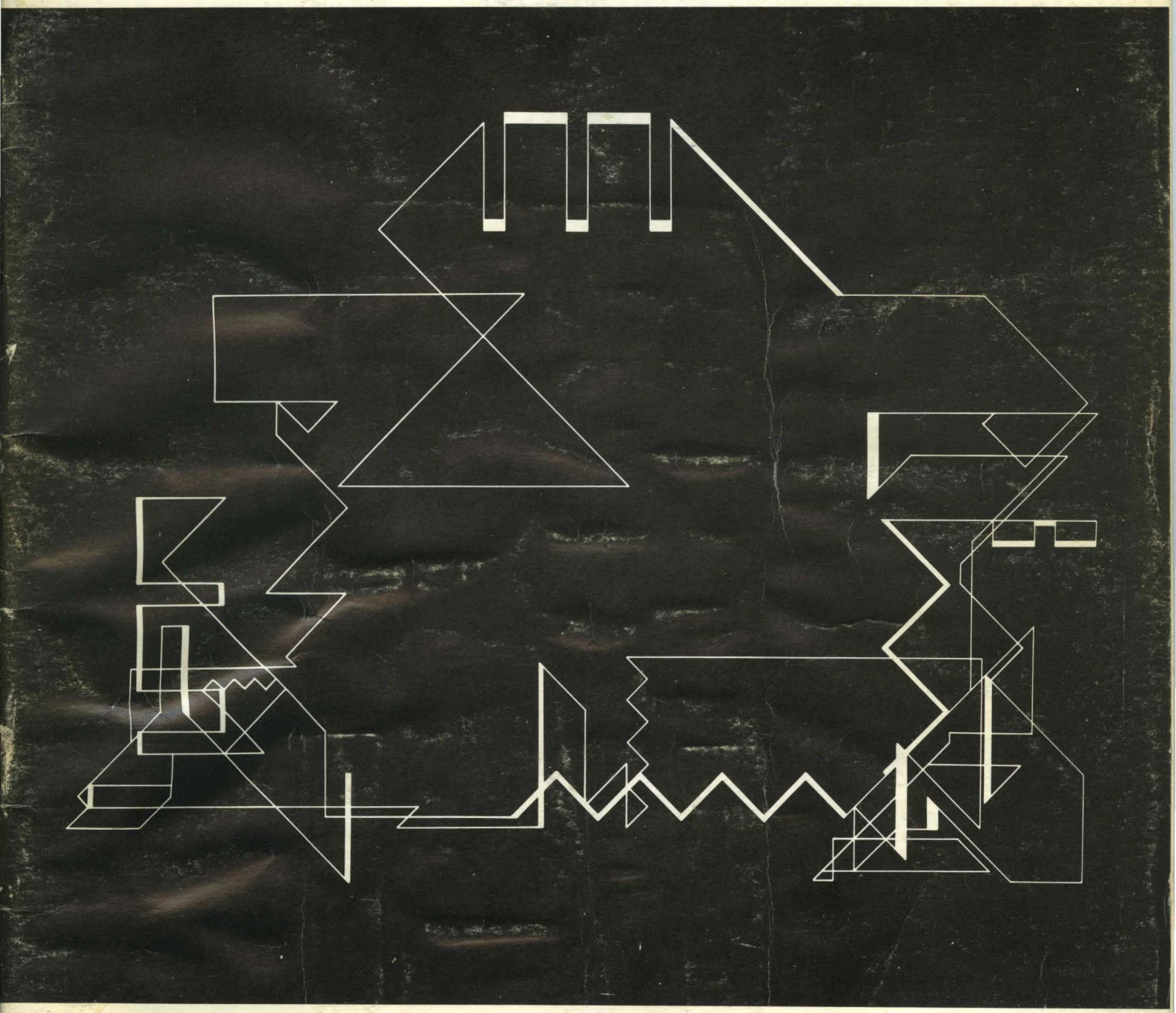
SCIENCE & TECHNOLOGY

October, 1970

Vol. 19, No. 10

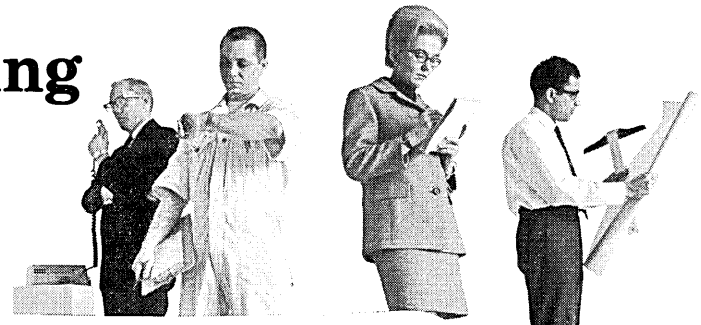
computers and automation



"Lightning"

Train 'em in house

the way 500 leading companies do-with VAI



Grow your own E
time with *VA I Vi*
major airlines an
corporations. Ge
of top instructor
Learner-controlle
dents work at the
learn faster at less

ywhere, any
t-tested" by
ica's largest

Computing System
tion to S/360 • Com-
nagement • Funda-
• COBOL • RPG •
• Advanced FOR-
alyst Training Pro-
Systems Concepts •
ning — I/O Devices
r Training • Intro-
L • Introduction to
imulation • Linear
agers & analysts) •
• Introduction to
ses coming soon.
tion.

emont, Ill. 60018

Cl
D

TON, DALLAS,
soon in Atlanta.

Letters To The Editor

Employer References in Computer-Based Personal Information

May I take issue with one point in Lord Halsbury's excellent speech on computer privacy [July issue, p. 42].

One passage says: "If a man applies for a job and gives references, and those references are taken up, they must remain confidential as between the referee and the future employer, for the very simple reason that nobody will give references, if, on those occasions when bad references are given, they are landed with a personal embarrassment through breach of confidence."

It is my view that the attitude implicit in this statement is exactly that which must be fought in structuring a defence against computer-based personal information.

In law an employer has no right of privilege in relation to his employee. His only defence to a suit for libel or slander is either that the words in question were true or that they did not mean what it is suggested they meant. If the words used are true then the employer should have no objection to their being seen by the employee. If untrue then the ex-employee should have his normal rights to rebut them.

In reality references are a farce. An applicant only gives references to those people who speak well of him. If his prospective employer demands the right to a reference from his previous employer, his alternative is to agree or not get the job. In my experience most employers write innocuously because they know the dangers.

The present system is not a danger because it is both a farce, and the individual can live down a real or fancied black mark since there is no central and continuing file on him.

But, create – via the computer – an efficient and all embracing information storage and retrieval system, then create a privileged category of information to which the individual has no right of access, give employers the right to input and output of information *which they do not have in law at this time,* and you have created exactly that which is the basis of the ordinary man's fear of computer-based personal information. (The fact that Lord Halsbury says this information should *not* go on the computer is beside the point. A computer only makes storage and access easier, it does not alter the quality of the information.)

What I have said in this letter may be entirely wrong but, if it is published, all interested, including Lord Halsbury, may make up their own minds. However, supposing I, as one of the employers of The House of Lords, had the right to input information to a file which was used annually to re-elect. Suppose a faction were looking for a reason not to re-elect. Suppose they came across a remark by me, "Excellent speaker but not really good at thinking things through. Glaring error in his speech on computer privacy 1970. Threw into doubt whether he really understood the common man's fears"?

P. DAVIDSON, Director
Control Data Institute
77-79 Wells St.
London W1, England

Management's View of Systems Analysts

The article in the August issue by Elias Awad ["The Dilemma of the Systems Analyst", page 34] is a perfect descriptor of the general attitude held by management towards knowledge workers. All too often the professional executives fail to understand the equally professional endeavors of those who form the framework of the organization both try to serve.

This is compounded by a relative shortage of competent systems analysts. The laws of economics indicate that the buyer (employer) willing to pay the highest price is sought by the seller (knowledge worker). Company loyalty is left to those best able to maintain eligibility for the pension plan; i.e., those whose skills can be neither bought or sold.

When the promotional opportunities are equal for the information user and the information analyst, members of this profession will begin to number among the recipients of gold watches, etc.

STANLEY JAFFIN
211 N. Piedmont St.
Arlington, Va. 22203

The NYT News Service – Correction

You are mistaken regarding *The New York Times'* use of its own news service. The news service is generated from articles from *The New York Times* and *The Washington Post,* not the *New York Post* as you stated on page 29 in your July issue [in "The May Article, 'The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence' – Report No. 2"].

Since *The Washington Post* printed an article about your May article on May 3, it went out on the news service.

Perhaps *The New York Times* should not have overlooked the story originally, but the fact that they picked it up later seems to me to indicate that it was simply an oversight.

ANNE JONES
380 Riverside Dr.
New York, N.Y. 10025

Ed. Note – Thank you for your correction, and your comments.

Vol. 19, No. 10
October, 1970

Editorial Offices
BERKELEY ENTERPRISES, INC.
815 WASHINGTON STREET,
NEWTONVILLE, MASS. 02160

CIRCULATION AUDITED BY
AUDIT BUREAU OF CIRCULATIONS

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

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

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

Computers and Society

14 COMPUTERS AND THE CONSUMER [A]
by Ralph Nader
A searching commentary on how computers to date have affected consumers, citizens, and the public, and how they might be used for wider advantage.

32 A 'CHECKLESS' SOCIETY OR AN 'UNCHECKED' SOCIETY [A]
by Rudy C. Stiefel, Pres., Infotran Inc.
Why the flow of electronic pulses that influence the monetary aspects of our lives may be very hard to control.

7 "COMPUTER-ASSISTED POLITICAL ANALYSIS" — COMMENT [F]
by Emanuel S. Savas

Computers and the Philosophy of Science

7 DO COMPUTERS THINK? [F]
by Donn B. Parker and the Editor

The Computer Industry

23 EDP FACILITIES MANAGEMENT: ABDICATION OR SALVATION? [A]
by Douglass M. Parnell, Jr., Pres., Computer Technology Inc.
The concept of computer facilities management — its historical development, its application to companies and industries, its strengths, and its weaknesses.

8 "THE DILEMMA OF THE SYSTEMS ANALYST" — COMMENT [F]
by Helen Solem

9 NEW ORGANIZATIONAL STRUCTURE FOR THE BRITISH COMPUTER SOCIETY IS PROPOSED [F]
by The British Computer Society

10 INTERNATIONAL SYMPOSIUM ON THE THEORY OF MACHINES AND COMPUTATIONS — CALL FOR PAPERS [F]
by Sheldon B. Akers

New Applications of Computers

28 COMPUTER GRAPHICS FOR SOCIETY — Part 1 [A]
by Prof. Leslie Mezei, Dept. of Computer Science, Univ. of Toronto
A discussion of the importance of computer graphics — and some of the subfields growing out of it, including plotter graphics, alphanumeric display, interactive design, and animation by computer.

40 A DATA BANK FOR NARCOTICS ADDICTS [A]
by Elmer D. Young
How the Narcotic Addict Reporting Program can evaluate different methods of treatment for the individual narcotic addict.

9 A NEW APPROACH TO COMPUTER ART AND ARCHITECTURE [F]
by Isao Oishi

Computers and Robots

36 INDUSTRIAL ROBOTS AND AUTOMATION [A]
by J. M. Sutherland, Product Mgr., AMF Versatran
How the programmable, automatic transfer and positioning machine — the industrial robot — is providing "flexible" automation which can be used for a very large number of tasks.

Computers, Science and Assassinations

52 THE CONSPIRACY TO ASSASSINATE SENATOR ROBERT F. KENNEDY AND THE SECOND CONSPIRACY TO COVER IT UP [A]
by Richard E. Sprague
A summary of what researchers are uncovering in their investigation of what appears to be not one but two conspiracies relating to the assassination of Senator Robert F. Kennedy.

56 INDEX TO "SPECIAL UNIT SENATOR: The Investigation of the Assassination of Senator Robert F. Kennedy" [A]
An index is supplied for the Random House book written by Robert A. Houghton, of the Los Angeles Police Department, about the investigation of the assassination of Senator Robert F. Kennedy.

Computers Abroad

43 REPORT FROM GREAT BRITAIN [C]
by Ted Schoeters
How European computer companies are trying to coordinate their research and development.

Computers and Fun

13 PROBLEM CORNER [C]
by Walter Penney, CDP

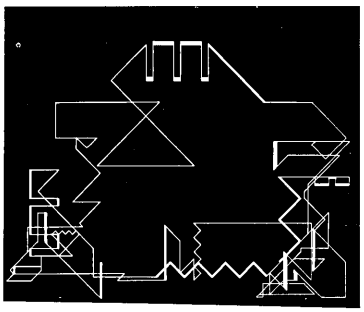
27 NUMBLES [C]
by Neil Macdonald

Notices and Corrections

10 "AN ARTIST VIEWS DISCOVERY THROUGH COMPUTER-AIDED GRAPHICS" — CORRECTION [F]

13 "PROBLEMS OF LIABILITY FOR THE EDP SERVICES INDUSTRY" — IMPORTANT NOTICE AND CORRECTION [F]

13 "AUTOMATED POLICE STATE" — CORRECTION [F]



This Month's Cover

This month's front cover drawing is another of the entries in the Eighth Annual Computer Art Contest sponsored by Computers and Automation *(see August, 1970 issue). The artist is Manfred Mohr, 58 Blvd. Latour-Maubourg, Paris 7, France. Another of his pieces of computer art appeared in the August issue.*

Departments

62 Advertising Index
44 Across the Editor's Desk
Applications
Education News
Organization News
Miscellany
63 Calendar of Coming Events
45 Classified Advertisements
3 Letters to the Editor
61 Monthly Computer Census
50 New Contracts
51 New Installations
47 New Products and Services
22 Punch Lines . . .

Key

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

What Top Management Should Know About Computers

Many reports of the experiences that organizations have with computers show that:

- It is expensive to use computers at all.
- it is difficult to use computers well.
- Apparently, the majority of organizations using computers do not use them well.
- For many kinds of operations above a certain size, computers have become indispensable – in this sense: they can and do provide much information at a far lower cost than ever before, and therefore have become an important factor in successful competition.

Under these conditions, the "computer problem" has become one of the most important and critical problems facing top management.

But before pushing ahead with the main argument, let us stop for a moment and consider what are the duties of top management. It seems to me that they fall into three main categories:

1. *Observation:* To perceive and observe extremely well; to design and direct crucial investigations and experiments of many kinds; to derive reasonable conclusions from observations, investigation, and evidence.
2. *Management:* To manage men, materials, time, and other factors so as to make a profit for the business; to insist on efficiency, courtesy, honesty, and other principles that make a business competent and respected; to make sensible and timely decisions.
3. *Strategy:* To adopt good policies and strategies for the business; to measure continually the status of the business relative to indexes of accomplishment; to make important distinctions correctly.

What distinctions? Top management needs to be able to make distinctions between:

- Competent men, and incompetent men;
- Reasonable estimates, and poor estimates;
- What a technology can do and what it cannot do;
- What an organization can do, and what it cannot do.

In order to fulfill these duties, it seems to me undeniable that top management must have more than just a small acquaintance with computers – for they have become a significant factor in business, management, society, and decision-making.

How much knowledge needs to be learned?

The amount of basic knowledge to be learned, and the basic experiences to be passed through, are much less than what is needed for, say, an elementary knowledge of French. I would estimate that a member of top management would need to know and understand some 60 to 100 important terms and some 40 to 80 important propositions about computers. Also, he should have a short (3 to 5 day) course (of good quality) in computers. And the course should include interactive contact with a computer, if possible not just a terminal but an entire machine. Why? Because there is no satisfactory substitute, it seems to me, for at least some first-hand contact with almost any activity to be managed: you have a better admiral if once he was a sailor.

Can the "computer problem" be sidestepped by utilizing computer services or facilities offered by an outside company? In some cases and to some extent, yes; but the managment decision should be based on grounds of solid reason and not on grounds of convenience or necessity.

What are some major general principles which seem to have been well established so far? Here are some of them:

1. *Gradual Development:* Regularly it is better – and far safer – to develop computer use gradually, than to try to take one large step to a great computer installation.
2. *In-House Training:* Regularly it is better to train good company people in how to use computers, than to train outside computer people in how to understand and apply the company's procedures.
3. *Variation in Problems:* Problems vary greatly according to: the ease of computerizing; the usefulness of computer solutions; the reliability of the computed results; etc., etc., etc. It makes sense therefore to apply computers first to the easier problems, but to make sure that the harder problems are not indefinitely postponed.
4. *Degree of Knowledge:* Top management MUST know enough about computers, data processing, and systems analysis, so that it can avoid the "snow job" – so that it can avoid being misled by the distorted, colored view of reality which an artist with words can paint for a failing application.

It seems to me that along these lines top management can effectively and realistically control the applications of computers in a business.

But it is not easy, and there is no shortcut.

Edmund C. Berkeley

Editor

C.a

READERS' FORUM

"COMPUTER-ASSISTED POLITICAL ANALYSIS" — COMMENT

Emanuel S. Savas
First Deputy City Administrator
The City of New York
250 Broadway
New York, N.Y. 10007

My compliments on your editorial in the July issue ["Computer-Assisted Political Analysis," page 6]. It demonstrates a motivation and a viewpoint which is still too rare in our profession. Although one cannot yet predict the consequences of your call to action, it expresses the right sentiment at the right time.

I sense that the talented professionals in the computer field are beginning to realize that they have focussed their energies and abilities on too minute a portion of the systems problems which afflict our society, and that their systems-oriented way of thinking can (with only a modest amount of remedial, on-the-job training) be applied successfully to larger problems – even to important problems in which information need not be sanctified by traversing the innards of electronic computer prior to its useful employment. □

DO COMPUTERS THINK?

I. From Donn B. Parker, Director

Computer Planning and Operations
Stanford Research Institute
Menlo Park, Calif. 94025

The July 29 edition of *Computerworld* contained a relatively negative review of the talk that you gave this summer in North Wales. I would appreciate receiving a copy of your talk, if one is available.

The *Computerworld* review stated that you asserted that computers do think, that computers will translate from one language to another, that every defined individual operation can be done by a computer better and faster than by a human being, and that it is possible for a computer to make decisions more wisely than a human being.

I am concerned about the impact that statements such as this have on the general public. I feel that statements of this type create an unhealthy feeling of computer technology leading to what I refer to as the giant electronic brain syndrome. I try to tell the lay public that computers *do not* think; they rethink or reprocess the thoughts of the people who program them. There are many human activities involving data that is exceedingly rich in information which could never be performed with the use of computers. The concept that a computer can make decisions more wisely than a human being makes no sense to me from the point of view that only people make decisions using computers as tools. I would be interested in what you said in context, relative to my comments.

II. From the Editor

Thank you for your comments. I too felt that the *Computerworld* review of the meeting at Llandudno was rather negative. I personally found more than half the talks that were given fascinating, and I would not have missed them for anything. Those given by Eckert, Hopper, Hargreaves, Thompson, and Edwards were particularly enlightening.

My own talk was by request not written down ahead of time; I gave it out of a large notebook full of notes.

I do assert that computers do think – although what I mean by this statement requires clarification (see below). I am firmly convinced that eventually computers will translate adequately from one natural language to another. I am convinced that "Every defined *intellectual* [the word "individual" in the *Computerworld* review was a garble] operation will be done by a computer better and faster and more reliably than a human being can do it." The catch in this statement is the word "defined."

I am convinced that it is possible for computers to make a great many decisions more wisely than human beings can. Here again there needs to be a description of the areas in

which these decisions are made. And, in fact, I believe it is anthropocentric, egocentric, fallacious, and nowadays stupid to maintain that computers do not think.

The basic area of difference between us, considering (1) how much we have both been involved with computers, (2) the soundness of your views, and (3) the soundness of my views, disappears, I think, as soon as we use scientific language. "Thinking" is not scientific language. What is happening inside of a computer is that a group of programmers (ranging from 1 to as many as 50 persons perhaps) expresses the set of calculating rules for the computer to use more or less blindly. Whatever "understanding" the computer has is like the "understanding" by a thermostat of "too hot" or "too cold."

The day will come when a computer will be able to behave intellectually better than a human being can in a vast number of areas, instead of only anti-aircraft firing, missile guidance, the direction of spaceships, and some 2000 more areas! But it is still a far cry to the day when a computer can do better than a school-bus driver, a newspaper reporter, etc. – the activities where there is a strong mixture of (1) perceiving an environment that has to be classified, and (2) intellectual activity.

In addition to what the programmers put into the computer at the start, there is the experience which the computer can acquire for itself from experimenting and/or learning from experience. This can lead to extremely powerful programs, like Dr. A. L. Samuels' checkers-playing program, which has become a championship checkers player, far better than Dr. Samuels. As the years go by, more and more ability to learn from experience and more and more adaptation to elements of the environment will go into computers, and they will become even more remarkable "thinking" machines.

I agree that the "giant electronic brain syndrome" is something to be avoided. That is just one of a great many stupid statements and attitudes: "statistics prove," "informed circles report," "the computers say," "the president of . . . said . . . , and who are we to question that?" There is no shortcut to avoiding all such pitfalls. But it is most unwise for us to take the position that computers do not think, for even the present behavior of a computer, if it occurred in a human being, would classify him as a wise man and a prodigy.

As computers (programmed computers, of course) accomplish more and more on the intellectual horizon, the people who maintain that they do not think will look less and less intelligent.

In the middle of the 1800's, there was a similar anthropocentric argument about the origin of species and whether man was descended from other animals. Charles Darwin trembled for over 20 years before he risked the wrath of the theologians and put forward his theory of evolution. At the beginning of the 1800's, chemistry had been divided into organic and inorganic, as I recollect, and there was a theory, I think, that only a "vital force" could make organic chemicals; this fell apart when a chemist synthesized urea. In the 1500's, Galileo was punished for saying that the earth went round the sun. So now in our era, we might just as well face the facts: thinking adequately and deciding wisely is done by machines as well as man, in a great many, though not all, situations. □

"THE DILEMMA OF THE SYSTEMS ANALYST" – COMMENT

Helen Solem
666 E. Main, Apt. 16
Hillsboro, Oregon 97123

I enjoyed reading Elias M. Awad's article, "The Dilemma of the Systems Analyst," in the August issue of *C&A* [page 34]. He articulates very clearly some of the symptoms of the disease (high mobility), but I don't think he gave us a complete prescription to cure it.

My first thought was "what a spoiled lot they are," expecting so much consideration, special attention, and recognition. For what? Have they made that much more significant a contribution to the organization than the creative engineer whose original idea is what the firm has to market; the machinist, the tool and die maker, and the line manager who crank out the product in sufficient numbers to compete effectively; the top salesman who peddles the product; or the financial man who finds the capital and manages it resourcefully so that they all receive a pay check and the firm makes a profit?

Systems people today temporarily occupy a peculiar position in the scheme of things. The concept and approach is relatively new. It has not been defined or cataloged and labeled as have other occupations. This ambiguity in itself contributes to the problem. Systems are more often formally applied in large organizations than small ones. Systems are what enable the Director to coordinate, to delegate, and to marshall the whole more efficiently. His job calls for timely information. In giant industrial labyrinths today, systems analysis provides the optimum framework for information to travel from the top to the bottom and back again. The Director naturally receives the lion's share of the reward. He feels that the Systems Analyst's contribution is far more routine than creative.

In my thinking, the Systems Analyst's position in an organizational hierarchy is analogous to that of the middle manager. Systems people who desire more responsibility, increased opportunity for creative expression, and all the rewards in modern society that are associated with this, must be prepared to take the same risks (to stand up and be counted) that any entrepreneur must take. And they must be prepared to try harder – much, much harder – particularly in the realm of human relations.

