(A) (Nov. 1972)								
GEC Computers Ltd.	902	5/68	-		0	17	17	0
Borehamwood, Hertfordshire	903, 920B	12/65	-		1	464	465	19
England	GEC 905	5/69	-		0	77	77	1
(A) (Nov. 1972)	GEC 920M	7/67	-		0	130	130	103
	GEC 920C	7/68	-		0	19	19	0
	Myriad I	1/66	-		0	47	47	0
	Myriad II	11/67	-		0	32	32	0
	GEC M2140	10/69	-		9	21	30	0
	GEC 2050	6/72	-		0	5	5	32
International Computers, Ltd. (ICL)	Atlas 1 & 2	1/62	65.0		0	6	6	X
London, England	Deuce	4/55	-		0	2	2	X
(A) (Sept. 1972)	KDF 6-10	9/61	10-36		0	34	34	X
	KDN 2	4/63	-		0	1	1	X
	Leo 1, 2, 3	-/53	10-24		0	43	43	X
	Mercury	-/57	-		0	4	4	X
	Orion 1 & 2	1/63	20.0		0	10	10	X
	Pegasus	4/55	-		0	9	9	X
	Sirius	-/61	-		0	8	8	X
	503	-/64	-		0	18	18	X
	803 A, B, C	12/60	-		0	107	107	X
	1100/1	-/60	5.0		0	13	13	X
	1200/1/2	-/55	3.9		0	11	11	X
	1300/1/2	-/62	4.0		0	82	82	X
	1500	7/62	6.0		0	35	35	X
	2400	12/61	23.0		0	3	3	X
	1900-1909	12/64	3-54		2	2200	2202	-
	Elliott 4120/4130	10/65	2.4-11.4		0	100	100	X
	System 4-30 to 4-75	10/67	5.2-54		0	200	200	-
Japanese Mfrs.	(Mfrs. of various models include: Nippon Electric Co., Fujitsu,							
(N) (Sept. 1970)	Hitachi, Ltd., Toshiba, Oki Electric Industry Co., and Mitsubishi						Total: 4150 E	Total: 800 E
	Electric Corp.)							
N.V. Philips Electrologica	P1000	8/68	7.2-35.8		-	-	105	39
Apeldoorn, Netherlands	P9200	3/68	-		-	-	300	25
(A) (Oct. 1972)	P9200 t.s.	3/70	-		-	-	5	1
	P880	9/70	-		-	-	29	16
	P850/55/60	9/70	-		-	-	40	290
	ELX	5/58	6-21		-	-	42	-
	DS 714	-/67	-		11	22	33	19
	DS 18	9/72	-		-	-	-	9
	PR 8000	1/66	-		-	-	23	-
Redifon Electronic Systems, Ltd.	R2000	7/70	-		1	19	20	4
Crawley, Sussex, England	R2000A	-	-		-	-	-	1
(A) (Jan. 1973)								
Saab-Scania Aktiebolag	D21	12/62	7.0		0	38	38	-
Linkoping, Sweden	D22	11/68	15.0		0	35	35	2
(A) (Mar. 1973)	D220	4/69	10.0		0	17	17	3
	D23	-/73	25.0		0	0	0	4
	D5/30	12/71	1.0		0	13	13	10
	D5/20	5/71	0.6		0	80	80	2000
Seelenia S.p.A.	GP-16	7/69	10.9	(S)	0	190	190	60
Roma, Italy	GP-160	-	5.6	(S)	-	-	-	-
(A) (Feb. 1973)								
Siemens	301	11/68	0.9		-	-	103	15
Munich, Germany	302	1/68	2.1		-	-	30	7
(A) (Jan. 1973)	303	4/65	2.7		-	-	70	2