In the final analysis, all we have to work with in life are other people. You can do the best, the most perfect job in the world. But if no one else is aware of it, or believes it, you might as well not bother. □

A NEW APPROACH TO COMPUTER ART AND ARCHITECTURE

Isao Oishi
12 Mt. Auburn St.
Cambridge, Mass. 02138

Re your [August] computer art issue, I would like to impart something I have found of some importance in approaching computer art or architecture. I have recently taken a course which briefly carried me down the corridors of game-playing, verbal response, theorem-proving, personality simulation, and social system simulation by computer. I found the concepts, notation and vocabulary of this course provided convenient frames for ordering my work in computer design of architecture.

Presently, computer programs to simulate the artist or the architect appear to be at the stage of the earliest programs to, say, play chess. Heuristics are of the more primitive types – generate and test with hill-climbing and heavy doses of random generators that are sometimes vulnerable to the British Museum (monkey on a typewriter) criticism. Strategies and hierarchial structures are generally absent. Empirical research and inputted or transformed information are minimal, and theories of reasonable width and depth are few. Hence, though advancements in a broadly defined artificial intelligence area are said to come slowly with many failures, they are much further along than is reflected in current computer art and architecture.

This adds another approach to computer art. The more immediate need is to increase the computer's graphic and man-machine capabilities. An off-shoot of this is to learn more about the production of art through protocol analysis of an artist-machine or programmer-machine set up. The not-incompatible approach advocated here enters into the world of empirical research, cognitive studies, and artificial intelligence. The contributions of this approach lie in its requirements, which follow.

(1) The need for a logical system composed of objects, attributes or properties, values, and the relations that tie these elements together. To this end, logic and applied algebra appear to be rather important. The universe of objects includes all that is found within art works, or if so defined, within a specific period or artist's works. Attributes are equally varied, but color, texture, shading, form, contrast, size and cartesian coordinates are immediately important. Relations include the spatial (left, right, parallel, adjacent, within, etc.), the hierarchial (levels of generalized forms, such as a square box in the center of people forming a triangle which resides in a larger rectangle), the physically linked (hand link to arm linked to .....), the active (X holds Y, X looks at Y), and the logical relations. "Rules" are essentially conditional constraints which limit the range of values to intervals or parameters. Graph theory should come into use. Just as corridor graphs organize buildings, I strongly suspect that adjacency and other graphs play a strong organizing role and are lurking within the composition of every work of art.

(2) The need for a "semantic memory", a network of associated information which mimics the human's (the artist's, in this case) memory. After the network is finished, including contradictory links, coefficients are imposed to mimic a simulated artist's active links. (I found Quillian's paper in *Semantic Information Processing,* Minsky, ed., M.I.T. Press, highly suggestive in this regard, if not directly applicable.)

(3) The need for the analysis, description and simulation of problem-solving processes or heuristics which tie (1) and (2) together in the production of a product, be that product the proof of a theorem, a chess move, or a work of art. Here, protocol research, "content analysis" via data banks of information extracted from art works, case studies, and other forms of empirical research are needed.

Ideally for this, a student would gain the capabilities implied by a degree in art with applied math and computers; a degree in the behavioral sciences emphasizing research techniques, more math and computers, and the cognitive studies branch of psychology; and a Ph.D. in the artificial intelligence area with a thesis offering a substantial theory, an empirical research project, and/or a computer program. Ideals, of course, come and go, but it seems that the above capabilities need to be spread out among those in computer art. □

NEW ORGANIZATIONAL STRUCTURE FOR THE BRITISH COMPUTER SOCIETY IS PROPOSED

The British Computer Society
29 Portland Place
London W1, England

At the beginning of this year an Ad Hoc Committee was set up by The British Computer Society (BCS) to examine the aims and structure of the Society and to make any necessary recommendations.

The Committee asked members of the Society to submit their views and comments for this purpose. The Committee has now produced its report which has been considered at a special meeting of the Council of The British Computer Society and approved in principle. The main findings are these:

1. The published aims of the Society are satisfactory, but there is a need to interpret these and establish a 'philosophy' for the Society.

2. The Society should establish itself as the leading professional organisation in the UK on computer technology and the application of computers in commercial, technical and scientific work.

3. Being the representative organisation of the profession, the Society should seek to be recognised as the UK authority on all matters affecting computers and computing.

4. Membership grading in the Society should be based on proven competence in particular computing skills rather than on occupational status.

5. The organisational structure of the Society should be modified with the object of improving internal communication and improving accountability at the various levels. More authority and autonomy should be given at branch and regional levels within the Society.

6. There is a need to co-ordinate educational activities at all levels within the Society extending from the BCS Council to BCS branches.

7. The workload between the committee members and officers of the Society needs to be spread more widely and evenly.

The Council of the BCS has referred the report of the Ad Hoc Committee to the General Purposes Committee and the four Boards of the Society (Education, Technical, Membership and Branches) who have been asked to submit their comments and to indicate how the proposals, if implemented, would affect their work.

The reports from the General Purposes Committee and Boards will be considered at a further meeting of the BCS Council for any amendments to be made to the original proposals. A timetable will then be set for the implementation of those proposals which the Council approves.

The Council realises that following the Society's recent explosive growth there must be a period of consolidation, and invites all those computer personnel who are eligible, to join the Society to help establish it as the leading professional computing organisation in the U.K. The BCS Council believes that there are many people of considerable experience who are not yet members, but who can hardly be expected to take examinations. The Council hopes these persons will take advantage of the relaxed rules of entry that have been proposed (subject to the approval of the BCS membership), to become BCS members and play their part in creating an authoritative professional Society. □

INTERNATIONAL SYMPOSIUM ON THE THEORY OF MACHINES AND COMPUTATIONS — CALL FOR PAPERS

Sheldon B. Akers, Secretary
IEEE Technical Comm. on Switching and Automata Theory
Bldg. 3, Room 226
General Electric Co.
Electronics Park
Syracuse, N.Y. 13201

An International Symposium on the Theory of Machines and Computations will be held at the Israel Institute of Technology in Haifa, Israel, Aug. 16-19, 1971. The symposium is sponsored by the Technion Depts. of Computer Science and Electrical Engineering, in cooperation with the IEEE Technical Committee on Switching and Automata Theory and the ACM Special Interest Committee for Automata and Computability Theory.

Papers (in English) describing original research are sought. Typical (but not exclusive) topics of interest include:

Algebraic Theory of Automata
Finite and Infinite Automata
Computational Complexity
Tree Automata
Applications of Automata Theory to Logic
Formal Languages
Computability Theory
Probabilistic Automata
Learning Machines
Cellular and Iterative Circuits
Minimization Techniques
Reliability and Fault Diagnosis
Sequential Machines and Asynchronous Circuits
Models for Logical Machines
Theoretical Aspects of —
  Computer Organization
  Computer Algorithms
  Computational Processes and Structures
  Parsing and Compiling
  Parallel Computation
  Simulation

Authors are requested to send six copies of an extended abstract (no word limit) by December 31, 1970, to one of the following addresses, according to the subject of their paper: *Formal Languages* — Dr. J. D. Ullman, Dept. of Electrical Engineering, Princeton Univ., Princeton, New Jersey 08540; *Switching Theory* — Dr. Z. Kohavi, Dept. of Electrical Engineering, Technion — Israel Institute of Tech., Haifa, Israel; *Computability Theory* — Dr. R. E. Miller, IBM Research Center, P.O. Box 218, Yorktown Heights, N.Y. 10598; or *Automata Theory* — Dr. M. A. Harrison, Dept. of Computer Sci., Univ. of Calif., Berkeley, Calif. 94720.

Authors will be notified of acceptance or rejection by February 26, 1971. A copy of each accepted paper will be due by May 5, 1971, for inclusion in the symposium proceedings. □

"AN ARTIST VIEWS DISCOVERY THROUGH COMPUTER-AIDED GRAPHICS" — CORRECTION

On page 26 of the article "An Artist Views Discovery Through Computer-Aided Graphics" by Grace C. Hertlein in the August, 1970 issue:

In paragraph 2, line 2 — Replace "results of my work was" with "results of my work were"

In paragraph 4, line 11 — Replace "Radiograph" with "Radiograph." □

"PROBLEMS OF LIABILITY FOR THE EDP SERVICES INDUSTRY" — IMPORTANT NOTICE AND CORRECTION

The article "Problems of Liability for the EDP Services Industry" beginning on page 18 of the September issue was submitted to us in June under conditions in which we thought we had full permission to accept the article, edit it, and publish it.

As we go to press with the October issue, we discover we did not have the prior knowledge or consent of the author and that we have infringed a copyright as well.

We deeply regret the resulting inconvenience to our readers, the unintended discourtesy to the author, and the unintended infringement of the copyright of the original article. We urge our readers to review problems of liability with their own counsel.

"AUTOMATED POLICE STATE" — CORRECTION

In the report, "Automated Police State", on page 9 of the September issue, some of the words at the top of the righthand column were obliterated in some copies in the process of printing.

The paragraphs containing those words should read as follows:

> In this context, the innocuous installation of computer systems in Los Angeles and Sacramento to help California law enforcement officers check out stolen cars and suspected criminals brings mixed emotions.
>
> On the one hand, we worry that people will ascribe to the computer great, menacing teeth, and a ferocious snarl that is not at all characteristic of the dumb beast.

THE PURPOSES OF READERS' FORUM

☐ To give you, our readers, an opportunity to discuss ideas that seem to you important.

☐ To express criticisms or comments on what you find published in our magazine.

☐ To help computer people debate significant problems related to the applications and implications of computers and data processing — such as privacy, garbage-in-garbage-out, unemployment, education, etc.

Your participation is cordially invited.

C.a

PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 7010: MINI-PROGRAM — SUM AND SUBSTANCE

"What's that mini-program you're writing?", Al asked, seeing Bob busy with a FORTRAN sheet.

"Well, I'm trying to find the sum of this series," said Bob, pointing to a series on the blackboard.

"You can't sum that series by computer, can you? It has an X in it."

"That's right, but I have an idea what the general solution is, and I decided to compute the sum for a particular numerical value before I gave it the all-out treatment. This program is for the case X = 8."

```
      A = 1.
      B = 0.
    3 C = 8**A
      D = C + 1
      E = A/D
      IF(E.Le . . 000001)GO TO 10
    7 B = B + E
      A = 2*A
      GO TO 3
   10 WRITE(6,11)B
   11 FORMAT('OB EQUALS', IF12.6)
      STOP
```

When he got the program back, Bob saw B = 0.14286 printed out and smiled with satisfaction.

What was the sum of the series Bob was trying to find?

Solution to Problem 709: Squares — or Something

Harry will get the expected result for N = 11, since $6318^2 - 11! = 18^2$, but he will find that for N = 12, $21887^2 - 12! = 39169$, which is not a perfect square.

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

COMPUTERS AND THE CONSUMER

Ralph Nader
Washington, D.C.

"At the present time the capability for gathering and providing information about products and services for consumer use is as primitive as the Gutenberg printing press."

OUTLINE

1. The Deployment of Power Affects Technology
2. Computer Uses that Aid Consumers and Citizens
3. The Buyer's Knowledge
4. Competition Based on Real and Rational Information
5. The Government's Information about Consumer Goods
6. The Packaging Revolution
7. Legal Accountability for Pollution
8. Injuries from Accidents
9. The Citizen and His Government
10. Secrecy in Government Agencies
11. The Air Force's Requested Bid for a System to Collect Derogatory Information
12. The Intrusive Aspect of Government Information Collection
13. Government Access to Private Data Banks
14. Determining the Real Need to Know
15. An Information Bill of Rights
16. The National Data Bank Proposal
17. Unregulated Credit Reporting Firms
18. The Interface between Law and Technology
19. Constitutional Rights Against Invasion of Privacy
20. The Barriers Protecting People's Personal Lives
21. Inhibitions from Fear
22. The Problem of Monopoly
23. Dealing with the Traditional Corporate Pattern
24. Delay vs. Internal Change
25. The Role of the Professional Society
26. The Interdependence of Industrialized Society
27. Dangers from Breakdown
28. The Pipeline System in the U.S.
29. What Is a "Professional"?
30. Inventiveness and Innovation
31. Extending Man's Nose
32. The Technological Sniffer
33. Really Desiring to Program Innovation
34. Faith in Pursuing Professional Missions
35. Standing Firm Against Management
36. Domination of Professional Societies by Industry
37. A Case in Point: The Society of Automotive Engineers
38. Atrophy of Professional Values
39. Redeploying the Computer to Benefit Citizens
40. Volunteers for Thinking, Writing, and Testifying on the Computer's Capability for Consumer Protection
41. The First Step

Almost anything that can be said about the area of specialization of computers is tentative, and these remarks are tentative; so they will not be controversial. In about five years, however, I would think some of these remarks will not be as tentative; more and more people will begin to focus around these ideas as policy issues, as political issues, as issues of corporate responsibility, and the like.

But I don't think that this kind of focusing is in the immediate future. The main reasons are the complexity of the subject of computers and the fact that most people don't understand the subject.

1. The Deployment of Power Affects Technology

The computer by all accounts is the technology of the century and one on which many other technologies, new and old, are increasingly relying.

But a computer and its technology do not dominate the context into which it emerges. Any such technology begins to be subjected to a compulsion of integration within existing power structures. And no matter how esoteric it may be, and how specialized its managers be, the technology is plummeted and develops within the old frameworks of existing corporate power and governmental class, and the whole context of the deployment of power in our society.

As such it is not surprising that most of the thinking about computer applications has been directly correlative with the amount of power that the thinking is associated with. A great deal of thinking is going into computer applications in the defense area, in the space area, and in the production-merchandising area.

2. Computer Uses That Aid Consumers and Citizens

One has to search far and deep, however, to discover some thinking on the other side of the aisle, that is, for computer uses for consumers, for citizens, and for the challenges and probes into existing power structures that computers are such a marvelous tool for.

The first subject that interests me is the use of the computer in the consumer area; its use fits in beautifully with classical economic theory.

This article is based on the key-note address given at the 25th National Conference of the Association for Computing Machinery, New York, N.Y., Sept. 1, 1970.

"The House is on Fire" —

THE PROFESSION OF INFORMATION ENGINEER AND HIS BRIDGES TO SOCIETY

Computers and Automation 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 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, this department of *Computers and Automation* will publish 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 shall seek to publish here 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.

3. The Buyer's Knowledge

The basic theory of the free market system – which of course doesn't exist any more in the world, much less in this country – is buyer knowledge. Without buyer knowledge the free market mechanism feeding back preferences and dispreferences to the producer or seller, is impossible.

Moreover the quality of competition that increases in excellence rather than decreases toward trivia, shoddiness, and camouflage must rest, again, on buyer knowledge about various competing products and services. That is the only way the market mechanism can aggregate the rational choices of consumers in such a way as to reward the superior products and services, and penalize the shoddy products or fraudulent services.

We need the kind of feedback which is based on the disclosure of product and service information, such as the quality, efficiency, and safety of products, such as automobiles and insurance policies. We need to know the actual offerings in an insurance policy that will allow comparability between policies on the part of shoppers for that service.

4. Competition Based on Real and Rational Information

All this kind of discriminating information in the marketplace is essential for the real purpose of competition. This purpose is to stimulate innovation, efficiency, and a response to real needs, emanating from consumers having real and rational information – not fake needs based on market profiles and emanating from extremely adept psychological manipulation of the consumer's options and alleged wants.

The consumer and the computer should be a major concern of somebody in the society. At the present time the capability for gathering and providing information about products and services for consumer use is as primitive as the Gutenberg printing press. It has not gone any further.

5. The Government's Information about Consumer Goods

The U.S. Government in recent months has been concerned via one of its task forces with a certain question: how can the vast amount of consumer goods information that the Gov't obtains in its procurement practices, be made of real use to the citizen? The U.S. Government is the biggest consumer in the world, buying everything from blankets to typewriters to automobiles. Presumably, it is supposed to test a good many of these products in order to obtain the best buy. What happens to the information? Nothing. It languishes disorganized and unretrievable except for the time-honored leak of the information from some conscience-stricken government civil servant to the public.

". . . Most of the thinking about computer applications has been directly correlative with the amount of power that the thinking is associated with."

If the marketplace still deserves a role in achieving better products and services, then it too must be balanced informationwise. The two parts of the equation of supply and demand – the buyer and the seller – must have some balance in terms of their bargaining power and knowledge about one another.

6. The Packaging Revolution

The packaging revolution includes not just styling and regular physical packaging, as you see in the supermarket. It also includes the kind of packaging that comes from obfuscation, from un-understandable warranty language in your car warranty, and the like.

If the packaging revolution has any meaning, it is to strip the consumer of his sovereignty – to strip him step by step of the ability to discriminate on rational or utilitarian bases rather than on psychological wish fulfillments or other emotional attachments.

I offer you Ultra Brite, for example, as an illustration of that point.

In many other ways, the adaptation of computer technology and applications to consumer needs presents a great many exciting possibilities. Here is another one. Involuntary consumption of pollution is a problem of consumer protection. One may not want to have anything to do with General Motors, neither to buy its cars or its spare parts, or to watch its advertisements, but no one can escape General Motors because no one can escape the breathing of pollution that its products and plants contribute to the air.

This involuntary consumption of violence to the environment is a very important front-line consumer issue. The computer and new applications of it could solve one of the most nagging legal problems dealing with corporate accountability for pollution, which is the following.

"The computer and new applications of it could solve the nagging legal problems of dealing with corporate accountability for pollution."

7. Legal Accountability for Pollution

The law ascribes responsibility on the basis of a kind of cause and effect sequence. The law is very good in ascribing responsibility where there is a direct and empirical visible contact between A and B. The law gets into difficulty, however, where the harm is usually invisible or silent, and is often part of the confluence of multiple sources of this harm from various legal entities which are often corporations.

How do you develop a legal accountability, say in the Cleveland, Ohio, area, when you know that dozens of plants are spewing forth pollution into the air, and it is very difficult to find out who is spewing what and in what quantity?

This, of course, is more than only a computer problem. It is a problem of developing sniffers of great precision, it is an overall problem of developing our scientific capability in the area of odor detection and the consequences from such detection, just as we have learned in the area of extending man's eyesight through microscopes and telescopes.

8. Injuries from Accidents

In the area of accident injury we have another unused role for computer applications. Picture the scene:

For years two traditional industries have been locked in a kind of mutual assault grip: the automobile and the insurance industries. The auto industry produces kinds of vehicles almost designed to maximize repair costs, such as trivial bumpers which generate four or five hundred dollar damages at impacts of seven miles an hour. The insurance companies then have to increase their premiums. This of course makes the overall cost of the car higher. It increases the kind of vicious cycle from which there seems to be no end.

But there is light at the end of the tunnel now. The insurance industry is now beginning to realize that increasingly the computer is enabling them to rate vehicles on some sort of scale, such as accident or injury proneness, and to develop premiums on the basis of that rating structure.

Once that begins we have a major new mechanism of restraint on the technological pornography that is coming out of Detroit these days.

Now for years some people have been urging the insurance industry to do this; for years the standard reply was, that's too expensive, and we can't get the information fast enough on a given model car. The computer changes all that. Here is a great benefit, of course, from the computer.

This kind of enabling information will take traditional power systems in this country and give them tools to countervail one another's excesses. It is a great need in this country in the private sector.

9. The Citizen and His Government

There is a second area of computer uses which do not seem to be subject to market incentives, and therefore requires a professional input. The essence of professionalism is not simply to wait until a market incentive develops to meet a human need. The second area is the relationship of the citizen and his government.

"One of the most difficult things to do in Washington is to find out about our government, in any area. It makes no difference whether you want to find out about defense, pesticides, power, communications, research, health, or what have you."

10. Secrecy in Government Agencies

A marked characteristic about all government agencies is secrecy. Information is the currency of power in a political and citizen sense. Secrecy has multiple uses; and since it has multiple uses, it has multiple supports to preserve it.

One of the most difficult things to do in Washington is to find out about our government, in any area. It makes no difference whether you want to find out about defense, pesticides, power, communications, research, health, or what have you. Right now one of the struggles is to try to get the Department of Interior to reveal the complete list of mercury polluters, the companies who are dumping mercury into the streams and lakes and rivers of the country, poisoning the fish, contaminating the water, and harming anybody who gets within consumption range of that water or that fish. That list is considered secret.

The system of citizen access to governmental information is getting worse; it is deteriorating; and it never has been so bad. The problem of access is largely a function of the increased importance of government information in people's lives, the increased size of it, the increased velocity of its updating, as well as the usual traditional obstacles politicians place in the way of citizen access.

"The information system has outpaced legal controls in a democratic society."

11. The Air Force's Requested Bid for a System to Collect Derogatory Information

Correlative with that problem we have the intrusive aspect of government information policy.

I remember about six years ago going through a procurement manual where bids were requested for government jobs. The Air Force had an interesting requirement, a unique description of a need. It said bids were invited for an Air Force system to collect derogatory information. At the time I wondered whether the bid would be any different because it was derogatory information rather than, perhaps, praiseworthy information!

Now nobody ever found out about what happened to that requirement except the Air Force and whoever fulfilled it. That was the end of the matter as far as its public emergence.

12. The Intrusive Aspect of Government Information Collection

The government is, obviously, collecting a great deal of information about people. If anything is new about that,

the newness is that such information collection is beginning to be decentralized from the federal government to state and local governmental organizations.

13. Government Access to Private Data Banks

Even more, the government is using its quid pro quo power to enable it to obtain access to data banks in the private or corporate sphere. For anybody who has hovered around credit reporting companies, it is no secret that the government is on tap very frequently for data bank information – without anybody knowing about it except those two parties.

"For anybody who has hovered around credit reporting companies, it is no secret that the government is on tap very frequently for data bank information – without anybody knowing about it except those two parties."

On the other hand, government, in order to pursue its own policies that the Congress and the people of the country give to it, must have detailed information, in order that it doesn't make mistakes, so it can plan, and the like.

14. Determining the Real Need to Know

So we have once more the eternal problem of balancing the equities here. But it is not enough simply to say: on the one hand there is a prospect for abuse; on the other hand there is a great need for this information. It is not enough to let it go at that. What we need to do is to determine exactly whether the need to know is real or false. Is the effort to get detailed information fake, a camouflaged way of permitting an abuse to proliferate, on the pretext that it has some secondary benefits? Or is a whole new system of information, including stripping the information of personal identification, really justified? Should the system allow access by citizens to the kind of information collected about them? Should the system have a whole host of other safeguards, which are now being discussed? Is this something which a professional society should give top priority to? Should it seek to see the whole picture in order to see its parts?

15. An Information Bill of Rights

Suppose this kind of foresight is not forthcoming; suppose we don't develop what others have called an information bill of rights, the right of access by a citizen to his file, the right to review it and correct it, the right to appeal its use to an ombudsman, and so forth.

Suppose we do not develop this new embrace of law that increasingly deals with the abuses of computers, whether by private or public mandate; then we shall generate a mass antipathy towards the whole technology of computers.

It has been over a century since the Luddites in England smashed the machines in the factories; yet up to this point we have had only the barest glimmer of animosity towards the computer. But never underestimate the power of a citizen backlash against something that he doesn't fully understand, against something that he feels is taking unfair advantage of him. Increasingly, the kind of information which is being collected by the credit reporting companies, by insurance companies, by banks, is becoming too efficient for the anarchy that operates within. In other words, the information system has outpaced legal controls in a democratic society. In fact, it has become so efficient, in a kind of self-contained conveyor belt transmission system between companies and between governments, that even the concept of liability for misuse has become purely superficial, because the individual doesn't know where the doer of the harm is located.