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
	304	5/68	4.5	-	-	81	13
	305	2/68	6.1	-	-	118	16
	306	6/70	7.9	-	-	29	5
	2002	6/59	16.4	-	-	41	-
	3003	12/63	15.8	-	-	32	-
	4004/15/16	10/65	6.1	-	-	98	4
	4004/25/26	1/66	10.0	-	-	82	15
	4004/35	2/67	14.2	-	-	204	49
	4004/127	4/73	14.0	-	-	-	4
	4004/135	10/71	20.5	-	-	93	38
	4004/45	7/66	27.3	-	-	365	35
	4004/46	4/69	41.0	-	-	16	1
	4004/55/60	7/66	35.0	-	-	28	-
	4004/150	2/72	49.0	-	-	53	53
	4004/151	3/72	61.0	-	-	9	3
	404/2	11/73	3.0	-	-	-	40
	404/3	4/71	2.1	-	-	37	14
	404/6	10/71	4.5	-	-	60	41
						Total: 1549	Total: 355
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIE	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	URAL 11/14/16 and others	-	-	-	-	C	C
						Total: 6000 E	Total: 6000 E

C.a PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 734: GRAY CODE

"Ever hear of a two-dimension Gray Code?" asked Pete as Joe entered the office.

"No, what's that, something shady?"

"Not at all. The usual Gray Code is a sequence of binary numbers with each one differing from the one before and after it in only one bit. This is simply an extension to a plane; each number in addition differs from the numbers above and below it in only one bit."

"Then you don't count diagonal neighbors?" asked Joe.

"No, just the four that are adjacent horizontally or vertically."

"How about the ones on the edges or in the corners? They don't have four neighbors."

"Well, we have to assume these are written on a torus so that if you go off the right you come in at the left. Likewise, top and bottom are to be considered equivalent."

"What's the problem, then?" Joe wanted to know.

"I'm trying to figure out whether it can be done."

"Since each number has only four neighbors you couldn't do it for more than four-bit numbers."

"Right," said Pete. "But I'm not even sure it can be done for these."

Can it be done?

Solution to Problem 733: A Random Walk

The probability of success on the firth, seventh, ninth . . . step is $\frac{1}{32}, \frac{4}{128}, \frac{13}{512}$ . . . and the required probability is $\frac{3^{n-4}-1}{4^{n-2}}$ which $= \frac{1}{6}$.

$n = 5$

ADVERTISING INDEX

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

CALENDAR OF COMING EVENTS

April 10-12, 1973: Datafair 73, Nottingham University, Nottingham, England / contact: John Fowler & Partners Ltd., 6-8 Emeral St., London WC1N 3QA, England

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

April 16-19, 1973: 11th Annual Association for Educational Data Systems Convention, The New Orleans Marriott, New Orleans, La. / contact: AEDS, 1201 16th St., N.W., Washington, DC 20036

April 24-26, 1973: I.S.A. Joint Spring Conference, Stouffer's Riverfront Inn, St. Louis, Mo. / contact: William P. Lynes, c/o Durkin Equipment, 2384 Centerline Ind. Dr., St. Louis, MO 63122

April 30-May 2, 1973: 1st Symposium on Computer Software Reliability, Americana Hotel, New York, N.Y. / contact: David Goldman, IEEE Hdqs., 345 E. 47th St., New York, NY 10017

May 2-3, 1973: 18th Annual Data Processing Conference, Tuscaloosa, Ala. / contact: C. E. Adams, Director, Conference Activities, University of Alabama, Box 2987, University, AL 35486

May 2-5, 1973: DECUS Spring Symposium, Holiday Inn, Penn Center, Philadelphia, Pa. / contact: DECUS, 146 Main St., Maynard, MA 01754

May 3-4, 1973: 10th Annual National Information Retrieval Colloquium, Independence Mall Holiday Inn, 400 Arch St., Philadelphia, Pa. / contact: Martin Nussbaum, Computamation, 2955 Kensington Ave., Philadelphia, PA 19134

May 13-16, 1973: 1973 International Systems Meeting, Hilton Hotel, Denver, Colo. / contact: R. B. McCaffrey, Association for Systems Management, 24587 Bagley Rd., Cleveland, OH 44138

May 14-16, 1973: DPSA International Meeting, Aperghi Hotel, Athens, Greece / contact: C. A. Greathouse, DPSA, P.O. Box 1333, Stamford, CT 06904

May 14-16, 1973: 3rd Annual NCR Users International Meeting, Sheraton Harbor Island Hotel, San Diego, Calif. / contact: Public Relations Dept., National Cash Register Co., Dayton, OH 45409

May 23-25, 1973: AIIE Annual Conference, Conrad Hilton Hotel, Chicago, Ill. / contact: Technical Services, AIIE, 25 Technology Park/Atlanta, Norcross, GA 30071

June 4-6, 1973: 1973 8th PICA Conference, Radisson Hotel, Minneapolis, Minn. / contact: IEEE Hdqs., Tech. Svcs., 345 E. 47th St., New York, NY 10017

June 4-8, 1973: National Computer Conference and Exposition, Coliseum, New York, N.Y. / contact: AFIPS Hdqs., 210 Summit Ave., Montvale, NJ 07645

June 18-21, 1973: SIAM 1973 National Meeting, Sheraton Conference Center, Hampton, Va. / contact: SIAM, 33 S. 17th St., Philadelphia, PA 19103

June 20-22, 1973: Canadian Computer Conference, Hotel Macdonald, Edmonton, Alberta / contact: Mr. Jim Wilcox, P.O. Box 1881, Edmonton, Alberta, Canada T5J ZP3

June 22-23, 1973: 11th Annual Computer Personnel Conference, Univ. of Maryland Conference Center, College Park, Md. / contact: Prof. A. W. Stalnaker, College of Industrial Management, Georgia Institute of Technology, Atlanta, GA 30332

June 24-29, 1973: 20th International Meeting, The Institute of Management Sciences, Tel Aviv, Israel / contact: TIMS XX, Box U, Brookline, MA 02146; OR TIMS XX, P.O.B. 16271, Tel Aviv, Israel

June 26-28, 1973: Workshop of Computer Architecture, Université de Grenoble, Grenoble, France / contact: Grenoble Accueil, 9, Boulevard Jean-Pain, 38000, Grenoble, France

June 26-29, 1973: DPMA 1973 International Data Processing Conference & Business Exposition, Conrad Hilton Hotel, Chicago, Ill. / contact: Richard H. Torp, DPMA International Hdqs., 505 Busse Highway, Park Ridge, IL 60068

July 17-19, 1973: Summer Computer Simulation Conference, Queen Elizabeth Hotel, Montreal, Canada / contact: Stuart Trask, Sun Life Assurance Co. of Canada, P.O. Box 6075, Montreal 101, P.Q., Canada

July 20-22, 1973: 1973 International Conference of Computers in the Humanities, University of Minnesota, Minneapolis, Minn. / contact: Prof. Jay Leavitt, 114 Main Engineering Bldg., University of Minnesota, Minneapolis, MN 55455

July 23-27, 1973: 3rd Annual International Computer Exposition for Latin America, Maria Isabel-Sheraton Hotel, Mexico City, Mexico / contact: Seymour A. Robbins and Associates, 273 Merrison St., Box 566, Teaneck, NJ 07666

Aug. 13-17, 1973: SHARE Meeting, Miami Beach, Fla. / contact: D. M. Smith, SHARE, Inc., Suite 750, 25 Broadway, New York, NY 10004

Aug. 20-24, 1973: 3rd International Joint Conference on Artificial Intelligence, Stanford University, Stanford, Calif. / contact: Dr. Max B. Clowes, Laboratory of Experimental Psychology, University of Sussex, Brighton, Sussex BN1 9QY, England

Aug. 27-29, 1973: ACM '73, Atlanta, Ga. / contact: Dr. Irwin E. Perlin, Georgia Institute of Technology, 225 North Ave., N.W., Atlanta, GA 30332

Aug. 27-Sept. 1, 1973: Computer Arts Society, 1973 Edinburgh International Festival, Edinburgh, Scotland / contact: R. John Lansdown, Secretary, Computer Arts Society, 50-51 Russell Square, London WC1B 4JX, England

Aug. 30-Sept. 1, 1973: International Conference on Systems and Control, PSG College of Technology, Coimbatore, India / contact: Dr. R. Subbayyan, PSG College of Technology, Coimbatore 641004, Tamil Nadu, India

Sept. 4-7, 1973: International Computing Symposium 1973, Davos, Switzerland / contact: Dr. H. Lipps, International Computing Symposium 1973, c/o CERN, CH-1211 Geneva 23, Switzerland

Sept. 25-27, 1973: Conference on 'Hybrid Microelectronics,' University of Kent at Canterbury, England / contact: Registrar, Institution of Electronic and Radio Engineers, 8-9 Bedford Sq., London WC1B 3RG, England