16. The National Data Bank Proposal

The Congress entered this field a few years ago with outrage over the proposal to set up a national data bank by the Federal Government. It conjured up all the old fears of Mr. Robot, Mr. Big, and the like. That proposal was a good example for anyone who wants to study the process of how something can be knocked down in a torrent of condemnation. The simple reason is that the new proposal and the new technology, in this case a data bank, is not rooted in the common value system the people understand, rather it is seen as a threat to that value system.

17. Unregulated Credit Reporting Firms

There is some legislation now before Congress, variously entitled, the Fair Credit Reporting Act and the like. This is an attempt to develop some legal and enforceable standards for: the use of credit information; the collection of it by companies throughout the land; and information dealing with insurance coverage.

The Senate passed this bill some time ago; it was very weak. The House version is much stronger; it provides for liability, and it provides for a stronger mode of access by the individual consumer to his file in the particular credit agency.

Most people may not realize just how big the credit reporting firms are getting. Retail Credit Co. in Atlanta, Georgia, has files on 45 million Americans – for a starter. That's only occurred in the last few years. Increasingly, as the technology allows cheaper and cheaper collection and dissemination of the information, so we can expect more and more information gathering of this kind to emerge.

18. The Interface Between Law and Technology

So, as in the case of any burgeoning technology, the issue is, what is the interface between technology and the law going to be like? and what should it be like? I am not going to predict what it is going to be like, because I don't think the kinds of public pressures are ready yet for that kind of prediction; but I would like to suggest some of the legal concerns of officials in Washington and some lawyers around the country representing their clients or representing what they think is the public interest.

First, there is no question that there will be an increasing drive to extend Constitutional rights and other civil liberties to this area. In fact, I expect the listing of an information bill of rights to become an important nucleus of this drive.

19. Constitutional Rights Against Invasion of Privacy

The invasion of privacy is also going to become I think a major issue in some political quarters. The words, invasion of privacy, have almost a luxurious connotation to them.

They are, however, very, very basic rights, and I would like to illustrate that in two or three ways.

First of all, some of the amendments to the U. S. Constitution are really protections against invasion of privacy; for example, the search and seizure protections and the right against self incrimination.

The rights against invasion of privacy are integral not only to the integrity of the democratic man, but to the functioning of the society. So I will offer my second illustration.

Suppose you were walking into a courtroom, and by some sort of multi-dimensional X-ray vision you could see everything the judge before you had ever done, in his personal life, in his private family life, everything. What would that do to your interaction with that court?

"To what extent is it absolutely necessary to preserve barriers of privacy and protection about people's lives, in order to permit ordinary interaction between people?"

In other words, to what extent is it absolutely necessary to preserve barriers of privacy and protection about people's lives, in order to permit ordinary interaction between people?

When a person goes into the courtroom, if he has in his information kit the kind of information I have just alluded to, it is going to make the judicial process operate in an entirely different, if not cataclysmic way.

20. The Barriers Protecting People's Personal Lives

I think if you look back over the various interactions that you have day to day, you will see that the "enclave" right is very critical for people to continue going about doing their business, and that if these barriers protecting people's lives are easily penetrated, processed, disseminated, sold, et cetera, then we are going to get a breakdown in that kind of social functioning.

This aspect is nothing that can be quantified, nothing that really has been studied so far. It is only something that can be offered up against the feelings and experience of everybody, and perhaps in this way produce an appreciation of just how sensitive these personal rights can be, and how strong their protections must be.

21. Inhibitions from Fear

How many times, for example, have you in your experience seen people inhibited from saying something on a technical matter or a policy matter, not because of any features of that matter or subject, but because of their fear that some other information about themselves will be revealed and used because of the controversies they provoke in this subject? This fear can be called the fear of blackmail.

It is no secret that many companies have files on their executives and sub-executives, personal files. To what extent does the knowledge by an individual in a company that there is a file "somewhere up there" on him, that he can't have access to that file, that he can't rebut it, that he can't control its use – to what extent does that knowledge inhibit his other activities? What does that do to his other candors, his other responsibilities in his professional or technical work? Suppose he wishes to object to a level of technological stagnation, to object to a safety hazard, and the like?

22. The Problem of Monopoly

Apart from the problem of extending the Constitution to these new challenges and developing more specific safeguards of access and rights against invasion of privacy, we have a second important problem that concerns some segments of the legal community. This is the problem of monopoly.

I suppose if a law professor were to teach his students about monopoly, his first example would be IBM. His second example would be General Motors. The computer is relevant to both of those kinds of operations, obviously.

The problem, of course, is: What does the Anti-Trust Law mean for the IBM-type situation?

If we are to judge by the January 1969 complaint against IBM filed by the Justice Department, particularly in the general purpose digital computer area, it means that there is a monopolization trend, if monopoly does not already exist. It means that the relief that the Justice Department is asking for goes to the heart of the organization of that company.

There are also, of course, the problems of transmission, and there is another legal monopoly in that other area, American Telephone and Telegraph.

"We have a burgeoning technology with the most exciting multiple uses and applications for the benefit of mankind, and it is being dumped into a traditional corporate pattern and corporate domination in various industries."

23. Dealing With the Traditional Corporate Pattern

These examples are precisely what I mean when I suggested at the outset that here we have a burgeoning technology with the most exciting multiple uses and applications for the benefit of mankind, and it is being dumped into a traditional corporate pattern and corporate domination in various industries.

AT&T, of course, had a monopoly position long before the computer came around. Is it now a kind of dinosaur-like corporate structure that not only precludes itself from utilizing freely and creatively this new technology, but blocks other organizations, big and small, from creating new concepts in all of the stages of the transmission and the receipt of the information?

24. Delay vs. Internal Change

The legal issue here is, I think, one that will be subjected to great delays. The IBM case – if it doesn't get settled in a consent decree – will probably go on for years and years. And so the question, of course, is, if we can't wait for the law, how about internal change? How about internal company change? How about internal industry change? And this brings me to the final point I want to make – the role of the professional society, such as the Association for Computing Machinery.

"Even if the computer is not going to become a kind of mechanical man, it is still going to be delegated increasingly complex tasks. And if the computer gums up these tasks, it can devastate portions of society."

25. The Role of the Professional Society

First, there is no denying that because of the complexities of the subject of computers, it is going to take a long time for the public to get aroused, except in the area of invasion of privacy and credit reporting where it is aroused now. As such, the specter of complexity as a technique for delaying accountability and delaying the facing up to hard questions is before us.

In the first place, there are the problems that exist now. In the second place there are the problems that are coming up in the next twenty, thirty years – which are going to make these problems trivial by comparison.

It is now "conventionally known" that the computer can't be smarter than the man. This knowledge was the first-stage popular communication to the public. As a result it is "conventionally known" that "there is nothing to worry about the computer," it is not going to get away from us, it is not going to dominate us, because it is "only as smart as its programmer."

26. The Interdependence of Industrialized Society

Well now, of course, there are doubts even about that proposition. But even more certain is the fact that, even assuming the computer is not going to become a kind of mechanical man, with all the human emotions and the like, the computer is still going to be delegated increasingly complex tasks, and if the computer gums up these tasks, it can devastate portions of society. We are a very, very interdependent society.

27. Dangers from Breakdown

I suppose this country could bomb Hanoi again and again and again and life would still go on there. But what do you think would happen to New York if the garbage stops being collected for a long period of time, the elevators stop, and the subway breaks down? The interdependence of a complex industrial society, its increasing delegation of tasks to machines, the ability of the machines to correct themselves or to try new alternatives for performing the same mission, is something that has got to concern more than the science fiction writers.

28. The Pipeline System in the U.S.

For example, we have a massive pipeline system in this country. How much thought has been given to the techniques needed to turn off the system in case of an emergency? A tiny advisory committee in the Federal Government has given some thought to that – but who knows whether the attention is adequate, who knows whether the safeguards are being taken? Here is something which requires much, much greater visibility and discussion.

29. What Is a "Professional"?

In a professional society the definition of the term "professional" seems to me implies the obligation to pose new challenges and to present visibly all problems that are not likely to be met by the market mechanism.

In other words, how much work does a professional society have to do, without any thought or any incentive that the work will ever find a market?

30. Professional Involvement

There are obviously two main areas for this kind of professional involvement: defensive and positive.

The first area includes efforts to develop the kind of computer systems, or at least an awareness of their need, that will redress serious imbalances brought about by unilateral use of computer capability. An example is in the consumer area that I mentioned.

The second area, the positive area, includes efforts to provide a really energetic search for spectacular breakthroughs in science and technology that otherwise would not come about, because those in the vanguard of search either don't have the appreciation of the computer tool, or they simply don't have the funding for it.

31. Inventiveness and Innovation

I think we have to recognize that inventiveness and innovation in this country still rely heavily on the individual lone creator. It is true that collective research labs and the like may have certain roles to play in the extension of newly discovered technologies, their application, and distribution.

But still I think recent history has shown that the core innovation comes out of a single mind. The single mind may not be part of a large organization that recognizes his talents, or that permits him to moonlight his talents; the single mind may be very lonely indeed. That I think is what professionalism has to search out, has to encourage, has to safeguard, and has to support, where merited.

32. Extending Man's Nose

At the present time, to give you one example, there is a tremendous gap between our ability to extend man's sight, both to other planets and to microscopic life, and the ability of man to extend his nose, his capacity to smell.

There is now enough information to indicate that developing techniques to analyze a person's breath will open incredible horizons for medical diagnosis and prescription. The same can be true in the environmental area, in the foodstuffs area, and in one activity after another in our society.

And at the present time the science and technology in these areas is in such an elementary state that no one sees a market mechanism for it, at least enough to invest in it. Even the government has its priorities in areas that some might consider more remote from human welfare.

33. The Technological Sniffer

The prospect of a gigantic breakthrough in a technological "sniffer", so to speak, and its intimate relations with

new and ingenious applications, is an invention which we cannot afford to await for one decade or two or three decades, until a market mechanism develops. This is particularly true when much of the technology is first developed in a governmental context, a governmental lab, where, if the mission of the agency is not in this direction, the research will be overlooked or not supported.

"The prospect of a gigantic breakthrough in a technological 'sniffer', so to speak, and its intimate relations with new and ingenious applications, is an invention for which we cannot afford to wait one or two or three decades until a market mechanism develops."

34. Really Desiring To Program Innovation

Now I am sure that you can think of dozens of examples like this. But the fact of the matter is, that while we are certainly entering a period in our history when we can almost program innovation, almost schedule it on demand, the critical point is really desiring to program it. The critical point is whether we are going to apply our value needs to the generation and production of these new tools.

35. Faith in Pursuing Professional Missions

So it all comes down, doesn't it, from the dizzying heights of complex technology to the value structure of each individual? and to the act of faith which he has in pursuing missions that are of a clearly professional nature?

Any professional society would have to have some professional standards by which it recognizes that conflicts between professional, corporate, or government allegiances are going to arise. And these standards must provide a mechanism for resolving these conflicts fairly, and not on the criteria that might makes right.

36. Standing Firm Against the Management

Every day in the auto industry the automotive engineer comes up against the problem, of what he should do as a professional vs. what he has to do as an employee. I am sure it comes up in all industries where the professional concept is clearly etched.

The question is not just to have a code of ethics, professional ethics, which can be hung up on the wall in one's office. The question is, How do you develop an informal adjudicatory mechanism? Then – when the disputes arise, and when the individual stands firm against his management because he believes it is the professionally right thing to do, – then he can have that dispute resolved. At the very least what mechanism is he to use so that he can try to appeal for support among his professional peers outside the company?

There is no way to legislate that kind of professionalism. That kind of attachment of professional expertise to moral values can be considered beyond the effective limits of legal action. That is why such responsibility revolves so heavily on the shoulders of the professional society and each individual in that profession.

37. Domination of Professional Societies by Industry

For too long, professional societies in the mechanical engineering area or the chemical area or the automotive area, or others, have been excessively beholden, if not dominated, by the industries that they attach to in an empirical or knowledge sense.

The issue is whether employees of these companies perform within the professional society as independent professionals or as employees of these companies on a mission.

And, of course, that attitude is going to be significant in: the choice of issues to be discussed by the professional society; how these issues are to be discussed; what new challenging areas the professional society is going to enter. Many of these choices and opportunities are going to come up against the opposition of the corporate members or employers.

"For too long, professional societies have been excessively beholden, if not dominated, by the industries that they attach to in an empirical or knowledge sense."

38. A Case in Point: The Society of Automotive Engineers

It is the inability to resolve that conflict, indeed even to recognize it, that has reduced the Society of Automotive Engineers to a state of minionship in the automobile field – to a state of impotence as far as pushing forward innovation in that industry. If you look over the symposia of that society and who determines what is discussed and who discusses it, you will find almost a perfect consistency with the policies of the big three auto companies. As a result, the great horizons of human engineering, crash-worthiness, and vehicle dynamics were never systematically treated at SAE meetings. At the time of the first great breakthrough, when a theoretical paper on vehicle dynamics came out of the Cornell Aero Lab and it was presented to the SAE, the offerers of the study were informally told that it would be inappropriate because the subject was too complex. So that paper had to be presented before the British counterpart association of the SAE.

39. Atrophy of Professional Values

When a professional society allows its professional values to atrophy, then the atrophy of the professional skills of its members is not very far behind, in major areas of significance.

That particular episode – the denial of the paper because of its complexity, because, in effect, nobody could understand it, because nobody was working on it, because the companies didn't allocate manpower to work on these technical or theoretical problems and theoretical dynamics – and the transfer of that paper to a British professional forum, illustrates the point conclusively.

40. Redeploying the Computer to Benefit Citizens

As a lawyer I have tried in this report to make some of the concerns that some of us have clearer. As more and

more laymen become aware of the great potential of the computer tool, increasingly great demands are going to be made upon people in the computer industry to humanize the computer. In other words, demands will be made to redeploy part of its capability for the benefit of those who were not represented in the system design: the disadvantaged; the unorganized – the citizenry.

41. Volunteers for Thinking, Writing, and Testifying on the Computer's Capability for Consumer Protection

I once spoke before a group of computer specialists in California. I asked them whether any of them in their work had been giving thought to computer applications for consumer protection, and they said no, which wasn't surprising; and then I said, well, who would be interested in doing some thinking and perhaps some writing and some testifying on the computer's capability before, say, a Congressional hearing, based on an information quest; the computer's capability along the whole spectrum of consumer protection, from product knowledge, to accident analysis, to insurance rating and all the rest. And in that audience of four hundred one person raised his hand. I quickly obtained his name; I quickly wrote him and I have never received a response.

Now, if I interpreted that audience correctly, they were very interested in the subject, intellectually, if nothing more. But neither their missions, nor their concepts of what they could do part-time, or in their off-time hours, encouraged them to contribute in this field.

42. The First Step

I think the first step, and the most modest step, should be taken now. This is to gather together materials in symposiums or Congressional hearings, about the multiple uses of computers and their applications to some of these problems that I have outlined and many more which you can suggest. These problems include the consumer problem, the citizen problem, the problem of access, the problem of applications in the pollution area, and the like.

Because, unless we get this kind of information together, unless we really flush out the concept of the information utility and relate it to citizens' values in a very understandable way, it is not likely that the full potential of the computer's technology is going to proceed in what even the most conservative may consider a reasonable pace.

So I would request of any of you who are interested in developing materials as a beginning of discussion, deliberation, communicating to larger and larger groups of citizens – that you do get in touch with me* and perhaps some of these basic materials can be developed in the next few years.

ADDENDUM

Following the address, there were some questions and comments from the audience, and answers by Ralph Nader. Some of the interchange is briefly reported in substance below.

Question: A great area where computers can and should be applied to benefit consumers and citizens is in the Federal Government – even though some departments stand back, such as the Department of the Interior, which asserts that it has the role of mediator between consumers and industry. What do you think?

Answer: Computers in the Federal Government could certainly benefit consumers. One step that should clearly be taken is to have Congress obtain a computer. It would revolutionize the work of Congress.

The role of the Executive Branch (which is supported by hundreds of computers) at present is often to "snow" the Congress. The system of "checks and balances" between Congress and the Executive Branch has become incredibly unbalanced. The Senate of the United States has been reduced to a shrivel of its former power – the power it had a hundred years ago, when the main group of employees of the Federal Government was the postmen.

Question: What can the citizen do about the department store computer that makes mistakes?

Answer: There is no general answer, except that the department store is the problem and not the computer.

We need complaint centers manned by citizens. One has been set up in Cleveland, which is manned by students. It has had much success in resolving complaints.

Computer abuses hit everybody; they are not discriminatory; but they are traceable to the managerial system operating the computer. This is the real obstacle. Did you ever try to get out of a record club? To fail to listen to persons who want to get out of a record club is a merchandizing strategy.

A person could write a very exciting book on the calculated abuses of the computer to advance sales. And unfortunately, our laws have impact on institutions, not on individuals. If a corporation has to pay fines, it raises its prices to cover the fine, and transfers the cost to the market place. Usually the individuals engaged in the abuses suffer almost not at all.

Question: Aren't there possible sponsors other than a professional society of computer people, to fund efforts for developing materials and symposia on computer applications for consumer protection?

Answer: These problems do not have prospects for making products and services that can be marketed. There is no profit incentive here, and accordingly there are no logical commercial sponsors. The Federal Trade Commission has made some promises, but they move at a glacial tempo. Other than professional societies, I see no likely prospects for sponsorship.

Question: What are the prospects for data banks about people?

Answer: Information is power. He who can get information quickly has a powerful advantage.

We need to redress the balance of information available to the government and information available to the citizens – or we will encounter a deteriorating authoritative pattern of government.

I foresee the requirement for an application to an administrative body and a public hearing for any organization that wishes to set up a data bank. Without this kind of development, there will be increasing inhibition and increasing pressure on people to stop saying what they think. A computer should remain a tool – but it has a great potential for abuse, for tyranny. □

*1908 Q St. N.W., Washington, D.C. 20009

PUNCH LINES . . .

The third revolution in computers, expected to begin when the long-awaited concept of time-sharing was announced as reality by manufacturers, has not yet arrived. And it won't arrive until cooperation and standardization are achieved between the manufacturers and users of data processing equipment. An attitude of "business as usual" will not work. What is needed is a standardization in machine language and programming, a comfortable rate of innovation, easier translation of computer programs to application, and rewards normally associated with invention as requisites for the computer to gain status as a utility. We have such a duplicative, hodge-podge array of machines and such a proliferation of computer languages that, at present, there are no ingredients necessary to bring about a new revolution. The much-heralded time-sharing practice on today's computers is a step back to the early 1950's.

– *Steven J. Fenves*
Univ. of Ill.
Urbana, Ill. 61801

Since man first cultivated the soil, he has dreamed of easier and better ways of producing food and fiber. Sticks became plows, manpower gave way to horsepower, and motors replaced mules. As the age of technology gained a toehold in the 20th century, agriculturists began to question how it would benefit them. Some of the computer's earliest major contributions to the nation's agriculture came in the late 1930's, when it was used to help develop hybrid corn through selective plant breeding that involved hundreds of genetic qualities. **Today, computer technology is as essential to agriculture as it is to mathematics or engineering.**

– *Dr. Herbert H. Kramer, Director*
Purdue Univ.
Agricultural Experiment Station
Lafayette, Ind. 47907

There's no denying that computers have more than paid their way as super clerks doing many standard accounting and financial operations very well and very economically. But, overall, **they have failed to produce an acceptable return on the investments in the hardware itself, the operations, and the setup for it.**

– *Albert L. Dean, Technical Staff*
Logicon, Inc.
1075 Camino Del Rio S.
San Diego, Calif. 92110

Only 531 computers were being used by the Federal Government ten years ago, but well over 5000 are in use today. This is indicative of an increasing awareness on the part of Federal agencies that their programs can be accomplished more timely, efficiently, and economically through automation.

– *Robert L. Kunzig, Administrator*
General Services Administration
Office of Information
18th and F. Sts. N. W., Room 6111
Washington, D. C. 20405

Business management men seem too busy to understand the technicalities of computer-based information systems, and computer men seem too busy to understand business management. Lost in this communications gap are many millions of dollars in the form of ineffectual systems and the failure to gain important competitive advantages. **There is a yawning abyss where there needs to be a solid bridge between EDP technicians and management,** without burdening managers with unnecessary technical problems that are over their heads and only serve to bog down the relationship. General management should know a lot more about the concept, development, and implementation of computer-based management systems. Without learning the right questions to ask and knowing how to analyze and evaluate the answers, management too often makes very costly, unproductive decisions relative to these systems.

– *Leonard I. Krauss, Exec. Vice Pres.*
Opticomp Data Management Corp.
225 Park Ave. S.
New York, N.Y. 10003

The annual dollar volume of computer software purchased from outside sources by users has risen from $10 million in 1960 to a predicted $400 million in 1970 – a compounded growth rate of 45% per year. Based upon predictions of future computer industry growth, **software purchases are expected to reach $7.5 billion by 1980** – a compounded growth rate of 34% per year during the 1970's.

– *Walter F. Bauer, Chrmn. and Pres.*
Informatics Inc.
21050 Vanowen St.
Canoga Park, Calif. 91303

The real need of the end user of a data base is information. The user doesn't care about data files or structure; in fact, he doesn't even care about the computer. All he cares about is his information. He wants information, in the way he wants it, as fast as he wants it. There are barriers to information processing in the normal file structures of a data base. There is a barrier that arises through the process of program development itself. But all of these things can, and should be overcome if a good data base is to be established.

– *Richard G. Treanor*
Director of Market Development
Western Operations, Inc.
120 Montgomery St.
San Francisco, Calif. 94104

The tremendous growth of the data processing field undoubtedly has much to do with certain incompetent and even unethical operators coming into the instructional phase of the business. In my opinion, **it's time for the majority of the EDP schools that have proper equipment and qualified teachers to join together to see that students are warned against fly-by-nighters.**

– *Joseph Y. Larsen, Pres.*
Central Computer Corp.
1020 S. Anaheim Blvd.
Anaheim, Calif. 92805

EDP FACILITIES MANAGEMENT: ABDICATION OR SALVATION?

Douglass M. Parnell, Jr.
Computer Technology Inc.
1507 Pacific Ave.
Dallas, Tex. 75201

"In most cases, top management have abdicated their responsibility as it relates to electronic data processing. It is also quite obvious that most computer installations are in need of salvation."

Douglass M. Parnell, Jr., has spent the past 15 years in the data processing management field. He became the president and chief executive officer of Computer Technology Inc. in January of this year. Some of his prior positions in the industry include: vice pres., The National Bank of Detroit, Mich.; director, ADP Management Div. for the Post Office Dept.; and administrator of systems for federal government marketing, RCA. Mr. Parnell received a B.B.A. degree in public administration from Southern Methodist Univ., and a masters degree in industrial management from the Univ. of Denver. He is one of the founding members of the Management Information Society, and has been active in the American Bankers Association and the American Society for Public Administration.

Every estimate that has ever been made about computers or the computing industry has always turned out to be inaccurate; so I will not add my name to the list of inept forecasters by projecting that facilities management will become a way of life during the next few years.

But I think it is becoming more apparent that the average businessman will soon regard electronic data processing in the same way that he regards his telephone: it will not be necessary for him to install, operate and manage a computer facility in order to have EDP resources available to him.

A good question has been raised about *facilities management:* is it an abdication or salvation?

Before attempting to answer that question, I would like to discuss what facilities management is, how it was developed, who it is for, and how the business community can evaluate it. I will also cover some of the reasons why it is not a panacea and certainly will not and should not be used in all cases.

The Concept of Facilities Management

Facilities management, like any other emerging concept, has created a great deal of discussion about what it is. A specific definition is of no particular importance. But it is important to have a general understanding of the concept, and the evaluation of when and where that concept should be employed to accomplish one simple objective – to maximize the profit of a company.

"The product of the facilities management company must be regarded as a tool to maximize the overall profit of the company."

Computer Technology includes in its concept of facilities management "Total Computer Responsibility", including the design, development, implementation, operation and managing of all data processing functions for clients.

A facilities management company, under the concept of Total Computer Responsibility, is totally responsible for the *results* obtained from the client's data processing operations; and is responsible to the client's top management for obtaining those results.

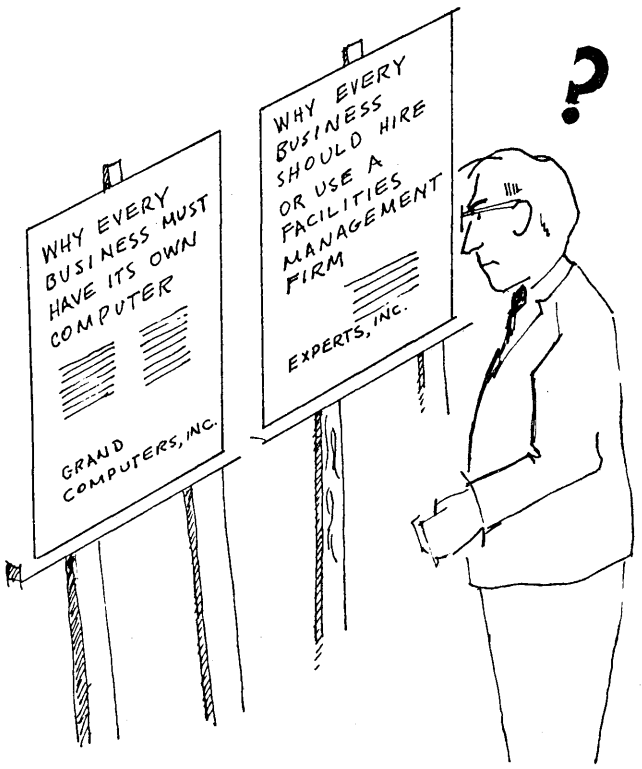
In many cases, a contractual agreement requires the facilities management company to perform according to mutually established guidelines at a predetermined price. In this way, the client knows what he is paying for, in results produced not just in time spent.

The Hardware Vendor

In understanding facilities management, it is important to recognize the philosophical differences between a facilities management company and a hardware vendor. Both types of organizations have a definitive place in the market, and their services are mutually compatible.

But whereas the hardware vendor's product can only be regarded by the client as an expense item, and is often thought of as expensive bookkeeping, the product of the facilities management company must be regarded as a tool to maximize the overall profit of the company.

A hardware vendor's major concern, and rightly so, is "to install" and "to protect." A facilities management firm, on the other hand, is dedicated to its objective "to operate effectively" and "to improve."



The achievement of this objective is essential to the viability of the facilities management concept, and to the life and strength of a facilities management company.

Evolution

Now that we have a general understanding of what we mean by facilities management, let's look briefly at how the whole concept came about in the computer industry.

During the 1950's and 60's the hardware manufacturers raced full speed ahead with R & D, and made fantastic improvements in their equipment. Sophisticated, fast computers were the result.

Unfortunately, the software needed to support this sophisticated hardware was **late** and **inadequate.** So today, we find ourselves with much more computer than we can effectively utilize.

During this same period, companies' expenditures on data processing accelerated rapidly.

A good portion of this increased cost can be attributable to hardware. However, the costs for software and for people required to support the systems have risen at a much more rapid rate.

McKinsey and Company reports that for every $100 spent on hardware, $187 is spent on staff.

The Failure of Business Management

One of the major problems growing out of the mushrooming computer industry is management's failure to keep pace with the technology. While costs for machines, software, and personnel continue to soar, effective usage of the equipment by many companies falls far short of its full potential.

A factor contributing to this situation is the failure of data processing personnel to focus on business problems. Many times a preoccupation with computer jargon causes data processing managers to overlook the more basic considerations.

"Many times a preoccupation with computer jargon causes data processing managers to overlook business problems."

Robert Townsend in his book *Up the Organization* says:

> . . . most of the computer technicians that you're likely to meet or hire are complicators, not simplifiers. They're trying to make it look tough. Not easy. They're building a mystique, a priesthood, their own mumbo-jumbo ritual to keep you from knowing what they – and you – are doing.

People Problems

During this period of rapid growth, management found the solutions to people problems becoming increasingly difficult. Many good businessmen simply do not have the technical knowledge necessary to fairly evaluate the professional qualifications of their data processing personnel. Consequently, they have frequently been ineffective in motivating and retaining good people.

Data processing personnel are **profession oriented.** They, unfortunately, do not generally have strong company loyalty. The chance for an immediate gain, a greater challenge,

or an increased opportunity causes large numbers of data processing "pros" to change jobs with greater frequency than other employees.

Furthermore, the acute industry shortage of critical skills has left many data processing operations in need of specialized talents – talent which they just can't find.

Economics

In addition to the people problems, several other problems contributed to the need for a better way to operate data processing departments.

Among them is the need that many companies have for the development of new systems. Often the dollar and people resources required for the development of a much-needed new system or application are simply not available.

Thus, the pure economics of the situation led many companies to look to outside sources. They have found that it is often less expensive to buy results than it is to manufacture them.

"Many companies have found that it is often less expensive to buy results than it is to manufacture them."

This situation of high costs, inadequate software, people shortage, inefficient utilization, and ineffective management led to the birth of the facilities management concept. It was a natural outgrowth which helped to fill the void between the hardware vendor and the user operation.

Who Is Facilities Management For?

An obvious question might then be: "Is facilities management for every company?" The answer is, NO.

Facilities management is not a panacea! It cannot provide a solution to the whole spectrum of data processing problems. The concept of facilities management can be utilized by a limited number of companies – but be assured this is not a small number.

While it is not the answer to all the industry's woes, neither is it a new and strange monster to be avoided or approached with undue caution. Facilities management is one of many alternatives available to help solve business problems. In many cases it is an effective and workable alternative, which should be approached and analyzed in the same fashion as any other business tool.

In terms of "Who is it for?", some industries are more likely to utilize facilities management than are others.

In general, we have found that service type organizations have a greater current need for facilities management than do manufacturing companies. Manufacturing firms can many times see a direct relationship between their DP shops and their profits; whereas the service companies cannot readily identify this relationship. To a greater extent, service type companies have not exploited the full impact that data processing can make on profit.

On the other hand, many manufacturing companies are more willing to look at facilities management objectively and accept it as a desirable, profitable alternative – the infamous "better mousetrap."

Specifically, we have noted a definite trend towards the facilities management concept in several industries.

The Banking Industry

One example is the banking industry. Smaller banks have been among the earliest to accept and adopt the facilities management concept. We expect a number of other banks in this category to follow suit in the short-term, especially those in the credit card field.

I will predict that within the next 18 months, one of the top 25 banks in the U.S. will accept the facilities management approach. Such a move, by any one of the nation's major banks, will then open the door for facilities management among large banking institutions throughout the industry.

Insurance, Medical, and Credit Card Fields

Other examples of industries wherein a facilities management trend is visible are the insurance, medical and credit card fields. Companies within these industries and industry-segments are likely to have similar problems, and may be in need of similar solutions. In many cases the system developed for one bank or insurance company can easily be applied to another bank or insurance company.

I have also observed a trend towards acceptance of facilities management in the transportation, distribution, education, and state and local government industries. And, of course, these are only a few of the many industries where facilities management can be effectively applied.

When a user considers the alternative of facilities management, he obviously must review it carefully. But how should he evaluate this alternative?

Evaluating Facilities Management

In my experience, executives evaluating EDP tend to view the decision differently than decisions affecting other functional areas.

Every day a number of "buy/make" decisions are made. The businessman is constantly looking for **economies** and **results.**

The criteria which he uses to reach his buy/make decision often are not applied to the data processing shop, and they should be. Should he buy certain data processing services, or "make" them himself?

The service segment of the data processing industry has matured to the point today that the business executive can consider any EDP project in terms of **economies** and **results**, evaluating both internal and external methods of accomplishment.

We have found that, in evaluating facilities management, three questions have been of particular concern to some managers.

Security

At times, the question of **security** has been raised. It is very clear that in most cases the facilities management firm exercises greater security over the client's proprietary information than the client did himself.

"It is very clear that in most cases the facilities management firm exercises greater security over the client's proprietary information than the client did himself."

Consider your own data processing shop. How difficult would it be for an unauthorized person to walk off some night with several reels of tape?

The facilities management firm is responsible to the client for the absolute protection of that client's materials and information. Both must be secured if the facilities management firm is to remain in business.

Flexibility

Another concern has been the need to maintain flexibility in developing systems. Clearly, the client is not "married" to the facilities management firm. Clients should be able to maintain a great deal of flexibility by exercising their right to request specifications or proposals on any new system.

Control

The third concern is for control. In any client/service relationship, the client has control. This is especially true under a facilities management contract. Our clients have more control than they ever had over their own computer system. With your own system you can't always get results as soon as you like, or in the form you want. You can't be sure if your people will always be there. You can't be sure if your costs will stay in line. With a facilities management firm you, as a client, have control through a contractual obligation. Either the facilities management firm delivers the results which were assigned or you don't pay. That's control.

Some Disadvantages of Facilities Management

If I sound entirely positive on the side of facilities management, it's because I do believe in it very strongly. There are, however, some disadvantages to this approach. Candidly, and briefly, I'll mention some of them.

First, there is the difficulty in completely defining the work or assignment. Sometimes a client does not really know what he wants or needs from the data processing operation.

A sentence in the *Koran* says: "If you don't know where you are going, any road will get you there." A facilities management company should help the client decide where he wants to go and show him the most direct route.

An industry-wide problem is that of executing a fair and flexible agreement which protects both parties – this is not impossible, just difficult.

The cost of data processing work is not easily estimated. It is not like, for example, the construction of a building, where the required materials are definitive. The margin of error in forecasting development costs is sometimes fairly large. It is not easy to determine exactly what resources will be required for the completion of a project.

"An industry-wide problem is that of executing a fair and flexible agreement which protects both parties – this is not impossible, just difficult."

Discipline

Another seeming disadvantage to some managers is the discipline which facilities management places on them. The responsible manager is required to make better expenditure decisions. How much should he pay for the results he wants? What does he really need? He will learn what he's actually spending and what he's getting for his money.

Also, the retaining of a facilities management firm can result in the removal of a manager's "security blanket." His decisions are more visible – so are his mistakes!

Important Advantages of Facilities Management

But in spite of these problems, there are several important advantages which most firms find in using professional facilities management.

The unlimited availability of qualified personnel for the development of a system is an obvious plus. The whole

people problem in the data processing industry is an advantage to the facilities management firm.

Because of more effective and efficient utilization of resources – because of economies of scale – companies are better able to control the costs of their data processing department. This certainly is a very important advantage.

The advantages of more timely output and peak-load services are apparent.

The Quality of Results

And most important, we should consider the quality of the results the client receives. The results received from a facilities management firm are almost always better than those obtained from an internal operation. The facilities management firm is **results oriented!** The justification for a facilities management firm's profit is the enhancement of the client management or improvement of his profits.

The manager has another advantage in the availability of alternatives. He is not locked into one limited operation, system, or development effort.

These advantages lead us to another – the fact that better management decisions are possible. Managers have more timely and accurate information. They have the counsel and advice of data processing pros whose only interest is improving those manager's operations.

Lastly, the retaining of a facilities management firm allows the busy executive to devote more time and energy to other areas of his business – to concentrate on producing whatever he is in the business of producing.

With the increasing responsibility and insufficient time many executives have, this advantage is one of the most important.

"Abdication or Salvation?"

Now we have looked at the concept of facilities management, reviewed its historical development, considered its application to companies and industries, and analyzed its strengths and weaknesses. But the original question of "Abdication or Salvation?" remains unanswered.

The answer is that facilities management is neither one.

In most cases, top management have abdicated their responsibility as it relates to electronic data processing; it's also quite obvious that most computer installations are in need of salvation.

Fortunately, facilities management is a technique that can be of assistance in both of these areas. Although not a panacea, it provides one way for business to more effectively use this complex tool that we call a computer.

It is unknown just how soon the businessman will accept data processing as a service – like the telephone – that can best be purchased from an outside professional company.

But we do know that this evolution is dependent upon the ability of companies to provide professional services which eliminate the EDP demands currently placed on the shoulders of executives.

When this happens, business will have what has been promised to them in vain by the computer industry for many years – that results from their data processing investment be commensurate with its cost. □

Based on Mr. Parnell's keynote address to the American Management Association's national briefing session on EDP Facilities Management in New York on June 22, 1970.

C·a NUMBLES

NUMBER PUZZLES FOR NIMBLE MINDS –AND COMPUTERS

Neil Macdonald
Assistant Editor
Computers and Automation

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

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

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

Stuart Freudberg
Newton High School
Newton, Mass.

NUMBLE 7010

```
        H E I S
      × R I C H
      W O N I E
    U T S U O
              C = R = T
  W C R S I
U R S U O
= U H W U I E W E
- U I O W N W C O
=   E N O U G H     36883   49782   6570
```

Solution to Numble 709

In Numble 709 in the September issue, the digits 0 through 9 are represented by letters as follows:

D = 0	T = 5
R,U = 1	N = 6
B,K,W = 2	S = 7
I = 3	O = 8
E = 4	A = 9

The message is: Abuse is written into iron, kindness into sand.

Our thanks to the following individuals for submitting their solutions: to **Numble 708**: C. L. Agrawal, Claymont, Del.; A. Sanford Brown, Dallas, Tex.; C. J. Eng, Jacksonville, Fla.; T. Paul Finn, Indianapolis, Ind.; Pvt. B. L. Gingrich, Endicott, N.Y.; Henry F. Greene, Durham, N.C.; Frank Komorowski, West Chester, Pa.; Bernard Kreul, Cypress, Calif.; Wm. A. Leonhardt, Cincinnati, Ohio; and Robert R. Weden, Edina, Minn. – to **Numble 706**: Krishna Moorthy, Kanpur, India – and to **Numble 705**: Dr. Mitchell Snyder, Ramat-Gan, Israel.

COMPUTER GRAPHICS FOR SOCIETY—Part 1

Prof. Leslie Mezei
Computer Science Dept.
Univ. of Toronto
Toronto, Ontario, Canada

> *"Vision, our creative response to the world, is basic, regardless of the area of our involvement with the world. It is central in shaping our physical, spatial environment, in grasping the new aspects of nature revealed by modern science, and, above all, in the experience of artists, who heighten our perception of the qualities of life and its joys and sorrows."*
>
> – Gyorgy Kepes, "Education of Vision", Vision + Value Series, Braziller, 1965

"Computer graphics" deals with the input, generation, storage, transformation and display of visual information, i.e., data in two or more space dimensions. It has often been said that true man-machine communication which is convenient for man will involve a large element of graphics. In addition to displaying the results of calculations and accepting procedure definitions graphically, we also want computers to process pictorial material. Since the visual information must be coded for the computer numerically (coordinates of the points, etc.) it also becomes a candidate for remote transmission. The following[1] categorizes the field into four logical sections according to the type of transformation involved:

1. Data to picture (output of calculations, data display)
2. Abstract to picture (graphic simulation, picture generation)
3. Picture to abstract (picture analysis, pattern recognition)
4. Picture to picture (visual design, digital picture processing)

Interactive and Passive

The two major modes of communication with the computer are "interactive graphics," corresponding to real-time conversational computing, and "passive graphics", corresponding to batch processing, where the result is not immediately seen. Although interaction offers great advantages, passive graphics also has a vast potential, and is generally simpler and cheaper.

Output Devices

A limited range of graphics can be achieved on a line printer or teletype, for example the SYMAP[2] program for contour maps. Pen on paper "electromechanical plotters" are the most popular graphic output devices, ranging from inexpensive ($5,000) units to large, highly accurate drafting tables ($200,000). These may be operated remotely, with the plotting commands transmitted over a communications line. The "microfilm plotter" displays the information on a cathode ray tube which is automatically photographed, by a built-in asynchronous movie camera with the frame advance of the film being under program control. This results in an increase of speed of the order of one hundred, and results in a very condensed form for voluminous outputs.

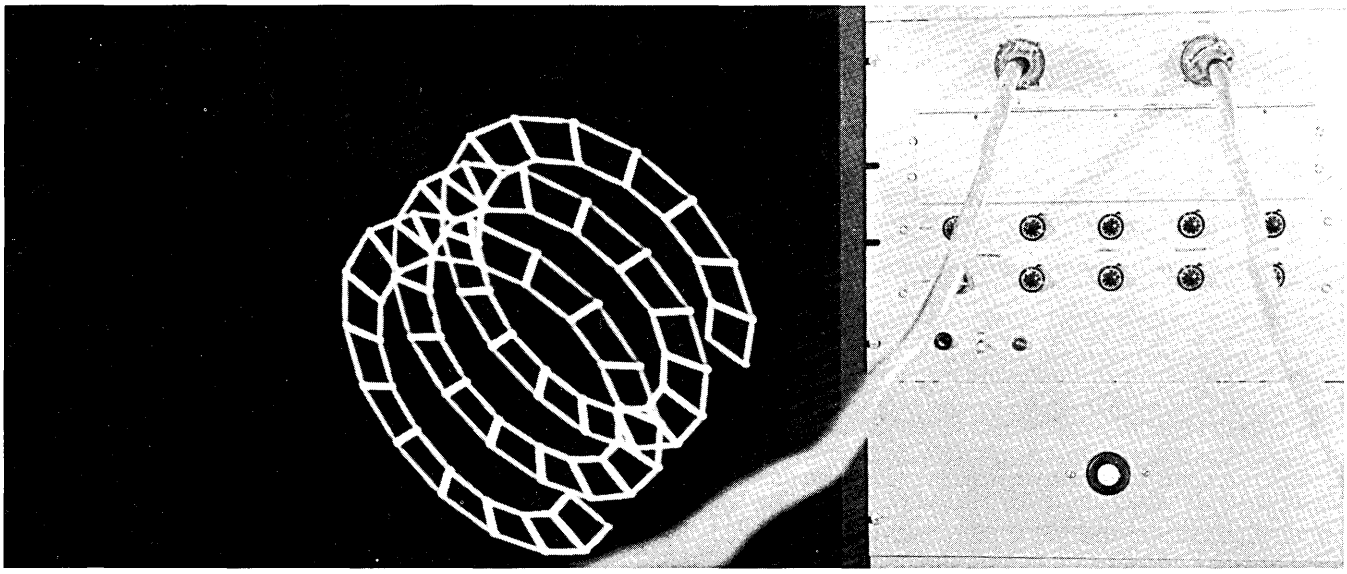
The cathode ray tube itself is becoming widespread for alphanumeric displays. Storage tubes with picture drawing capabilities are also inexpensive, on the order of a few thousand dollars. The interactive display systems use a fast decay phosphor so that the image can be altered rapidly, and the individual parts of the picture may be identified easily. This requires a "refresh" system (regenerating the picture about 40 times per second) using a buffer memory, or tying up the whole computer. In addition usually a "light-pen", "function keys", typewriter keyboard, etc. are also included.

Other devices for sketching and manipulating the pictures are available, such as "Rand tablets", "mice", 'joysticks", etc. These systems start at around $100,000. There is a limit on the number of points or lines which may be displayed in one refresh cycle; exceeding this causes an unpleasant flicker. For real time motion to be displayed the picture has to be recalculated rapidly. Some systems are beginning to offer built in hardware to speed up the basic functions, such as rotation of three dimensional objects.

The digitally controlled machine tool may be considered to be a three dimensional graphic output. Other devices may be controlled by digital (or analogue) output from the computer. Such techniques will likely become popular in the multimedia environment type of art, for example,

[1] Developed by Kenneth C. Knowlton and Leon Harmon

[2] Harvard Laboratory for Computer Graphics and Spatial Analysis



THREE-DIMENSION ILLUSION

The computer-generated object on the left and the surrounding room are a photographic simulation to illustrate the perspectives a user sees when looking into a new head-mounted device developed at the University of Utah. The device permits architects to visually step inside their drawings and view the interior of a building. The device is used in a research program which is aimed at simplifying communications between man and computer through the use of pictures.

where the program can react to the environment perceived by various "sensors" (for temperature, pressure, smell, etc.) and control the action of several "effectors" (projectors, lights, sound synthesizers, etc.).

The latest developments are moving toward standard video output on standard TV sets providing a cheap and readily available output device, and making it possible to use color directly. The major problem is to transmit the large amount of information needed for the video scan rapidly enough; this is being accomplished by means of drums or disk storage.

Input

The graphic information may be generated by program without any input. Such is the case when we use the results of some calculation which are to be plotted, or the generation of basic geometric shapes where only the parameters need be supplied (e.g. the center and radius for a circle). For "line drawings" only the coordinates of the end points of the lines which make up the picture are required. These could be coded manually and entered on punched cards, or a semiautomatic "digitizer" may be used.

These devices, costing about the same as plotters, generally include some type of stylus (like those on plenimeters) which the operator guides over the curve. The coordinates of points along the curve are automatically recorded on punched cards, magnetic tape, or directly in a computer. Some automatic line followers are also available, useful only with simple line drawings, such as a plot of X VS Y or a seismograph tracing. The "flying spot scanners" (in the $250,000 range) scan a transparency such as microfilm in a TV type scan, recording the gray level at each spot. For 1,000 by 1,000 resolution 1,000,000 points are generated! The programmable scanners give over control of the scan to the program, so that with line following algorithms, for example, the amount of data recorded can be cut down drastically. This digital picture processing technology is still in an early stage of development.

Some of the devices for interactive input have already been mentioned. Other digital or analogue inputs may also be arranged to control the processing. For example, in one system the motion of an "anthropomorphic" harness worn by a man can control the image on the scope, as can sound input such as music. It is in the area of input and output devices that we can look forward to the greatest changes in the next few years. Although these will bring great improvements, it is not yet clear whether they will also produce significant cost reductions.

Subfields of Computer Graphics

Computer graphics is one of the newer fields of computer application. Various areas have been developing separately, with not much unification between them. One such area is **plotter graphics.**

Plotter Graphics

The relatively inexpensive equipment and the ease of programming for simple applications has made plotters quite popular in the scientific and engineering world. Plotting a function of Y against X is the obvious example.

The glamour of interactive graphics has retarded the acceptance of plotters more generally. Many people are aware only of interactive graphics and when they find this too expensive and complex for their applications, they abandon further consideration of graphics. However, beginning with passive graphics is a good way to obtain experience in this field, and much useful work can be done with it, such as sales charts, market studies, etc.

"Many people are aware only of interactive graphics, and when they find this too expensive and complex for their applications, they abandon further consideration of graphics."

Alphanumeric Displays

A proliferation of alphanumeric displays – devices which display numbers and text – is appearing on the market. Although the development of the equipment is part of graphics, their programming and use does not require anything more complex than the use of line printers. They are often used to replace teletype printers in time shared computing.

As with alphanumeric displays, computerized typesetting – the computing aspects of preparing text for conventional or photo typesetting machines – is not really graphical in nature. It deals only with linear strings of alphanumeric characters, although some systems are being developed for layout and editing, and illustration will be added eventually.

Interactive Design

In the area of interactive design, only a small number of installations are in day-to-day productive operation for circuit design, automobile, ship and aircraft design, and some other engineering fields, such as piping layouts. Even fewer production installations have been established for architecture, graphic design, typography, art, etc.

Computer Animation

Another subfield of computer graphics is **computer animation.** Since the output of a microfilm plotter is directly onto film, by varying the picture frame to frame a motion picture can be easily created for any process which can be suitably programmed. Alternatively, a camera can be placed in front of a display tube. The result of a video display can be recorded on videotape. A number of educational, scientific and art films have been produced, particularly at the Bell Telephone Laboratories, though progress has been slow due to the lack of software, the cost of the equipment, and a lack of appreciation of the benefits to be gained. Suitable languages and interactive animation systems are being developed. Recently a real time, shaded, colour display of simulated objects has been demonstrated by NASA.