Oct. 2-4, 1973: 2nd International Computer-Aided Design and Computer-Aided Manufacturing Conf., Detroit Hilton Hotel, Detroit, Mich. / contact: Public Relations Dept., Society of Manufacturing Engineers, 20501 Ford Rd., Dearborn, MI 48128

Oct. 8-12, 1973: Business Equipment Show, Coliseum, New York, N.Y. / contact: Rudy Lang, Prestige Expositions, Inc., 60 E. 42nd St., New York, NY 10017

Oct. 15-17, 1973: 14th Annual Switching and Automata Theory Symposium, University of Iowa, Iowa City, Ia. / contact: Prof. Gerard Weeg, Computer Science Dept., University of Iowa, Iowa City, IA 52240

WILL YOU HELP?

Yes, *you.* It may come as a surprise that you'd be asked . . . but as a reader of *Computers & Automation* you are in a unique position to help us.

NAMES . . . people, institutions, companies who should be interested in 1) the computer industry and/or 2) seeking truth in information are very much needed to join you as readers of *C&A*.

Will you tell us who they are? And perhaps even more, will you let us use your name in writing to them? But with or without your name (we'll only use it if you grant permission) we need to know those *you* think might be interested in also reading *C&A*.

Please give us their names and addresses on the form below or add another sheet of paper. Trim out the card with scissors and drop it in the mail. We'll gladly pay the postage to learn of possible new friends. And many thanks for your help! As a token of our appreciation we'll send you our ****Reprint.

P.S. If you like you may mail your list separately to:
R. A. Sykes, Circulation Mgr.
Computers & Automation & People
815 Washington Street
Newtonville, MA 02160

*** * * * reprint from computers and automation**

Science and the Advanced Society, by C. P. Snow, Ministry of Technology, London, England (April 1966)
The Information Revolution and the Bill of Rights, by Dr. Jerome B. Wiesner, M.I.T. (May 1971)
Employment, Education, and the Industrial System, by Prof. John Kenneth Galbraith, Harvard Univ. (Aug. 1965)
Computers and the Consumer, by Ralph Nader, Washington, D.C. (Oct. 1970)

cut here and tuck in flap

cut here

cut here

TO: R. A. Sykes, Circulation Mgr.
Computers & Automation & People

I suggest you send information on C&A to . . . (attach list if you like)

(1) Name_____

Address_____

City_____ State_____ ZIP_____

(2) Name_____

Address_____

City_____ State_____ ZIP_____

May we use your name? ☐ YES ☐ NO

Please give us your name and address on the form below so we can send you your ****Reprint. Just cross out the subscription request – unless you also want to enter your new or renewal order.

cut here

Fold here – do not cut

cut here

B – staple or glue to A

FIRST CLASS
PERMIT NO. 33531
BOSTON, MASS.

BUSINESS REPLY MAIL

No postage stamp necessary if mailed in the United States

POSTAGE WILL BE PAID BY BERKELEY ENTERPRISES, INC.

COMPUTERS AND AUTOMATION
AND PEOPLE
815 Washington Street
Newtonville, MA 02160

bend here and fold

YES, start my subscription to COMPUTERS AND AUTOMATION AND PEOPLE according to the instructions checked below.

One Year (including the Computer Directory and Buyers' Guide — 13 issues) U.S. only. ☐ $18.50

One Year (excluding the Computer Directory and Buyers' Guide — 12 issues) U.S. only. ☐ $9.50

Name:_____ Title:_____
Organization:_____
Address:_____
City:_____ State:_____ Zip:_____
Country if not U.S.:_____
Signature:_____ P.O. No.:_____

☐ Payment enclosed ☐ Renewal
☐ Bill me ☐ New subscription

To SPEED the processing of your order, please check the one best descriptor in each of the two categories below. (This information will be used for statistical purposes only.)