Visual presentation of information allows us to perceive many relationships which are difficult to deduce from tables of numbers. There are many situations in which the relationships we seek are not only distributed in space (e.g. the population of various centers) but also in time, since we are interested in the development of these relationships over some period. These include data available as time series (population statistics, pollen counts, per capita income, sales figures, etc.) transportation data (automobile traffic, telephone calls, information transfer, etc.), stochastic events (traffic accidents, births and deaths, war casualties, etc.), dynamic processes (evolution, blood circulation, weather systems, the operation of a computer under program control, etc.). Such information is best displayed in the form of moving pictures.

"Visual presentation of information allows us to perceive many relationships which are difficult to deduce from tables of numbers."

Population Data

Consider for example the vast amounts of data which exist in the form of series of values over a period of time (years, days, seconds, etc.) for a large number of locations on a map (of the world, Canada, Ontario, one suburb, etc.). The values at any point of time can be displayed on a map by means of a number of techniques such as circles proportional to the value (the black dots of demographic maps); histogram-like rectangular boxes (or pyramids); figures representing the variable (stick figure for people, dollar bag for money, etc.); shading; elevating a particular region proportionately to the given value, etc.

Between any two successive points in time the data can be interpolated and the appropriate number of frames output, resulting in continuous change when the film is shown by a standard film projector. A calendar (or clock) can be added to provide a frame of reference.

Such a moving picture will make evident not only the rate of change of the values, but also the changes in the rate of development (sudden spurts, the leveling off of the increase or decrease, etc.) Furthermore, the developments at the various locations on the map will be seen in relation to each other. The westward spread of population in North America is an obvious example. Techniques for showing more than one variable at a time (e.g. population and income) can also be developed.

The fields of potential application are widespread. Demographic and economic data, medical and educational statistics, production and sales figures are a few of the major types. In the case of many of the developing problems of our society the figures would speak for themselves with dramatic impact through such films; for example water and air pollution, the increasing incidence of lung cancer and traffic accidents and other information about the "quality of life".

"In the case of many of the developing problems of our society, the figures would speak for themselves with dramatic impact through the use of computer animated films."

In addition to the use of actual data, this technique may also be used to display the effect of various alternative predicted figures, as well as for data obtained from simulation programs.

Transportation Data

Arrows between locations can be used to display volume of traffic. The width or the intensity of the arrow can indicate the volume, and this can be made to change continuously on the resulting moving picture. By showing small objects (arrowheads, boxes, cars, stick-figures) in motion (their number proportional to the traffic density) the velocity of movement can also be indicated.

This type of data can be superimposed over the "population" type of map, so that, for example, the immigration and emigration rates can be shown together with the dynamic population map.

Any type of "traffic" can be displayed including vehicles, telephone conversations, employee transfers and data communication between computers.

Exceptional events can be superimposed in the form of a bright flash, for example, to indicate traffic deaths, communication breakdowns, births, etc.

Graphic Simulation

Simulation of dynamic processes of other types (e.g. blood circulation, evolution, kinship relations, cash flow, movement of the planets, weather systems, topological transformations) require different programs, each depending on the particular problem.

As an example we may cite the visualization of computing concepts. We see only the static initial condition of the stored program, but must imagine it in a dynamic, changing form to understand it. This has to be done in conjunction with the visualization of the data on which the program operates. We have flowcharts, but usually need to trace through them with specific sample data to understand them.

To demonstrate a complex sorting routine, for example, we cover large chalkboards with numerous columns of variable data (current inputs and outputs, the state of each index, etc.). In some situations, such as the communication between an operating system and the tasks it is supervising, a dynamic visualization of the process may well provide new insights to the system designer. In other cases such moving pictures will serve mainly as educational and training aids.

Cartoon Animation

In addition to the abstract graphic symbols indicated, previously stylized renderings of real entities (human figures, birds, cars, trees, etc.) have to be used. The motion of these must seem believable. A demonstration of the laws of gravity by means of a circle representing a bouncing ball is graphic simulation, but to show two boys playing ball would be cartoon animation according to this terminology. (However, the whole field of computer-generated moving pictures is often referred to as computer animation.)

Cartoon effects can add a human element to educational movies, providing the appeal to feelings which many educators consider essential to real learning. The commercial potential of cartooning is extremely large, production costs are high and the results are generally poor – as one can judge by tuning a television set to any channel on a Saturday morning.

Some primitive cartoon elements have been incorporated into a few computer-generated films, and one or two papers have appeared in the literature. The development of cartoon animation involves the solution of many interesting problems. It also presents a good vehicle for studying various types of motion, such as the natural movements of men and animals.

On the simplest level the computer is used merely for the "fill-in" task, interpolating between two given frames to provide the intermediate frames needed for the illusion of continuous motion. The animator presents the two pictures on the display tube. A better approach is to provide subroutines for the most common motions of the usual types of animated figures. To take an example, if the animator wants a flying bird he would sketch the bird or retrieve it (in coded form) from the picture library (on disk), then draw with the light pen the path to be taken. The "flying bird" subroutine would then be used to provide the motion, including the flapping of the wings.

Three Dimensional Representation

Although the conventional cartoon consists of two-dimensional drawings, usually it has to simulate motion in three dimensions. A three dimensional representation of the figures is necessary, so that perspective can be introduced, the figures can be presented from various angles, and the portions of the scene hidden by the figures can be eliminated. Representation of three dimensional arbitrary surfaces, hidden line elimination, and shading are very complex processes involving large amounts of computer time. Colour adds further complexities.

"Representation of three dimensional arbitrary surfaces, hidden line elimination, and shading are very complex processes involving large amounts of computer time."

Although stress has been laid on recording the resulting "dynamic graphics" on film, this arises from current technical limitations. Display systems with real-time capabilities will be able to generate the images (still or dynamic) upon demand, utilizing programs and pictures stored on mass memories. With a trend toward a "graphic processor" as a part of each display system, the display may be at a location remote from the central computer.

Digitized Picture Processing

Digitized picture processing deals with the computer processing of photographic transparencies. It has received its impetus from the space program where pictures of the moon and Mars were transmitted digitally and processed through a computer at the California Jet Propulsion Laboratory to "filter" out the noise and for contrast enhancement. Other applications, so far, have been largely in the scanning of photographs of "bubble chamber tracks" in high energy physics, and chromosome counts, nerve fibres, etc. in medicine. These techniques are necessary for fully automated picture analysis of aerial photographs, maps, X-rays, photomicrographs, etc.

Pattern Recognition

Closely related to the picture processing area is pattern recognition. Although a field quite distinct from graphics, where visual images are involved a graphic preprocessing is necessary before further analysis. Character recognition is the most important area commercially, due to the computer input preparation problem. The infantile robot projects at M.I.T. and Stanford use video input for the visual system. The "scene analysis" required is fraught with many difficulties; currently only very regular objects with strong contrasts between faces can be handled. □

(To be continued)

Part 2 of this article, scheduled for publication next month, will discuss software requirements for graphics, the potential scope of applications of graphic techniques, and social aspects of the use of computer graphics. It will include a bibliography.

A 'CHECKLESS' SOCIETY OR AN 'UNCHECKED' SOCIETY?

Rudy C. Stiefel, Pres.
Infotran Inc.
860 5th Ave.
New York, N.Y. 10021

"Our efforts must be directed towards producing the electronic equivalent of money that cannot be counterfeited. The value of a form of money is not determined by the inherent worth of the paper on which it is printed, but by the difficulty with which it can be counterfeited."

The "cash and checkless" society of the future has been given a great deal of discussion and publicity. There is little question that, from a technical point of view, it will become possible to execute, electronically, financial transactions from pennies to billions within fractions of a second over any distance. The key problem, however, is what protection against fraud can be obtained.

Potential for Disaster

There is much potential danger lurking in a "cash and checkless" society dependent upon electronic computers and data communications. I am talking about the man who leaves his magnetically encoded deposit slips conveniently on the bank counter so that other customers will deposit their money in his account.

I am talking about the enthusiastic employees who mixed punched cards and magnetic tape with the ticker tape in celebration of the Mets world series victory last year.

And I am talking, above all, about the possibility of syphoning off electronically huge amounts of money, from the economy – something which may be going on right now without being detected.

Credit cards are already causing widespread concern due to fraud, even without automatic features to transfer funds. Once credit cards are inserted into cash registers and the amounts deducted electronically from the owner's checking account, the opportunities for fraud will multiply, and further expansion will be limited until anti-fraud measures can be effected.

So far, we have been spoiled either because the caliber of men and machines employed has been very high, or because the capability of the people defrauding the system has been so great that it has evaded our attention. People concerned with law enforcement and crime protection must assume the latter. This means that the computerized economy may be working with a time bomb that is getting more powerful the longer it remains undetected. If and when it should blow up, it could have disastrous consequences on the economy and on the electronic-scientific community in particular.

The purpose of this article is to help prevent this from happening by devising means and methods to keep the burgeoning flow of electronic pulses, which increasingly influence our lives, from going out of control.

Paying by Telephone, Paying by Computer

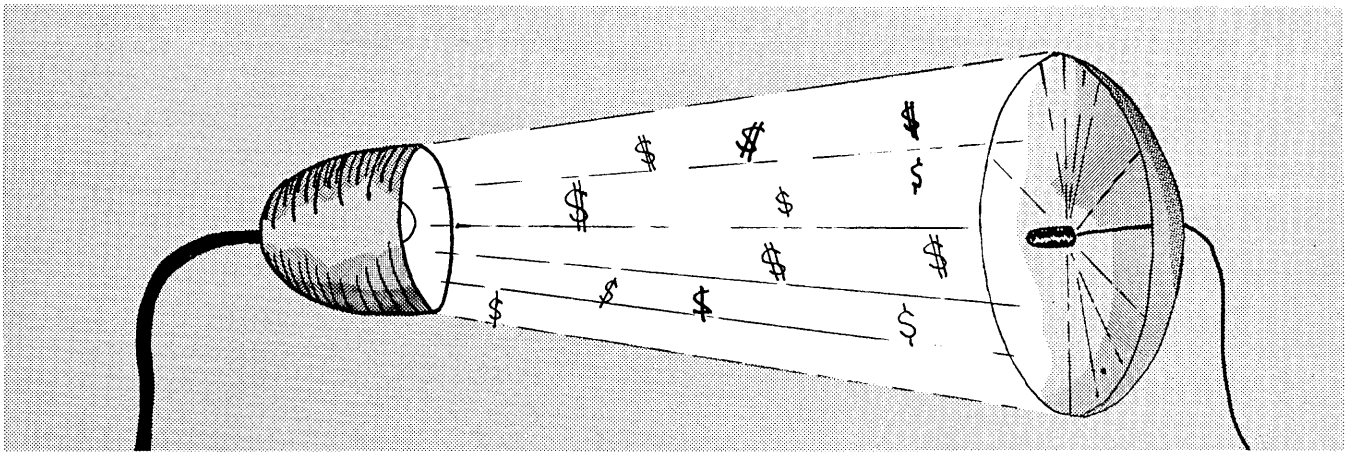
Recently, one of the Governors of the Federal Reserve Board testified before a House Subcommittee on Banking and described future bill paying like this:

> Once your bank has issued you a cash/credit card, you will be able to pay any creditor who has a bank account simply by inserting your card in a telephone and dialing a series of numbers. The telephone line, hooked up to your bank's computer, will tell the bank how you want payment made. The store clerk will put the card in his telephone and do the dialing for you. The merchandise would be paid for then and there.

Establishing credit with a card is one thing, paying by card is quite another thing.

"As the legitimate use of paying through electronic means increases, the power and leverage of fraudulent users increase as well."

The ease with which transfers of money can be made electronically has caught the fancy of the layman. Electronic payments are easy to instrument, but the criteria of any



payment system is its degree of protection against fraud. It is easy to print money, but it is difficult to provide money that cannot be defrauded. We must test electronic means of exchanging funds for the ability to prevent fraud. As the legitimate use of paying through electronic means increases, the power and leverage of fraudulent users increase as well. If not held in proper check by supervision, regulations and by technical means, it may cause serious breakdowns of the economic system.

The "Check" Society

At present, a transfer of property, such as writing a check, requires a signature, which is a very distinct action by the owner showing his willingness to transfer some of his property. In contrast, the mere pushing of a button or the insertion of a key does not constitute an equally distinct intent of the owner to transfer property. It can easily be claimed that a wrong button was pushed or a wrong number inserted, whereas the signing of one's name on a check is an action that cannot readily be renounced as having been committed accidentally.

Prevention of fraud can be sought by such means as dialing a "secret" code number to afford access to an account, presenting an encoded card, or by several other means, all of which, however, require careful consideration and integration of technical possibilities and commercial requirements and crime prevention tactics.

Are the 20 billion checks that are expected in 1970 a sign of excessive paper work and bureaucracy, or are they a testimony to a very active society? I believe it is the latter. It even bespeaks of the efficiency of our economy that values of hundreds of millions of dollars in effort, labor and material can be safely and adequately transferred with a piece of paper. To be sure, this piece of paper should be machine producible and machine readable, something that has been pretty well achieved, though further improvements, particularly simplifications are expected beyond the present state of character recognition.

What's Wrong with Paper?

Let's examine for a moment what's wrong with a piece of paper:

- It is maligned and unfashionable.
- The information content is difficult to alter.
- It is not easily machine-readable.
- It is not readily electrically transmittable.
- While most conveniently storable, it is not conveniently retrievable in automatic form.

The Advantages of Paper

But paper has its advantages:

- It is human-readable.
- As one of the oldest information storage mediums, considerable skill has been accumulated in its use.
- It has a small volume since it is very thin.
- Two dimensions are relatively large, resulting in easy human recognition and manipulation.
- It has a high information storage density.
- Machine-readability is being improved through simpler character recognition methods, special fonts, magnetic "stripes," etc.
- Scanning enables "machine reading" of graphic information.
- Since the information on paper cannot readily be changed without leaving a trace, it has excellent documentation qualities.

– Electronic transmission is being improved through high-speed facsimile transmission methods.
– Some progress is being made to automatically store and retrieve through filing and library systems, and indirectly through microfilm, microfiche, etc.

The fact that information on paper cannot readily be changed is of special importance here. While generally a disadvantage in data processing, the use of paper as a permanent document is unsurpassed. Enhanced by the law, a bad check, for example, is a criminal offense, a basis for prosecution, and as such difficult to replace by an "electronic document."

"Enhanced by the law, a bad check is a criminal offense, a basis for prosecution, and as such difficult to replace by an 'electronic document'."

Also a word of caution about volume. While complaints are being heard about the "volume" of checks which have to be handled daily, it is not certain that, with electronic means, sheer physical volume can be reduced. With every bit of information in a core, drum or tape, goes a reading and retrieval device, and if it is included in the volume count, as it should be, paper makes an efficient means of storing data.

The Electronic Thief

The advent of electronic data processing has increased the ease with which property can be transferred, but it has also increased the opportunities to misappropriate these transfers. Particularly as the volume of transactions, made feasible through electronic handling, has increased, fraudulent transactions may go undetected that would have aroused suspicion with manual handling.

A special case of fraud that has come to light in recent years consists of using funds deposited by others in a bank or brokerage house as collateral for loans or stock speculation. If the embezzler is successful, and if he knows when to quit, he may put the temporarily stolen funds back and no overall loss is apparent. While no funds were actually stolen, the owner took risks unwittingly which could have been disastrous. If done on a large scale, such transactions can seriously undermine the entire economy, as was done in the Kreuger case in 1932.

With the advances and increased acceptance of data communications, we must also be prepared for the "remote controlled" theft. If accounts are kept in electronic memories – as they now commonly are – and if these are connected to the telephone net, time-sharing systems or private lines, it is possible to steal money without ever touching it, now more than ever before.

"We must be prepared for the 'remote-controlled' theft."

Electronic Security

Our efforts must be directed towards producing the electronic equivalent of money that cannot be counterfeited. The value of money is not determined by the inherent worth of the paper on which it is printed, but by the difficulty with which it can be counterfeited. Similarly, it is the protection against fraud that determines the value of electronic means of exchanging property, rather than the ease with which the transfer can be executed.

Through the use of cryptography, any degree of security can be achieved, a hierarchy of access can be obtained, and guardians can be assigned keys to their areas of responsibility. Keys can be changed and reissued frequently; master keys can be retained for emergencies.

"Electronic law enforcement" must be oriented toward electronic data processing and make use of advances in electronics to counteract and stay ahead of the expected criminal use of electronics.

Some Simple Rules

Certain simple rules offer good protection against fraud, such as, keeping the records up to date, with the aid of real-time on-line systems (which had not been feasible before the advent of electronic data processing), and keeping the records as visible as possible. If the storage itself cannot be visible, the use of intermediate visible steps that are amenable to human checks are desirable.

The much heralded burden of billions of checks may, in form, remain the backbone for the safe transfer of funds. A signature on a check is still the most accepted, overt act indicating the willingness to part with one's money – short of giving cash. Other means are being considered – voice identification, finger-printing, secret codes, etc. – in addition to being in possession of a valid credit card.

The future may lie in a combination of automatic data processing and data communications. A machine-readable document may be made out as a by-product in the cash register, together with an instantaneous check and "ear-marking" of the purchaser's credit balance in the bank.

Special attention must be paid to the question of centralized vs. decentralized computer facilities and to time shared systems. In banking, it has become increasingly common to use one large, central facility and to connect the branches with data communications. When money is deposited in a branch office, for example, this fact is sent to the central computer through telephone facilities, cables and exchanges. This offers then an excellent opportunity to rob a bank without ever setting foot in it – probably considered a vast improvement over the existing methods of hold-ups.

However, an equally likely opportunity for "electronic fraud" lies in the operation of the computer room itself. As data processing becomes an increasingly routine operation and less skilled and probably lower paid workers will be employed, the incentive for fraud is bound to increase.

Central Data Banks and Central Registration

An important and much discussed system to counter crime should be mentioned at this point, namely, the

establishment of Central Data Banks and Central Registration.

There is much argument about the threat to freedom and privacy by powerful electronic data banks. I believe this threat is not very realistic. First, large electronic memories are still a serious bottleneck for large data banks and will remain so for the foreseeable future. There is nothing in sight, at the moment, that approaches the storage density of the human brain, and while substantial data can be stored on tape, discs and particularly on microfilm, access to the memory becomes worse as the capacity increases.

"There is much argument about the threat to freedom and privacy by powerful electronic data banks. I believe this threat is not very realistic."

Electronic access is efficient only in a search for specified characteristics, which implies that data should be stored centrally only if there is a specific need for them – and not just because they are available, or for an as yet unspecified future use. If a central data bank for a specific national need is authorized, let's say, by Congress, then it can be expected to operate more reliably than its manual counterpart and it is therefore likely to protect the citizen better than an informal system.

Legality, Responsibility, and Morality

Problems of legality, responsibility and morality have to be clarified, not so much because electronic data banks bring about this problem, but because they focus the issue more sharply and more urgently.

Central data banks for credit information will be forthcoming, possibly in connection with a universal registration number that is assigned to a person right after birth and stays with him wherever he goes. Such a system is already in use in many countries. In fact, it has already been abused in the past by dictatorships.

There is no one infallible system, nor will there ever be one. However, I believe an electronic system is now able to offer the means of obtaining efficiency of operation while maintaining individual freedom and privacy. Such a system must also be flexible enough to adapt to the varying needs of crime countermeasures required to counter a constantly changing criminal climate.

The Voice of the People

On the constructive side, an "electronic" registration system can help the lawmakers, particularly Congress, in keeping abreast of the "people's voice". An electronic voting system that allows frequent voting or polling opinions over the telephone net, while maintaining security and privacy, has been suggested and may, in the future, inject new life and meaning into a democratic society.

The problem of how to make the "voice of the people" heard, and make it count, is being tested anew. "Silent" and "vocal" majorities and minorities complain of not being heard or represented. Others claim, on the basis of mail response statistics, sample inquiries and of population computer models, to know the "true" feeling of the populace on important issues.

No single device or gimmick is likely to solve this problem. But electronic data processing and data communication do make it feasible – at least in principle – for every citizen to express his opinion on the issues important to him and to his government. That his opinion is clearly heard and recognized, is the first step, and an important one. That it is also counted in shaping decisions, is a second step that requires a sensitive, yet flexible constitutional framework to work effectively.

The Significance of Exchanging Property

My young friends may ask:

Is it possible that the entire idea of exchanging property is becoming old fashioned?

One of the cornerstones of advanced civilizations is the ability to "store" its efforts, materials, etc. These are produced at one time and can be used and dispensed with at other times, at other places, and by other people. Even in societies that profess not to have any private property, the exchange of goods and services between individuals and groups of people remains important and warrants documentation. So, I believe the significance of exchanging property is here to stay, and it is dependent on human decisions. Electronics should give due attention to these facts even though, on a data processing flow diagram, the human decision appears as an unpredictable nuisance.

"I believe the significance of exchanging property is here to stay.

As the means of exchanging property are streamlined, so are the temptations and efforts of outsiders who will try to avail themselves of the fruits of labor of others by the lesser effort of forging documents or, in our case forging an electronic pulse worth so many millions of dollars. This will be the case regardless of the political or economic systems.

Conclusions

There has always existed a search for an immutable currency. At various times, it was thought to have been gold, greenbacks or checks, and many people believe the money of the future will consist of electronic pulses or bits. While traditionally 2 bits have been worth 25¢, in an electronic environment 2 bits can easily represent 2 billion dollars. It is this consideration that presents a threat to security and a temptation for fraud. If an electronic pulse wants to take its place in society, it's fleeting effect – we can't even talk of a fleeting image – has to be backed by extreme reliability, security and, above all – by the goodwill of the men who use it.

Will an electronic pulse replace our check system? My answer is it will do everything to execute a transaction, but it will not replace a check in the authorization of the transfer of property itself.

The right to transfer funds will probably remain reserved to a hard copy document showing reasonably clear evidence that the owner agreed to proceed with the transfer of his funds. Fraud will still be possible, but the paying of bills by pushing buttons could leave us literally with a checkless society, namely one without controls. □

INDUSTRIAL ROBOTS AND AUTOMATION

J. M. Sutherland, Product Mgr.
AMF Versatran
695 Hope St.
Stamford, Conn. 06907

"Automation" has, until recently, meant a machine or system designed to perform a specific combination of actions automatically and repeatedly. For example, a machine used in the automotive industry transforms rough metal castings and other components into finished auto engines. If, however, you want to produce an aircraft engine, such a single purpose automation machine must either be discarded or re-built at a staggering cost.

"Flexible" Automation

Industry now is using automation on the production line that is "flexible" or "multi-purpose", can be used for an infinite number of tasks, is a lot less complicated to apply and operate and, in addition, has economic and labor-saving benefits. This is the programmable, automatic transfer and positioning machine, or "industrial robot" (Figure 1). This robot can be rolled or fork-lifted to a work station, "taught" or programmed in a single, short session by the lead worker to do a particular task, then left unattended to do its work automatically, and exactly according to its program, hour after hour, day after day. Its program can be stored for later re-use. The robot can be re-programmed to perform an entirely different task, with the only other change possibly required being the modification of its "hand" or object-gripping tooling.

Several hundred such robots are now at work on industrial production lines. Independent sources project some 50,000 – or one for each 500 line workers – will be at work by the end of this century.

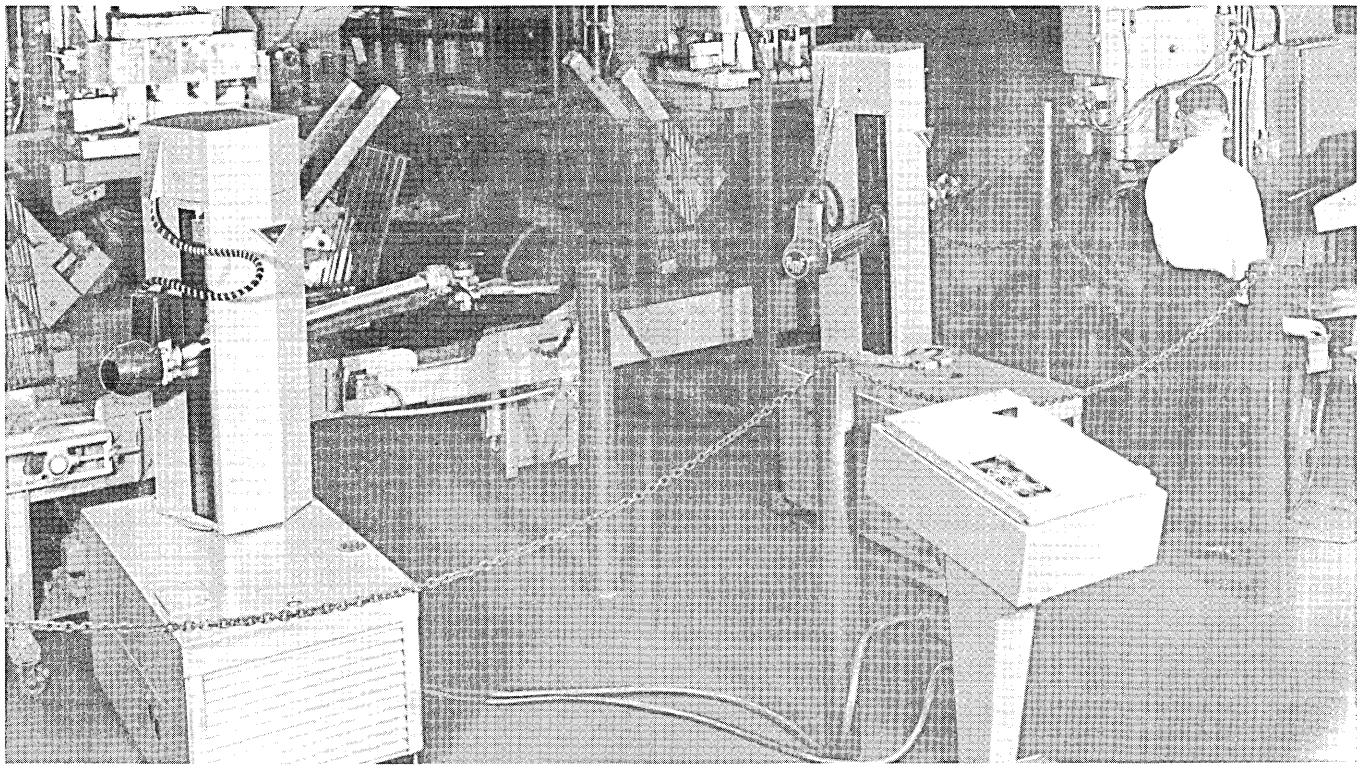


Figure 1

Two AMF Versatran industrial robots are shown in action at a major auto maker's stamping plant. The unit shown is point-to-point program controlled, with control brain contained in the pedestal in the foreground. Operation is continuous under fail-safe provisions. When finished with this job, the robots can be readily moved to a new work station and quickly re-programmed by the user.

"Robots are currently feeding, operating, and monitoring metal forging and stamping presses, arranging brick and other products for processing, painting auto engines on conveyor lines, as well as welding, machining, and inspecting."

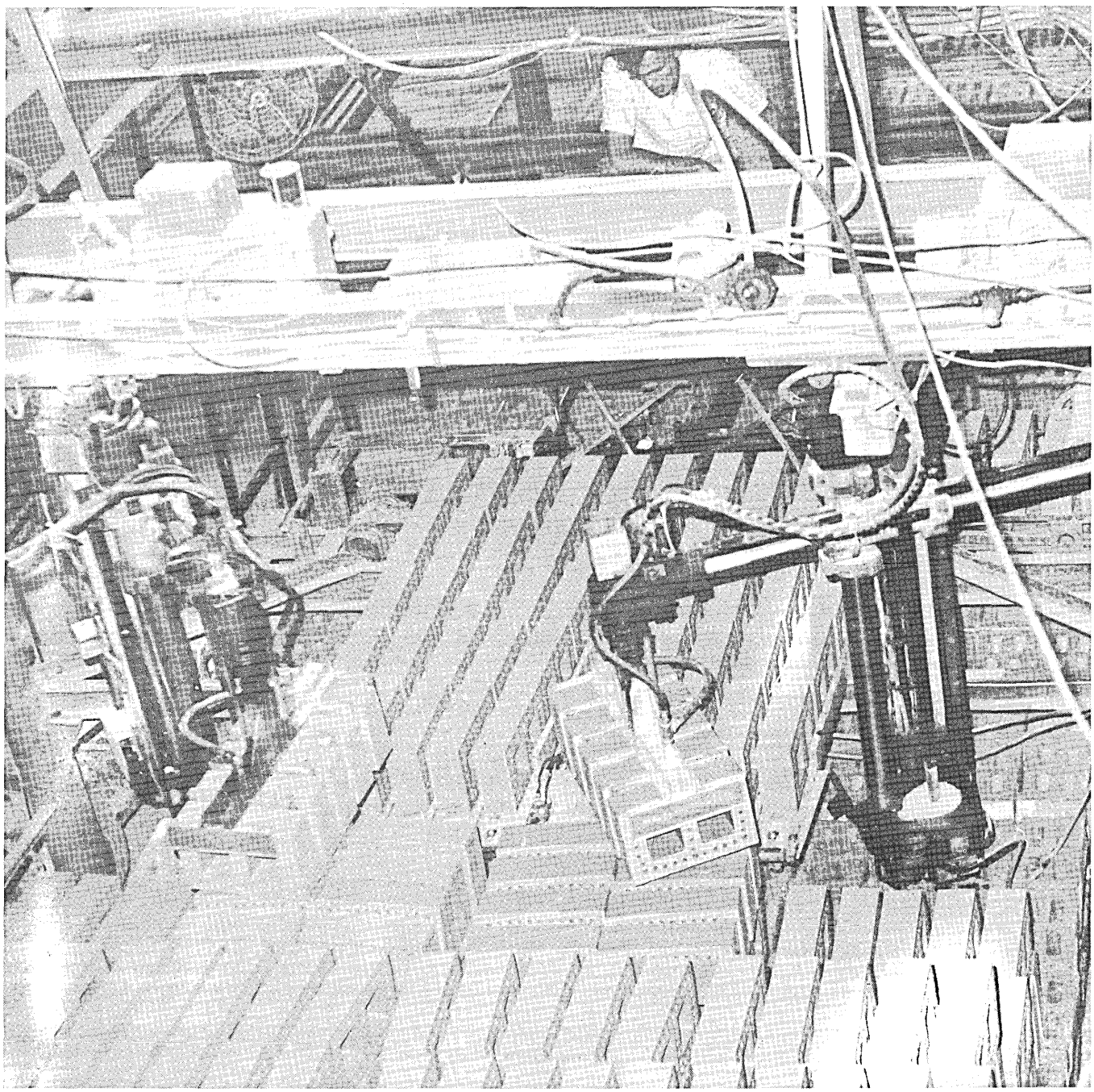


Figure 2

Two robots do the job of twelve workers while suspended from overhead beams. Over 10,000 bricks per hour are transferred from a conveyor and arranged in special patterns on kiln cars. The robot hands shown are handlng five "jumbo" bricks per pickup. Other hands can carry three rows of eight brick at one time. Changing to different size brick involves only the changing of the robots "hands", and dial adjustments on the robot program brain.

Robots are currently feeding, operating, and monitoring metal forging and stamping presses, arranging brick and other products for processing (Figure 2), painting auto engines on conveyor lines, as well as welding, machining, inspecting and doing other useful tasks. A single robot could be used to do all of these jobs in a single plant, merely by changing its program and its gripper tooling.

"Dumb" Machines

These "dumb" machines are considered ideal to perform the myriad, simple "put-or-take" tasks which are so abundant in production operations. They offer two very important benefits: (1) the human worker is released to a more satisfying (and more productive) job requiring reasoning and other human attributes; (2) the robot eases the cost and shortage of human labor which promise to become increasingly severe.

A machine which was purposely designed merely to do exactly and repeatedly what its program demands, the currently used robot was not designed to be a man-substitute; it is a machine that has limited physical abilities, and cannot see, feel, smell, reason, or improvise. Although on some jobs it has been provided with rudimentary external "sensorial" attachments, the bulk of its tasks do not require such faculties.

"The currently used robot was not designed to be a man-substitute; it is a machine that has limited physical abilities, and cannot see, feel, smell, reason, or improvise."

Independent groups have, however, gone to great lengths to investigate the future possibilities of such industrial robots as automated machine-men. Prof. Marvin Minsky at M.I.T. is working with robot arm articulations which provide a wider range of complex movements, approximating those of the human limb. Computer-oriented groups are coupling robot program control systems experimentally with digital computers to provide the robot with reasoning capabilities. Others have endowed robots with optical systems for seeing and recognition, and other sensory systems approximating the basic ones possessed by humans.

The current robot configuration, however, is felt to be more than adequate for the foreseeable future in coping with handling and transfer tasks. Most important, the user can, if necessary, upgrade his robot's abilities to an exotic level by modular addition to its program control, modification of "wrist" and "hand" tooling, and interfacing the robot system with many available types of external electronic and mechanical devices.

Automation Via Robots

Robotics has progressed to the point where off-the-shelf systems are employed in virtually all production line applications. The basic gripper for the end of the arm (such as that shown in Figure 3), is readily adaptable to a great number of holding and manipulating functions merely by addition of simple "finger" pieces. Special or optional configurations may call for longer-than-standard arm, or taller column, or mounting of the mechanical handling unit in positions other than standing on the floor.

Systems consist of hydraulic, electrical, and mechanical components which have previously been thoroughly debugged in automatic lathes and other industrial production machines. Usually system simplicity and modularization permit maintenance and repair by plant personnel familiar with other automatic production machines.

The AMF "Versatran" System

One robot system currently in use is the AMF "Versatran"* system. In the remainder of this article, we will take a look at this one system and how it works.

The AMF "Versatran" system consists of: (1) the man-size, mechanical handling unit, (2) its separable hydraulic power pack, and (3) either the "point-to-point" (PTP), or "continuous-path" (CP) automatic program control console. The mechanical unit is normally located at the work station, with the power pack and control console remote. In some applications the handling unit is hung upside-down, in others horizontally, and in still others it is mounted directly on a production machine to optimize work flow and maximize use of valuable floor space. The unit has also been arranged to move itself along rails among work stations.

The standard Versatran mechanical unit operates its arm within a work envelop 30″ X 30″ vertically and horizontally, and through a sweep of 240°, the latter providing a side-to-side reach of 88″ to 108″, depending on gripper tooling. Optional, longer arms provide a 30″ X 42″ X 240° work envelop, with a reach of 112″ to 132″. The standard arm satisfies the bulk of all applications, with one robot in some cases able to work with more than one production line machine.

Load Limits

Initially, maximum recommended load to be handled by robots was 25 lbs., with transfer speeds of 36″/sec horizontally and vertically, and 90°/sec through sweep. It didn't

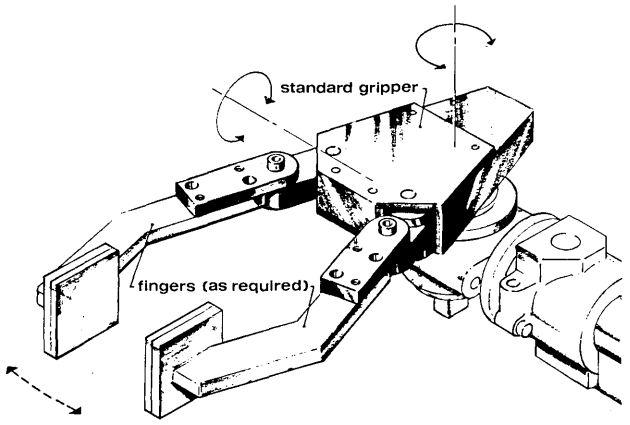


Figure 3

The standard gripper for the end of the robot arm can handle a great number of work requirements. Tabs at the end of the gripper can accommodate either a wide variety of "fingers" which can be attached to handle a particular object, or universal fingers which are capable of handling different objects.

*"Versatran" is a registered trademark of American Machine & Foundry Company.

take long for users, bent on maximum productivity and profit, to determine that up to 75 lbs. could be handled at maximum transfer speeds without any design change. In fact, one brick manufacturer has each of his "Versatran" robots handling in excess of 200 lbs. pickup at virtually maximum design speeds, with the claim that "operation is at 75% of capacity". This particular two-shifts-per-day operation records each robot handling over 5,400 bricks/hr., or over 120 tons per shift. In addition to being able to maintain a steady high rate indefinitely, each such robot has been able to handle better than double the number and weight of brick per shift than its equivalent in the former 6-man team employed.

Industrial robots are handling heavier loads, for longer periods of time, at greater speeds, and with more accuracy and less reject than human workers. For example, robots have doubled the rate of hot forging an auto transmission gear (from 300 to 600 parts per hour); handling of auto headlamp lens (from 450 to 900 per hour); getting more dishes on a firing belt – and they have quadrupled the rate of processing parts coated under conditions unbearable for humans.

Robots, being machines, are capable of not only working enthusiastically at highly repetitive and extremely boring tasks, hour after hour, but they are capable of working where the environment is too cold, too hot, too dusty, too dirty, or too hazardous for human beings.

In a time of ever-rising labor costs, the robot offers a refreshing opportunity to his owner-master to obtain three shifts per day of work from single units for a total cost of under $1 per hour.

Automatic Control Programs

The mechanical handling unit of the robot system can be controlled by either a PTP "point-to-point" or CP "continuous-path" program. The PTP is by far the most widely used – the majority of production tasks are extremely simple "put-or-take" types, in which the actual path taken from one point to the next is unimportant, such as transferring an object from a conveyor line to a stamping press. The robot is not intended to duplicate the motions of the human worker, but to transfer, under PTP, in the shortest, fastest path. The continuous-path control is used where the transfer path or task movement configuration is critical, such as in contouring of an object on a moving conveyor line (painting), or maintaining a specific distance and angularity between a tool in the robot's grasp and a contoured object being processed (welding).

Point-To-Point Control

Second and third generation point-to-point program control systems now in initial field application provide a standard accommodation of spatial motion points, which are found adequate to most industrial tasks. Modular concept, however, permits the robot user to enlarge his programming complexity and point capability merely by addition of extra modular electronic units to his program console. These systems also permit automatic selection of sub-programs or sub-routines from stored banks, special task sequences, and other capabilities which could allow a point-to-point system to approach the continuous-path system in infinite-point capability.

The standard PTP control used with "Versatran" robots accommodates up to 90 spatial points (216 theoretical) and provides for 12 additional actions at each of the 90 points. Each of the points are represented by tabs on a rotating memory drum, with the tabs sequentially calling up specific potentiometers connected for arm action in horizontal, vertical, or swing axes. Other tabs call in positional commands for wrist and gripper actions at specific program times. Positional feedback, error detection and position correction take place automatically, permitting positional accuracy within 1/8" consistently in the closed-loop servo system.

"One brick manufacturer has each robot handling over 5,400 bricks per hour, or over 120 tons per shift."

In preparing a PTP program for a specific task under this system, the operator first lays out the motion requirements of the job graphically on plot sheets. These sheets indicate the numbered tab slots on the memory drum, switch positions, and potentiometers for all axes of motion. The plotted and timed tab positions are transferred to the actual program system. The drum advances to allow potentiometer adjustments to be made for exact arm positions, where necessary. After the necessary program positions are established and "tuned up" electrically, a press of the "automatic run" button initiates automatic operation of the robot on that particular job.

Continuous-Path Control

The "continuous-path" program is established on dual magnetic tapes, each of which has a running time of 6½ minutes. While one tape is controlling the robot, the other is rewinding to be prepared to repeat the program without interruption. A single program of 13 minutes can be recorded, if the task permits "time dwell" between end and beginning of program to allow the tape to be re-wound. Advanced versions of the CP system will provide each tape with approximately 15 minutes of programming.

The CP program is established by leading the robot's arm manually (and with hydraulic power assist) through the actual movement paths of the job. During this time, a detachable programming aid enables the recording of the exact position points, gripper and other actions to be recorded on the tapes. After the program has been established and used, it can be stored for re-use.

Advances in the CP control system allow a program to be stopped at any point so that corrections can be made on a specific segment of the program, without affecting the rest of the program. The newer system also permits subroutining.

Summary

The low "wages" for industrial robots, combined with their ability to do the repetitive, dirty, and uncomfortable jobs disliked by humans – as well as the jobs where no human could work because of adverse conditions – will make them increasingly common in industry. Continuing refinement of their capabilities will expand the number of tasks they can perform. □

DATA BANK FOR NARCOTIC ADDICTS

Elmer D. Young
5732 Wonder Drive
Fort Worth, Tex. 76133

"Only when data is compiled in a meaningful way can computers seriously affect social problems and contribute to their solution."

With the growing concern over social problems today, there is a need for better information leading to the development of national data banks. Computers, the heart of today's rapidly evolving data systems, are now being used to compile information on numerous social problems existing in our society.

It is clear, however, that before significant inroads can be made, adequate information relative to the problem under study must be available. But, information without planning, structure, and analysis is inadequate, and by itself serves no useful purpose. It is only when data is compiled in a meaningful way that computers can seriously affect social problems and contribute to their solution.

Narcotic Crisis

The narcotic or drug crisis has recently become one of the nation's most serious problems. More and more young people, in particular, are becoming narcotic users and pushers. This phenomenon, which has in the past been associated primarily with the ghettos and criminal elements, has now reached major proportions among the middle and upper classes of our society. Thus, it cannot be looked upon as a problem of "others", and regarded as having little or no effect on the proverbial "average middle class family". Drug abuses are no longer limited to one class of society, to one segment of the country, or to one particular income group in our society.

In a recent White House Report, President Nixon stated: "The number of people in the United States who use marijuana is eight million. The number of people who use heroin is 180,000. But now, putting it in another dimension, the number of people of college age who use marijuana, or have used it, is one-third of all the college students of this nation. The number of students of high school age who have used marijuana is 16 percent."[1] Although President Nixon stated that he was using statistics that were deliberately cautious, his statement does point up the magnitude of the problem. The impact can be even greater when one considers that a significant number of marijuana users become narcotic addicts. In a substantial number of cases, when persons start on marijuana, the inevitable path leads to seeking higher thrills and emotional experiences through use of harder drugs. Once the drug user is addicted, the path back to a normal existence becomes exceedingly difficult, usually requiring many months or even years of treatment. For some, returning to a normal life is beyond all hope.

In attacking problems within our society having these proportions, it is imperative that adequate information concerning addiction be provided so that effective methods for treatment can be developed and administered. A form of national response to this social problem is that of providing funds needed for the development and evaluation of narcotic treatment centers. In addition, flexibility within our laws must be provided in order to reach addicts and help give them a chance to rebuild their life without fear of conviction. The Narcotic Addict Rehabilitation Act of 1966 gives certain addicts a choice of treatment instead of imprisonment, and, if they are not charged with a crime, the right to receive treatment instead of neglect. The law also provides, for the first time, that a complete range of rehabilitation services will be made available to addicts in their own communities.[2]

Narcotic Addict Reporting Program

Under the Narcotic Addict Rehabilitation Act and the Community Mental Health Act of 1968, the National Institute of Mental Health awarded Texas Christian University a contract to develop and maintain a Narcotic Addict

Elmer D. Young spent the past year on an educational leave of absence from General Dynamics Corporation. He received his Master of Business Administration degree from Texas Christian University this May. He also holds a bachelor's and master's degree in electrical engineering.

Reporting Program. The reporting program is managed at Texas Christian University by the Institute of Behavioral Research (IBR) under the direction of Dr. Saul B. Sells. The contract was awarded in December, 1968, and collection of data for computer programming was first received in June, 1969. During the interim period, program requirements, formats, forms and computer programs were developed, evaluated and approved.

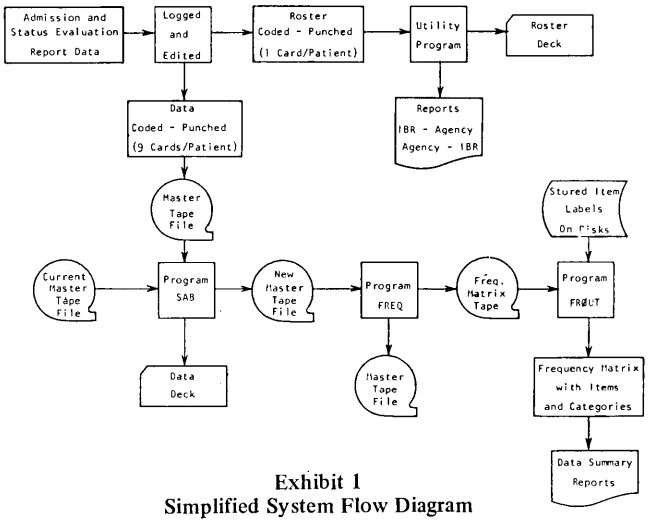


Exhibit 1
Simplified System Flow Diagram

The Narcotic Addict Reporting Program is the only national data bank established to maintain information on treatment of individual narcotic addicts. Detailed information is furnished to the IBR by sixteen experimental treatment centers located across the United States from Albuquerque, New Mexico, to Boston, Massachusetts.

The goal of IBR is to help in evaluating the effectiveness of the treatment methods being used at the participating

"The goal of the Institute of Behavioral Research is to help in evaluating the effectiveness of the treatment methods being used for drug addicts."

agencies. After sufficient information is collected, the data bank will allow an analysis, which may show that certain methods of treatment are most effective for addicts of a given age, socio-economic background, environment or other classification.

The participating agencies are provided two basic data collection forms for use in this reporting program. The primary form is the Admission Record. This form is filled in when the patient is admitted for treatment and contains a detailed background description of the individual. The other form is the Status Evaluation Record, which is completed at each two-month interval following initial admission for treatment. From these forms, computer programs are used to create and maintain a cumulative data bank of all addicts admitted to the participating narcotic treatment centers. Presently, there is information in the data bank on over 2,000 addicts.

General Description of System

Completed forms received from cooperating narcotic treatment centers are entered into a log-book by the following: data received, number of admission forms and report period, and number of status evaluation forms and report period. Each new admission is assigned an IBR patient number, which is associated with that patient for all subsequent forms. These numbers are consecutive for the convenience of the data system. Each agency (narcotic treatment center) is assigned consecutive IBR patient numbers starting with 00001 for use in card punching and processing. The forms received are edited for omissions, inconsistencies, legibility, etc. to facilitate accurate coding. After editing and verification, a letter is sent to the agency acknowledging receipt of the forms and, if necessary, requesting any further clarifications. A simplified system flow diagram of the overall computer program is shown in Exhibit I.

A roster deck is punched for each patient containing the following information: agency number, agency patient number, IBR patient number, report period for admission, and punches for each status evaluation report received. This roster provides a running list of corresponding patient numbers and provides a ready reference to enable the staff to:

(1) know where to start new admission numbers,
(2) identify the IBR patient number for status evaluations, and
(3) correspond with an agency concerning any specific patient, using the agency's patient number.