BUSINESS TYPE

01—Computer Manufacturer
02—Aerospace / Aircraft Manufacturer
03—Other Manufacturing
04—Raw Materials Processing; (chemical, primary metal, petroleum, food, etc.)
05—Mining and Construction
06—Computing & Consulting
07—Finance, Insurance, Publ., and Service Organizations
08—Transportation Companies
09—Public Utilities
10—Research
11—Wholesale, Retail, Sales, and Marketing Firms
12—Educational; (College, University, or School)
13—Government and Military
14—Libraries

JOB FUNCTION

1—Technical Management; (computer installation management, program management, or engineering mgmt.)
2—Computer Center Personnel; (methods & procedure analysts, and operators)
3—Programming Personnel; (systems, application & research programmers)
4—Professional: (systems analysts, mathematicians, operations researchers, and professors)
5—General Management Executives; (corporate officers, owners, and partners)
6—Engineering Personnel; (systems engineers, research & development engineers)
7—Research Personnel
8—Students
9—Library Subscription
10—Subscription in Company Name Only

A – staple or glue to B

cut here

"WHO'S WHO IN COMPUTERS AND DATA PROCESSING"

EDITION 5.2 = 5th EDITION + 2 SUPPLEMENTS

THE MOST ESSENTIAL COMPONENTS IN COMPUTERS AND DATA PROCESSING ARE PEOPLE

Who are they ?
What do they do ?
Where do they do it ?

Consult

"WHO'S WHO IN COMPUTERS AND DATA PROCESSING"

jointly published by Quadrangle Books (a New York Times company) and *Computers and Automation* (Berkeley Enterprises, Inc.)

"Who's Who in Computers and Data Processing" has been changed to an annual subscription basis as follows:

1. The latest Cumulative Edition (the 5th edition published 1971, containing over 15,000 capsule biographies, over 1,000 pages long, 3 volumes, hardbound) **PLUS**
2. At least 3 Updating Supplements per year expected to total over 3,000 entries

Both for $34.50 per year in any year when a cumulative edition is supplied . . . and $15.00 per year in any year when a cumulative edition is not supplied.

BASED ON "Computers and Automation" 's continual data gathering from computer professionals

---

This reference is particularly useful for:

Personnel managers
Libraries
Conference planners
Directors of computer installations
Suppliers to the computer industry
Executive search organizations
Prospective authors
Prospective speakers . . .

anyone who needs to keep up with the important people in the field.

Each computer professional has a capsule biography detailing: last name; first name and middle initial (if any); occupation; year of birth; university education and degrees; year entered the computer field; main interests; job title; organization and its address; publications, honors and memberships; home address. See sample in next column:

ANDREE, Richard V. / professor, author, lecturer, consultant / *b:* 1919 / *ed:* BS, Univ of Chicago, PhD, Univ of Wisconsin / *ent:* 1948 / *m-i:* A Ma P Sy; writing, information science / *t:* professor of math, research associate in computing science / *org:* Univ of Oklahoma, Norman, OK 73069 / *pb-h:* ACM, AEDS, ASL, DPMA, MAA, NCTM, SIAM lecturer, American Assn for the Advancement of Science, American Math Society, American Society for Engineering Education, Mu Alpha Theta, Pi Mu Epsilon, Sigma Xi, 3 fellowships, numerous committees, *Who's Who in America, World Who's Who,* editor, 12 books, 8 paperbacks, about 20 articles / *h:* 627 E Boyd, Norman, OK 73069

We are confident that you will find the subscription will repay you many times over. In fact, one day when this wealth of material gives you the inside track with someone important to you, you'll find the information PRICELESS: the most essential component in EDP is GOOD PEOPLE.

RETURNABLE IN 10 DAYS FOR FULL REFUND (if not satisfactory)

(may be copied on any piece of paper)

WHO'S WHO IN COMPUTERS AND DATA PROCESSING
815 Washington St., Newtonville, Mass. 02160

( ) YES, please enroll me as a subscriber to WHO'S WHO IN COMPUTERS AND DATA PROCESSING at the following rate:

( ) $34.50 including the last cumulative edition

OR

( ) $15.00 since I already have access to the last cumulative edition

I understand that in each 12 months I shall receive at least three updating supplements, expected to total over 3000 entries.

( ) Payment enclosed ( ) Please bill me.
( ) Please bill my organization

RETURNABLE IN 10 DAYS
FOR FULL REFUND
(if not satisfactory)

Name _____

Title _____

Organization _____

Address _____

City _____ State & Zip _____

Your Signature _____ P.O. No. (if company order) _____