Data received on each patient is coded and punched on a deck of nine cards for each patient. These data, containing complete information on the patient regarding background and treatment status, are obtained from the Admission Record and Status Evaluation Record as applicable. Information from these card decks is fed into a Master Tape File, where a computer program (SAB) reads the data deck, sequences the information, and stores it on disks. The program then reads the sequenced data records from the Current Master File and the new data, and merges it in a consolidated sequence, creating a New Master Tape File containing all of the old and new data.

All of the data received from a participating treatment center for a given period are stored on the Master Tape. Through application of a second computer program (FREQ), the data can be processed to produce frequency distributions of either new admissions, cumulative admissions, or status evaluations for that period. The items of all appropriate records are tabulated in a frequency matrix, and the matrix stored temporarily on a second tape. A third computer program (FRØUT) allows the entry of additional control variables to produce frequency distributions of totals or subcategories of any item. Report items may be summarized according to many categories. For example, patients institutionalized in orphanages and those not thus institutionalized are summarized according to principal parent relationship.

The data system is sufficiently flexible to allow analysis of relationships between variables, such as length of drug

"The data system is sufficiently flexible to allow analysis of relationships between variables, such as length of drug use compared to the type of referral, or compared to the extent of outpatient employment."

use compared to the type of referral or to the extent of outpatient employment. Another example might be the stated reason for starting to use drugs with the type of drug first used.[3]

Data Bank Information

The flexibility of the computer programs used in the Narcotic Addict Reporting Program allows data to be analyzed at any specific point or over any specified period of time. In this manner, the treatment of addicts can be evaluated from various aspects. For instance, it may be desirable to determine the level of progress of all patients after having been in the program four months, or eight months, or any other selected period of time. With this versatility, various treatment modalities can be analyzed and evaluated. The large amounts of data allow relationships and patterns to be analyzed and the best methods of treatment derived for persons having similar conditions and backgrounds.

Data accumulated from the sixteen centers provides an independent and objective look at treatment methods used in various localities of the country. It is of major interest to these participating agencies to provide the most effective treatment possible. During the two-month reporting period, information on the addicts' habits and treatment during the report period are obtained and recorded in a status evaluation form. Specific information sought includes:

Place of residence and with whom did he live?
How many times did the patient move?
How many days was the patient employed, what was the nature of employment, and the rate of pay?
Patient's major source of support?
Patient's use of alcohol, quantity and type?
Patient's drug abuses, frequency of abuse, type of drug used, and resulting behavior?
Negative and positive influences on patient's progress?
Frequency of treatment modalities?
Medical treatment or diagnosis performed by a physician?[4]

Treatment Modalities

A most significant category of information to be obtained and evaluated is the particular treatment modalities the patient receives during various phases of treatment. Some centers offer forms of treatment that are not available at other agencies, and vice versa. The data bank allows all of this information regarding individuals of similar backgrounds, but receiving different methods of treatment, to be compiled and analyzed on a large scale. For instance, every two months the agencies submit data on the treatment status of each individual addict, such as the frequency of withdrawal without drugs, with methadone, or with other drugs; frequency of methadone maintenance or other chemotherapy without drugs; frequency of individual psychotherapy or behavior therapy; and frequency of group activities such as therapeutic community, encounter, challenge, group leadership or work assignments.

Other treatment modalities may include areas such as vocational counseling and other activities, skill training, sheltered workshops, educational counseling, lecture films, social and recreational activities, family therapy, and evaluation.[5]

Bimonthly Data Summaries of each center are compiled according to new admissions and patient status evaluations. These reports and cross-center totals are disseminated to respective agencies and to the National Institute of Mental Health Division of Narcotic Addiction and Drug Abuse.

Conclusions

In our nation today, meaningful information is in increasing demand for use in business, research, education, medicine and practically any field one names. More data is not necessarily the answer to these demands. It is through well planned and structured programs that extensive data can be collected and processed to provide meaningful information. The computerized system allows us to accumulate, manipulate and analyze massive quantitites of data with relative ease.

"More data is not necessarily the answer to the demands for meaningful information."

It is of significant importance to our society that modern computer technology can be used to help understand and possibly alleviate some of the existing social problems. The Narcotic Addict Reporting Program is relatively new, but hopefully it can assist in providing the participating agencies meaningful information for use in evaluating treatment modalities best suited for the individual narcotic addict.

The magnitude of the drug crisis demands that extraordinary measures be taken at all levels of society. Through federally funded programs of this type the nation can respond to the narcotic addiction problem. It is recommended that the technique used and the results obtained be constantly analyzed, evaluated and improved so that maximum effectiveness can result. The need is clear and the opportunities are limitless. □

References

1. Governor's Conference, Washington, D.C., December 3, 1969. *Weekly Compilation of Presidential Documents,* Monday, December 8, 1969, V, No. 49, pp. 1693-1694.
2. U.S. Department of Health, Education and Welfare, National Institute of Mental Health, *Narcotics – Some Questions and Answers,* Public Health Service Publication No. 1827 (U.S. Government Printing Office, 1969).
3. Anne Curby, *System Documentation and Computer Programs for Narcotic Addict Reporting Program* (Fort Worth, Texas: Institute of Behavioral Research, Texas Christian University, November 5, 1969), pp. 4-8.
4. *Ibid.,* pp. 32-43.
5. *Ibid.,* pp. 44-46.

Bibliography

Endore, Guy. *Synanon.* Garden City, N.Y.: Doubleday and Company, Inc., 1968.

Gavin, James M. "The Social Impact of Information Systems." *COMPUTERS and AUTOMATION,* XVIII, No. 8 (July, 1969).

Sprague, Richard E. *Information Utilities.* Englewood, N.J.: Prentice Hall, Inc., 1969.

Yablonsky, Lewis, *The Tunnel Back: Synanon.* New York: The Macmillan Company, 1967.

C.a

REPORT FROM GREAT BRITAIN

Potential for a "European" Computer Company

A spate of rumor around possible closer connections between Britain's white hope ICL, the French CII organization (offspring of De Gaulle's Plan Calcul), and America's Control Data Corporation seems to have subsided for the time being.

It may have been sparked by the realisation that sooner or later even this apparently passive Tory Government will have to take action on electoral pledges, including the one which said it would repeal the Act giving power to Government ministers to intervene in and take substantial shareholdings in private companies.

Such State intervention is, of course, anathema to true-blue Conservatives, except those at the top of ICL. They cannot be happy at the thought that at some time in the not too distant future the company will have to repay the money invested in it by the former Government which took a 10.5% holding in ICL when that company was formed from ICT and the computing section of the English Electric Company.

The truth of the matter is that ICL is picking up the pieces of what would have been a considerable European structure had the Labour Government not been booted out so unexpectedly by an electorate weary of constant price rises in a climate of constant wage squeeze or freeze.

If Harold Wilson were still at Number 10 Downing Street, we should have been well on the way towards the formation of an Anglo-French holding company comprising the 30,000 strong ICL, CII's 5,000 and the 14,000 or so staff of Bull-General Electric which the French Government would have "allowed" the two European companies to take over.

Together, they would have formed a force able to stand up to IBM in most if not all countries of Europe. But the swing against Labour killed that plan. To replace it, ICL has suggested to CII and to the giant Philips organisation some form of collaboration on the company's Project 52, a very large computer with a commercial orientation. It is on this machine, and on the new generation of computers leading up to it, that discussions are in progress at the moment.

Control Data

Where CDC comes in, relative to these arrangements, is not yet clearly defined. But it is certain that contacts between ICL and CDC have been growing closer ever since ICL was formed. Indeed, Arthur Humphreys, the ICL managing director, told me on the day of the merger that it was his policy to seek close collaboration with CDC because "anyone who is fighting IBM is our friend". This policy of close working with CDC has found immediate expression in the amount of peripherals of CDC origin or design that ICL computers are using. And there is a two-way flow of information and manufacturing aid with four working parties in virtually permanent session to determine the course of future designs so that dovetailing can take place between products from both companies without friction.

Agreement has been reached on a common interface, and ICL is contemplating without a qualm the promotion of both the CDC 6600 and 7600 for use in UK universities, since the ICL armoury has nothing of this size to offer. On its side it will seek to concentrate on machines big enough to counter the new threat from IBM's 370 machines.

CII and CDC have a design aid arrangement which goes some distance, but nothing that goes as far as that with ICL.

The basic philosophy being adopted between the three seems to be that there is no point in reinventing the wheel, and that properly assigned research and development work can save a large amount of scarce research and development money.

The Aigrain Committee

Whatever the outcome on European companies' interest in the ICL ideas, it is likely to be known much earlier than the fate of the giant computer proposed by the Aigrain Committee for construction by some future consortium of European companies. This machine would have a central processor costing at least $5m and – in an extremely optimistic forecast commissioned by Aigrain – it is suggested that there would be a market by 1975 of a total of 60 in European industries and possibly as many as 80 overall. For 1980 these figures become 140 and 160/170 respectively.

ICL makes no bones about the fact it considers this machine to be too big for Europe to handle. It would be about the size of CDC's Star which can perform 100m operations a second.

ICL would like to borrow Star technology and scale it down somewhat for its own purposes, simply because no one outside IBM has anything like enough money to develop hardware, much less software, to meet every application.

Ted Schoeters

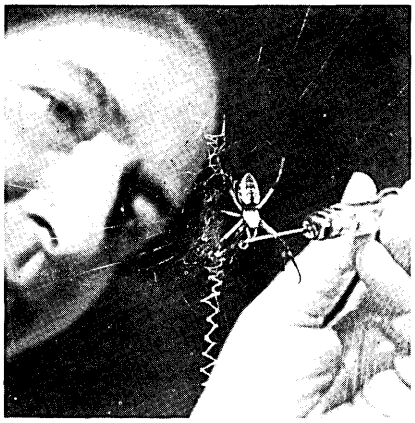
Ted Schoeters
Stanmore, Middlesex
England

ACROSS THE EDITOR'S DESK

APPLICATIONS

SPIDERS WEAVE NEW WEB OF KNOWLEDGE ABOUT THE BEHAVIOR OF MAN

Are behavior patterns innate or learned? Can they be changed by enriching man's environment? Dr. Peter N. Witt, Director of Research for North Carolina's Department of Mental Health, seeks answers to those and other questions by feeding drugs to spiders and comparing the erratic webs they weave with a master web stored in a System/360 Model 40 computer.



Ara — her full name Araneus diadematus — is a female orb spider. Her routine seldom varies. She gets up early each morning, sips LSD from the needlepoint of a syringe and spins. Ara takes only 20 minutes to build her web in a 20-inch-square glass and aluminum flat that is her unnatural home. One hundred fifty spiders are used in the daily tests. Fifty are a control group and receive no drug; fifty take one drug; the remaining fifty take another.

The master web, stored in the IBM computer, is the composite of many normal webs. Twenty-seven measurements are made from the drug-induced webs including size, shape, regularity, distance to the center, and distance between spirals. The computer compares webs with the master and records the numerical difference. Webs spun by normal spiders are near invisible works of geometric art; webs from drugged spiders vary from normal to bizarre patchworks of holes, awkward angles and incomplete spirals. Dr. Witt says the computer helped uncover slight differences in web patterns that may have gone unnoticed.

He experiments with many classes of drugs including amphetamines, tranquilizers, barbiturates and halluciogens. As a result, he is finding subtle differences in the way drugs affect man's brain and his body. Dr. Witt, a medical doctor and a pharmacologist, tested drugs on people but found they gave too many subjective responses to isolate a pure drug reaction. The female orb spider was picked because no other animal gives such a meaningful pattern of behavior (males are poor weavers and never used).

COMPUTERS AND CREDIT: A NEW TWIST FOR AN OLD PROBLEM

Parisian, Inc. in Birmingham, Alabama, recently installed a computerized credit authorization system (made by Credit Systems, Inc., Colmar, Pa.). The system, known as Credit-Chek, ties 48 individual selling departments to Parisian's central customer account file in the chain's main store. When a clerk enters the customer's account number on a counter-top terminal, the central processor searches the customer's file and instantly approves or disapproves credit — a green light signal is returned if credit is okay; a red light indicates special instructions from the customer; blue, an invalid account number; and orange indicates "questionable" credit. Reasons for credit denial are given on an authorizer unit, located in the credit department.

Parisian president Emile Hess explained that under the old system, customers with overdue balances could continue to make under-the-floor-limit purchases, adding to their debt, without the store being aware of it. With the CSI Credit-Chek system, every charge purchase is authorized — regardless of the amount. A typical credit transaction, assuming credit is okay, can be completed in 15 seconds; if a problem exists, a "go" or "no-go" decision can be made within one minute.

In terms of debt collection, Mr. Hess reports, the major benefit is being able to put the customer on the phone with the credit department right at the point of purchase. "The items a customer wants are right there at the counter and they seem more receptive to making agreeable arrangements for payment of past due balances," Mr. Hess said. "If we had to send this same customer to the credit department, he'd probably make a really quick detour — right out of the store, leaving his purchases and debt behind.

Mr. Hess also cited another advantage of their system — its effectiveness in preventing use of stolen credit cards. One thief already has been foiled — and within minutes after the card was reported lost or stolen.

COMMUNITY GASOLINE STATIONS COMBINE WITH COMPUTERS

Community consciousness and computers are combined in a new concept for a franchise group of coin-operated gasoline stations which can be operated by one host or hostess. The gas station franchise group, PAN-NOVA, Inc., Santa Fe Springs, Calif., has completed a prototype station in Costa Mesa (Calif.) under the guidance of Peter Rothschild, vice president of the firm.

Computerization plays a major role in the self-service station. Customers connect the computerized gas dispenser to the tank of their car, turn a small lever and then deposit tokens (purchased from the host) in a slot on the pump. The computerized pump starts automatically and continues until the sale is completed — at which time the computer delivers the correct change to the customer. The computer mechanism to deliver exact change to the customer, named "Econo Mat", is the result of a two year research and development by the firm.

PAN-NOVA anticipates that within a year more than 100 similar stations will be erected. Since most of these stations will be built within residential areas (rather than on busy thoroughfares), the Rothschild design eliminated bright colors. Decorative lava rock and stone was used in the construction of pillars holding the roof above the 12 pumps at Costa Mesa station. The roof is constructed

of "homey" looking, fire-protected red cedar shakes. No garish signs spoil the unobtrusive architectural design. Only on the computerized pumps does the firm name and octane rating appear. While many companies feel bright colors are needed in station decor, as a means of drawing attention, the Rothschild idea of unobtrusiveness seems just as ef-

fective — the Costa Mesa station sold over 200,000 gallons of gasoline in its first month of operation.

COMPUTERS IN CRYSTALLOGRAPHY RESEARCH

A woman scientist at Southern Illinois University at Carbondale is using the University's recently installed computer systems (an IBM 360/50 and IBM 1130) to implement her crystallographic studies of the internal structure and the thermobehavior of solids such as iron, coal or plastic. Prof. Marisa Canut-Amoros, Spanish-born crystallographer, uses the computers to produce the astronomical calculations involved in the formulas showing how the atoms and molecules within a crystal of naphthalene or benzene jump around even "at rest" and how they scatter in various temperatures. She then feeds these formulas to the CalComp digital incremental plotter to produce the intricate contour maps that pictorialize this behavior.

Basic information on the crystal structure is obtained by means of General Electric's X-Ray Automatic Diffractometer (one of few in the country) coupled with a Digital Equipment Corporation PDP/8 computer, which yields the preliminary computations on the x-ray intensity of the crystals. The problem then goes into the IBM 1130, which serves as a remote terminal for the IBM 360/50. The data is teleprocessed to the 360/50 and the calculations are returned automatically to the 1130.

ARCHITECTURAL FIRM USING COMPUTER IN DESIGN WORK

The architectural firm of Perry, Dean and Stewart (Boston, Mass.) recently installed a Digital Equipment Corporation PDP-15 computer system in an effort to speed up and improve the design process and increase the output of its key staff members. The firm specializes in the design of large institutional structures, such as schools, hospitals, and public buildings. The computer is used in the design process in a number of areas.

For instance, in the design of a large hospital, the computer stores basic room designs. Using the system's two cathode ray tube (CRT) displays, the architect may order any of the designs drawn for him in a matter of seconds. He may then choose the room layouts that best suit the needs of his clients. Once a design has been selected, he will use the computer to calculate the areas of all layouts on a floor. Using cost information stored in the computer, he can almost instantly calculate the price of construction on that floor.

After the area and cost analysis has been completed, the computer aids in the overall design. At each stage, information stored in the computer speeds up the process. The computer also can be used to automatically produce lists of specifications for the contractors who will build the actual building.

EDUCATION NEWS

DIVISION OF COMPUTING AND INFORMATION SCIENCE EXPANDED AT UNIVERSITY OF NEW MEXICO

The University of New Mexico has expanded its Division of Computing and Information Science with the addition of two full-time faculty members and several new courses. The division offers a wide variety of computing courses dealing primarily with the "non-hardware" aspects of computer usage. Dr. Chester C. Travelstead, vice president for Academic Affairs for the university, said the expansion represents a step toward the formation of an autonomous division when approval of graduate and undergraduate programs by the university faculty and the Board of Educational Finance can be obtained. While the University does not offer degrees in computing and information science at present, students can study toward degrees in Business Administration, Mathematics, and Electrical Engineering with concentrations in the field. Also, individual departments can authorize distributed minors in computing and information science.

COMPUTER AND TELEVISION MICROWAVE NETWORK SHARED BY TEXAS INSTITUTIONS

College students and instructors in Texas are attending distant classes and solving problems on a remote computer without leaving their own campuses. This is made possible by a new microwave network that spans 4,000 square miles and serves several Texas colleges and universities. The network, operated by TAGER (The Association for Graduate Education and Research) enables these institutions to pool their instructional capabilities and scientific resources through closed circuit television and a central IBM computing facility linked to several remote campuses by microwave. The computing center is located at the University of Texas at Dallas and includes an IBM System/360 Model 50.

Closed circuit television and high-speed computer data transmission between campuses can be operated simultaneously on a single microwave band. Dialogue exchange is preserved through two-way voice communication built into the network. A student at a distant campus or plant taking a televised course can see the instructor and visual aids and also can pose questions during the lecture. All students can hear the questions and responses. Time-sharing on the 360/50 permits several persons at the campuses served by the computer to solve problems simultaneously. Also, management gaming is offered by the IBM system through the TAGER network. Students at the participating campuses may compete — on a campus-versus-campus basis — in developing solutions to simulated business problems.

The UT at Dallas computing center is being used by Texas Christian University in Fort Worth and Austin College in Sherman. Texas Christian has its own IBM system but can communicate with the larger computer in Dallas for increased problem-solving capacity. Other institutions in the network are able to add typewriter-like terminals as needed and connect with the central IBM system by microwave. Participants include Southern Methodist Univers-

ity (whose own computer facilities are accessible through the system); Bishop College in Dallas; the University of Dallas; University of Texas Southwestern Medical School at Dallas; and Texas Wesleyan College in Fort Worth. Circuits are also available at the University of Texas at Arlington for future expansion of both the teaching and computer capabilities. "This network once was just a grand idea, as it still is throughout most of the country," said Don Simons, TAGER's academic coordinator. "But we abandoned our individual campus ties and jointly turned the idea into a valuable and functioning system."

ORGANIZATION NEWS

NEW EDUCATIONAL LEASING POLICY ANNOUNCED BY DEC

Digital Equipment Corporation (DEC), of Maynard, Mass., has announced a new leasing policy that puts the computer within reach of all colleges and secondary schools. Under this new policy, the educational institution is offered a 4,096-word, general-purpose PDP-8/L or PDP-8/I small computer, teletypewriter (for getting data into and out of the computer), and a variety of program packages — for as low as $400 per month, including maintenance. It also permits a large portion of the rental charge to be applied to the purchase of the leased computer. The minimum rental period is twelve months. A variety of configurations are included in the leasing package. All configurations offered can use either the popular algebraic language, BASIC, or FOCAL®, an easily learned conversational language developed by DEC.

COMPUTER TRADE CENTER TO BE OPENED BY STANDARD PRUDENTIAL

A permanent trade center specializing in the auctioning of computer equipment has been announced by Standard Prudential Corp., a diversified financial services company. Chairman Theodore H. Silbert said the new computer clearing house will operate as an orderly market for used computers, especially in the used peripheral equipment area.

The center will occupy the 10-floor building at 226 West 26th St. owned by the New York Auction Company, a division of Standard Prudential which was formerly the largest auctioneer of ranch raised furs in the country. The heavy-duty floors will comprise year-round exhibition halls for used computer and peripheral equipment, including major systems from Control Data, Honeywell, IBM, RCA, and Sperry-Rand. Equipment on location elsewhere will also be offered for auction or sale.

SOFT-PAC TO LICENSE AND MARKET PROPRIETARY SOFTWARE SYSTEMS

A new service is being offered to the data processing community — a national outlet for the marketing of proprietary programs. Firms or individuals who have developed quality production-proven programs may license with SOFT-PAC Corporation for the marketing of their systems. A software abstract guide has been developed to assist the firm (or individual) in preparing their systems for the market place. SOFT-PAC reviews each system to insure a quality software product for the potential purchasers. It costs the firm (or individual) nothing to license his program — the expertise to market the programs is provided by SOFT-PAC. A royalty is paid to the licensee each time their system is sold. SOFT-PAC is located at 205. W. Oak - Suite 400, Fort Collins, Colo.

MISCELLANY

AUTHENTICITY OF RAPHAEL PAINTING ESTABLISHED BY X-RAY RADIOGRAPHS

In July, 1970, the National Gallery, London, England, announced that a Raphael painting of Pope Julius they possessed was actually

the original and not a copy as they had thought. Therefore, the so-called "original" held by the Uffizi Gallery, Florence, Italy, was the copy. The key which unlocked the secret of the true value of the painting was provided by a few detailed x-ray radiographs.

In 1969 when the National Gallery learned there was some doubt concerning the painting in Florence, authorities decided to obtain a radiographic mosaic of the Raphael painting using Kodak Industrex D industrial x-ray film. Once before, following World War II, the Raphael painting had been x-rayed. Techniques, however, were not adequate to x-ray the whole painting. The particular area chosen for scrutiny was the head of Pope Julius, which, however, proved to be wrong.

X-ray techniques have now progressed to the point where the whole painting can be radiographed. From the resulting radiographic mosaic: the work can be dated; constituents of paints used can be identified since different elements within the pigments absorb different amounts of radiation; and original ideas of an artist and the details of subsequent changes are revealed. The latter is known as "pertimenti" and was the determining factor in solving the riddle of the Raphael painting.

The radiograph showed that papal emblems of golden crossed keys had originally been in different background positions. In addition, a number of them had been painted out completely. With this new evidence, a re-study of documentary evidence relating to the original painting was begun. Meanwhile, the Uffizi Gallery had their version radiographed — and found no "pertimenti". The National Gallery's Raphael was established as authentic — and the age-old painting, whose value rose overnight from four to seven figures, has been allocated a special room — one worthy of a true work of art.

PATENT ON AUTOMATIC DIAGRAM SYSTEM RECEIVED BY AUTO-GRAPHICS, INC.

Patent #3517591 was issued on June 30, 1970, to Auto-Graphics, Inc. on a computer system for automated electrical and electronic schematics and block diagrams. The system can eliminate the entire manual drafting process, according to Robert S. Cope, company president. He says that the system provides a higher quality diagram, with more standardized symbols, than is possible through manual drafting. The system is particularly suited for quantity production requirements. Information on the process may be obtained by writing Mr. Cope at Auto-Graphics, Inc., 751 Monterey Pass Rd., Monterey Park, Calif.

NEW PRODUCTS AND SERVICES

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
Digital		
Dietzgen Printing Desk Top Computer	For many of commonly encountered engineering and scientific problems / programming capacity for 128 steps / dynamic range of 10^{99} to 10^{-99} / 10 storage registers, information recallable instantly / print rate, 2½ lps	Eugene Dietzgen Co. 2425 N. Sheffield Ave. Chicago, Ill. 60614
GEMINI Generation	For both commercial and scientific applications / user-oriented, large-scale, multiprocessing system / incorporates single, large, homogeneous memory subsystem shared by three to six independent processors / memory capacity presently to 16,000,000 bytes; 30-bit byte addressing allows user programs and microprograms to directly reference over 1 billion bytes of virtual memory / Operational Control Program (OCP) combines many functions in one large bundle / all standard IBM System/360 peripheral devices are supported by OCP and can be utilized in GEMINI systems	Computer Operations Inc. 3161 Redhill Ave. Costa Mesa, Calif. 92627
HDC-601 Aerospace Computer	Total compatibility with DDP 516 and 516R / non-destructive read-out memory, 1 usec memory cycle time / parallel organization; 16-bit words; fixed-point single address / 8,000 words expandable to 32,000	Honeywell Aerospace Div. c/o Public Information Dept. 13350 U.S. Hwy. #19 St. Petersburg, Fla. 33733
Special Purpose Systems		
ALGORMATIC-16©	For process control of environmental chambers, diffusion furnaces, production equipment, pilot plants / multi-channel direct digital control and data handling system / controls numerous independent processes, as well as variety of parameters in any one process / built around DEC's PDP-8/L computer	Research, Inc. Box 24064 Minneapolis, Minn. 55424 Attn: J. R. Anderson
Detector System Model TDS-1E	Computerized 3 detector system for studies in nuclear medicine / built-in computer performs complete mathematical analysis; detectors obtain dynamic functions of three separate organs of body simultaneously, which are displayed graphically on an oscilloscope	Elron, Inc. Raritan Center Edison, N.J. 08817 Attn: Yaron Reggev
Manufacturing Information System	Designed for operation by factory personnel in their own environment / an extension of System Ten (Computers and Automation, May 1970, p. 74) / goes beyond data collection functions to provide two-way plant communication / system includes: Attendance Station, Job Information Station, System Ten Model 20 Processor with magnetic tape and disc peripherals	Singer Friden Division 2350 Washington Ave. San Leandro, Calif. 94577 Attn: W. J. Bettencourt
Teaching Devices		
ABACUS Educational Computer EC362/372	Designed specifically as a teaching aid / EC362 arithmetic unit may operate independently to demonstrate all arithmetic operations of conventional central processor / EC372 control unit and core store may operate independently to demonstrate program interrogation and control cycles / combined they form a fully programmable single address 16-bit serial digital computer which can be operated at either slow or high speed / 50 lbs.	Feedback Incorporated 438 Springfield Ave. Berkeley Hgts., N.J. 07922 Attn: M. J. Lawson
Memories		
Discstor® 510 Mass Memory System	Combines fast head-per-track access (8.7 msec average) with interchangeable discs / capacity to 10 million bits / provided as self-contained desk top unit, or with own stand, or in standard RETMA rack mounting hardware	Systematics/Magne-Head Div. General Instrument Corp. 13040 So. Cerise Ave. Hawthorne, Calif. 90250
IODISC Series 1000	Can plug in directly to most popular minicomputers / series includes five separate storage systems with eight single-disc removable cartridges or combinations of cartridges and fixed discs	Iomec, Inc. 345 Mathew St. Santa Clara, Calif. 95050 Attn: Bruce F. La Centra
M2700 Discdrive	Small (17.5" wide), high-capacity, with 11-disc removable pack equivalent to IBM 2316; fully compatible with all existing IBM computer equipment / 29-million 8-bit byte capacity; 30 msec average random access time	Marshall Data Systems 2065 Huntington Drive San Marino, Calif. 91108 Attn: Norman B. Conwill

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
(Memories, continued)		
Mainframe Memory Options	Read-only; scratch pad; large and small core read/write memories / plug into standard prewired memory slots; can be field installed / 1K, 2K, 4K core memories; 1.5 usec cycle time / 400 nsec read-only series can be mixed with 128 and 256 word scratch pad memories	Computer Automation, Inc. 895 West 16th St. Newport Beach, Calif. Attn: Carroll C. Gewin
Model 401-11 Read/Only Core Memory Systems	Random access system for such applications as disc drive controller / 512 words, 48-bit length used in 2K x 48-bit configurations packed into four modules / 500 nsec full cycle time / 180 nsec access time	Quadri Corporation 2959 West Fairmont Phoenix, Ariz. 85017
NANOMEMORY 4850	Commercial, military and aerospace applications / 3-wire, 3D core memory system with 850 nsec full cycle time; 350 nsec access time / word lengths 8 to 40 bits in 5-bit increments / stacks and associated electronics on plug-in cards or modules; field expandable	Electronic Memories 12621 Chadron Ave. Hawthorne, Calif. 90250 Attn: Charles A. Signor
Software		
ADABAS	Adaptable data bank system for all information systems / capable of optimal time and memory utilization on all computers / associative approach permits incomplete seek-demands / provided with complete data security system	Aiv Institut Darmstadt Schofferstrasse 2 61 Darmstadt, Germany Attn: Peter Kreis
ALPAC	For complete solution of linear or non-linear parameter optimization problems / 8 non-linear parameter optimization algorithms available / uses single input unit, single output unit / programs available in FORTRAN IV or FORTRAN II	Electronic Associates, Inc. West Long Branch, N.J. 07740 Attn: Ed Sharpe
Bisynchronous Oriented Communications System (BOCS)	Supports high speed computer-to-computer data transmission over leased telephone lines with speeds of 1,200 to 240,000 bps / compatible with any multiprogramming environment / for IBM System 360/25 computers or larger	GT&E Data Services 5422 Bay Center Drive Tampa, Fla. 33609 Attn: John H. Blalock
DatagraphiX Automated Retrieval Techniques (DART)	For use with Computer-Output-Microfilm recorders / converts computer-generated data into microform structure for use in information systems / an assemblage of software sub-systems written in COBOL / three versions: the sequential system, the index sequential system, and the direct (random) access system	Stromberg DatagraphiX, Inc. P.O. Box 2449 San Diego, Calif. 92112 Attn: H. Bernstein
MCBT®	Complete mini-computer business software package for small business applications / designed for one-time data entry with automatic carry-through and automatic journal postings / 30 programs; written in FORTRAN IV / available to users on lease basis; to OEM under license arrangement	Computing Corporation International, Inc. 3375 South Bannock Englewood, Colo. 80110 Attn: W. E. Schmidt
MICAP	For circuit designers / provides interactive steady state analysis for microwave and low frequency circuits / supplies the engineer with 29 separate output parameters / no computer programming knowledge required	Tymshare® 525 University Ave., Suite 220 Palo Alto, Calif. 94301 Attn: Gary Myers
PRTFAST	Increases printer throughput on any IBM System/360 operating under DOS or TOS / combination of logic and core storage buffering reduces machine time requirements by average of 25% / modular system / can be used with any program written in COBOL or BAL	GDG Data Systems, Inc. 110 W. 40th St. New York, N.Y. 10018 Attn: Alan Reinstein
Quickpoint postprocessors	Translates output of DEC's Quickpoint language into a format the machine tool control will accept / expanded list of current postprocessors available for users of a number of different machine tools	Digital Equipment Corp. Computer Numerical Control Products Group Maynard, Mass. 01754
TSOS-Version 6 (Time Sharing Operating System)	For users of RCA's Spectra 70/46 remote computing systems for simultaneous local and remote batch, interactive and transaction data processing / expanded version for Spectra 70/61s later this year	RCA New & Information Cherry Hill, N.J. 08034 Attn: M. William Friis
Vertical Brailler	An IBM 360 DOS program designed to increase the speed and efficiency of blind computer programmers / has a variety of possible input and output formats; optional output is the vertical or "Chinese" output / input can be records of any length, from either tape or disk	Bradford Computer and Systems 220 East 42nd St. New York, N.Y. 10017 Attn: Richard J. Snipas
Numerical Control		
Datapoint	Minicomputer-based tape preparation system / two-axis, point-to-point system that prepares tape for input to any standard machine-tool controller / consists of a Nova or Supernova 16-bit computer, teletype terminal, and Datapoint software package / system can be modified for 3-axis controllers	Data General Corp. Routes 9 & 495 Southboro, Mass. 01772

NAME/MODEL NO.	DESCRIPTION	FOR MORE INFORMATION
Peripheral Equipment		
DCS-2 Data Translation Terminal	Paper tape input data in EIA code automatically translated to ASCII code / puts either code in proper output format for time-share FORTRAN and BASIC compilers / has keyboard for editing and entering identifying header information / equipped with 60 cps paper tape punch; also drives high speed printer	DigiTem, Div. of Microwave/ Systems, Inc. 1 Adler Drive East Syracuse, N.Y. 13057
DP-650 Series Digital Printer	Compatible with 1, 2, 4, 8 binary code / printing speed 3 lines per second, asynchronous / standard seven columns is field expandable to a maximum of 21 columns / internally stored roll or fan-fold paper	Anadex Instruments Inc. 7833 Haskell Ave. Van Nuys, Calif. 91406
Dacom DSP-35, a microscanner/plotter	For automatic image processing in scientific research / converts photographic images to computer compatible signals / resolution from 1 millimeter down to 2 microns; displacement uncertainty less than 0.4 microns / scans or plots up to 1000 picture elements per second	Dacom Inc. 1060 Morse Ave. Sunnyvale, Calif. 94086 Attn: Robert S. Meltzer
1130/SPRINT	Low-cost 400 lpm chain line printer for IBM 1130 / includes all control circuitry for direct connection / no modifications required to 1130 software / standard 48 character set, 128 character line width (options available) / 6" to 18-3/4" wide form sizes, up to 6 parts	Intercomp 243 Vassar St. Cambridge, Mass. 02139
Miniature Punched Tape Reader	Tape transported on dual sprocket stepping motor drive / all power from the stepping motor / no mechanical adjustments or lubrication needed or provided for / operable up to 600 cps / circuitry available for direct interface to many computer systems	Decitek 15 Sagamore Rd. Worcester, Mass. 01605 Attn: Harry O'Donoghue
"TAPE IT", a pocket computer terminal	A complete data recording, data storage, and data transmission unit / small (2" x 2½" x 5"), hand-held, 15 oz. / 15-key keyboard records all numbers and 5 other characters, in computer code directly onto magnetic tape in a mini-cassette / built-in transmitter is own acoustic coupler / applications include inventory taking; stock ordering; meter reading; nursing; market survey; etc.	Fondiller Corp. 200 West 58th St. New York, N.Y. 10019 Attn: Fr. Robert Fondiller
Typeliner Model IV	Remote impact printer for CRT terminals and stand-alone applications / plug-to-plug compatible with CRTs and any modem / full 132 column with 64 character ASCII set / produces up to 6 multiple copies on 14-7/8" pin-feed, fanfold stock / operates at 100 lpm	Data Computing Inc. 2219 West Shangri La Rd. Phoenix, Ariz. 85029 Attn: Donald E. Oglesby
Universal Document Reader	Combines functions of optical mark reading and optical character reading / reading functions can be performed either separately or simultaneously / optical character reader reads new international format of the ECMA "B" font / optical mark reader identifies marks made by hand, embossed plates, output printers or letterpress machines in specified positions on document; also, identifies holes punched in cards / designed to provide original-document input / accepts various sized documents	International Computers of Canada Ltd. 199 Bay St. Toronto 116, Ontario Attn: Ronald K. Stewart
New Literature		
AUERBACH on Time Sharing	Understandable for the novice, yet meaningful to the experienced data processor / handbook is presented in four sections, each dealing with the subject in advancing detail / sections include: "Time Sharing Survey"; Time Sharing Evaluation"; "Time Sharing Languages"; and "Time Sharing Equipment" / 180 pages / $33.00 in the United States; $37.00 overseas	AUERBACH Info, Inc. Dept. 870 121 No. Broad St. Philadelphia, Pa. 19107
Automatic Plotter Report	In-depth study of: Graphic Computer-Output-Microfilm Systems; Large, Automatic Drafting Systems; and Low Cost, Low Accuracy Plotting Systems (primarily drum plotters) / compares and evaluates companies and their products, projecting performance within each market area through 1974; evaluates applications; identifies areas of opportunity for present and prospective manufacturers / $300 per copy	Creative Strategies, Inc. 885 No. San Antonio Rd. Los Altos, Calif. 94022 Attn: Eugene Austin
The Role of Computers in Cardiology	Booklet in non-technical language designed as basic primer on the understanding of computerized ECG interpretation / outlines the cardiologist's problem; how computers compute; how computerized ECG systems work; and details three ways to process data in a computerized ECG system	Technical Information Section, Clinical Instruments Operations Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, Calif. 92634

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Computer Sciences Corp., Los Angeles, Calif.	Atomic Energy Commission	Five-year extension of 1965 contract; CSC provides scientific computation and business data processing to AEC and its contractors at AEC's Richland (Wash.) Operations	$18+ million
Century Data Systems, Anaheim, Calif.	BASF Systems Inc., Bedford, Mass.	Purchase of IBM-compatible disk drives which BASF will market under their own label to end-users throughout the country	$10+ million
California Computer Products, Inc., Anaheim, Calif.	U.S. Navy, Automatic Data Processing Equipment Selection Office	Installation of IBM compatible disc drive memory systems (produced by Century Data Systems) in Washington, D.C., Maryland, Virginia, the Carolinas, and Georgia; also provide full-time maintenance service	$4.4 million (approximate)
Univac Division of Sperry Rand Spain S.A.	The Spanish National Telephone Company (C.T.N.E.)	Two UNIVAC 418-III computer systems to serve as heart of nationwide data and message transmission network; expect network to be operational in 1971	$4 million (approximate)
Control Data Corp., Minneapolis, Minn.	U.S. Army, Safeguard System Command, Huntsville, Ala.	Purchase of CDC 6400 computer (under a fixed price contract modification) which is being utilized in the Safeguard Management Information System(SMIS)	$3,891,938.95
Recognition Equipment Inc., Dallas, Texas	Mobil Oil Corp., Kansas City, Kans.	Two Electronic Retina® Computing Readers and related sorting equipment for data processing center in Kansas	$3.1 million (approximate)
Colorado Instruments, Inc., Broomfield, Colo.	Ford Motor Co., Dearborn, Mich.	Production and installation of source data collection system throughout major Ford production facilities	$2.4 million
Software Systems, Inc., Washington, D.C.	Associated Distributors, Inc., Atlanta, Ga.	Seventy-five month facility management contract; includes systems development, implementation, and operation	$2 million (approximate)
RCA Aerospace Systems Division, Burlington, Mass.	U.S. Air Force	Development of computerized system to speed jet engine fuel control testing	$1.9 million
Fischer & Porter Co., Warminster, Pa.	City of Atlanta, Ga.	Supply of pollution control instrumentation for construction improvements to the R.M. Clayton Pollution Control Plant	$1.5+ million
Informatics Inc., Canoga Park, Calif.	U.S. Air Force	Design, development and implementation of an intelligence data system; work will be performed at Headquarters, Pacific Air Forces, Hickam Air Force Base, Hawaii and in company's Bethesda (Md.) offices	$1+ million
Univac Division of Sperry Rand Corp., Blue Bell, Pa.	U.S. Post Office Department, Bureau of Research and Engineering	Design and fabrication of machines that will use fluidics to accomplish the handling and canceling of letters	$838,000
Hazeltine Corp., Little Neck, N.Y.	U.S. Air Force, Electronic Systems Div., Bedford, Mass.	Development of classified Electronic Battlefield Equipment	$721,000
Ampex Corp., Culver City, Calif.	Sycor Inc., Ann Arbor, Mich.	Model TMX and TMZ low-cost digital tape drives for use in Sycor 610 communications systems and off-line data translators	$700,000+
The Systems Discipline, Inc., New York, N.Y.	Department of Housing and Urban Development, Model Cities	Development, testing, and implementation of evaluation procedures for local City Demonstration Agency (CDA) information systems	$449,900
Ampex Corp., Culver City, Calif.	Systems Engineering Laboratories, Ft. Lauderdale, Fla.	Core memory stacks for use in Systems' 810B and 8600 multiprocessing computer systems	$350,000 (approximate)
	U.S. Department of Defense	To supply (on yearly basis) Model TM-1624 and TM-1629 digital tape drives for on-line use with IBM 360/65, 7080 and 1401 computers	$300,000+
TRW Inc., Houston, Texas	Department of Transportation, Bureau of Public Roads	Development of operational software package which will generate traffic signal control patterns in response to traffic conditions as they are occurring	$216,600
Satellite Computer Service, Inc., Philadelphia, Pa.	The Franklin Institute Research Laboratories, Philadelphia, Pa.	Computing services; remote batch service will be made available to all of FIRL's laboratories, as required	$200,000 (approximate)
Computer Sciences Corp., Los Angeles, Calif.	American Telephone & Telegraph Corp.	Development of comprehensive sales training course for the 21 operating companies of the Bell System; the self-instructional course will include programmed instruction texts, videotape, 35mm slides, and cassettes for tape recorders	$155,000
Litton Systems (Canada) Limited, Rexdale, Ontario	U.S. Air Force	A design study of an automatic print reading device to enable a computer to process and translate Russian technical documents; Optical Character Recognition system will read typed Russian characters, translate them into machine language and record this on magnetic tape for computer processing	—
Stewart-Warner Corp., Chicago, Ill.	San Francisco Bay Area Rapid Transit (BART) District, Calif.	Design, manufacture, installation of computerized passenger information display system	—

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B2500 system	City of Highland Park, Mich.	Processing city's administrative, accounting, and income tax services, as well as other programs; formerly done by outside data processing services (system valued at $367,000)
	St. Joseph's Hospital, Milwaukee, Wis.	Many standard administrative activities, management reports, and providing services for St. Michael's Hospital (Milwaukee) and St. Mary's Hospital (Racine, Wis.) (system valued at over $370,000)
Burroughs B3500 system	Geo. F. Brown & Sons, Inc., Chicago, Ill.	Expanding into a data base management information system; also will speed preparation of reports (system valued at over $628,000)
	First New Haven National Bank, New Haven, Conn.	Several categories of applications including club accounts, demand deposits, installment loans, time deposits, mortgage loans, payroll, etc. (system valued at over $1 million)
Control Data 3300 system	Ateliers et Chantiers de Bretagne (SFI-ACB), Nantes, France	Administrative and financial management, production applications and scientific computation
	Methods et Traitement de l'Information (METTI), Nantes, France	Expanding firm's consulting and data processing services to the French banking industry and others (system valued at over $600,000)
	Office Commercial Pharmaceutique, OCP, Paris, France	Automating firm's business data processing functions, order registration and invoicing; a second system, a CDC 3150, will be installed in February
Control Data 6400 system	Bowman-Gray School of Medicine, Wake Forest Univ., Winston-Salem, N.C.	Support of its medical research and development projects; applications include programmed instruction for medical and paramedical students, retrieval of drug, diet, textbook and other information from computer-based data files, computer-directed patient interviews (system valued at $2 million)
	United Aircraft of Canada, Ltd., Montreal, Quebec	Processing engineering information, supporting jet engine design and aircraft research programs, providing punched paper tapes for over 25 numerically controlled machine tools (system valued at $2.3 million)
Digital Equipment PDP-10	The Hatfield Polytechnic (cq), Hertford, Hertfordshire, U.K.	Teaching and research; also to provide computer services to colleges and schools in the county
Digital Equipment PDP-15	Medical Information Technology, Inc., Cambridge, Mass.	Expansion of medical services to hospitals, clinics and laboratories
IBM System/3	The Bron-Shoe Co., Columbus, Ohio	Computerizing financial operations, including sales analysis, payroll and invoicing
	Climalene Co., Canton, Ohio	Analyzing marketing trends, order processing and financial accounting functions
	Lanman Bolt & Forge, East Chicago, Ind.	Accounting and bookkeeping activities, sales analyses, labor distribution reports
IBM System/360 Model 20	Bacardi Corp., San Juan, Puerto Rico	Keeping track of rum stocks from distilling to aging and blending, to bottling, packing, shipping
IBM System/360 Model 30	U.S. Army Automotive Tank Command (TACOM), Warren, Mich.	Replacing smaller IBM computer; significantly increases number of messages that can be processed
IBM System/360 Model 65	E.P.G. Computer Services, Inc., New York, N.Y.	Handling the steadily increasing demand for firm's services
NCR Century 100 system	American Precision Industries, Buffalo, N.Y.	General ledger work, labor distribution and payroll, accounts receivable and payable
	Buffalo Slag Corp., Buffalo, N.Y.	General accounting, accounts payable, and labor distribution
	Syrian Central Statistics Bureau, Damascus, Syria	Syrian annual statistics summary and biennial agricultural census
NCR Century 200 system	Central Bank of the Philippines, Manila, Philippines	Payroll processing, personnel accounting, property distribution, inventories of materials and supplies, economic research and general accounting
	Department of Community Colleges, Commonwealth of Virginia, Richmond	Payroll, personnel record-processing, fiscal reporting, budgetary accounting for 22 colleges
RCA Spectra 70/45	Southern Airways, Atlanta Airport, Atlanta, Ga.	Monitoring airline's more than 400 daily flights; teletypewriter linkage to 60 other airports served (system valued at $1 million)
	Texas Health Department, Austin	A statewide tuberculosis control system
RCA Spectra 70/46	University of Southwestern Louisiana, Lafayette, La.	University-wide educational, administrative and research purposes
UNIVAC 418 III system	Tokiwa Mutual Savings Bank, Tokyo, Japan	On-line processing of savings accounts, time deposits and domestic exchange
UNIVAC 1108 system	Ishikawajima-Harima Heavy Industries Co., Ltd., Toyosu, Tokyo, Japan	Extensive time-sharing computer system; projects include structural analysis of ships and other products, and cost accounting
UNIVAC 9200 system	Associated Sand & Gravel Co., Everett, Wash.	General accounting, payroll, and a vehicle maintenance system
	Stewart Data Center, Lodi, Calif.	Utility billing and payroll processing for cities of Lodi and Tracy
UNIVAC 9300 system	Diversified Business Data, Pasadena, Texas	Clinic patient billing, general accounting, payroll processing and preparation of statistical information for various clients

COMPUTERS, SCIENCE, AND ASSASSINATIONS

Computers and Automation believes that the possibility of conspiracies in the assassinations of important American leaders in our times is of the utmost interest and significance to every American – and especially to computer people, because computers can be used: to handle large amounts of information easily; to correlate the information rapidly and accurately; to prove or disprove certain theories or possibilities of conspiracy; etc. Therefore, computer people can make a unique and important contribution to society in this area. Already a computerized analysis of information regarding the assassination of President John F. Kennedy is underway in Washington.

Accordingly, *Computers and Automation* is publishing from time to time articles and reports on: investigations into assassinations; the major evidence; and the application of computers to the evidence. Our purpose is to present important, useful, and authoritative information objectively in order to find out the truth. Since this subject is not receiving adequate and comprehensive coverage anywhere else that we know of, *Computers and Automation* has taken the responsibility to publish.

No scientist, no honest man, ever refuses to consider new evidence or to correct errors. If corrections are needed or new evidence appears, *Computers and Automation* will publish both.

THE CONSPIRACY TO ASSASSINATE SENATOR ROBERT F. KENNEDY AND THE SECOND CONSPIRACY TO COVER IT UP

Richard E. Sprague
Hartsdale, N.Y.

In June 1970, a group action suit was filed in Los Angeles on behalf of all residents of the State of California by Theodore Charach, a free-lance journalist, to force the Los Angeles Police Department and the District Attorney of Los Angeles County to make public additional information in their possession relating to a possible conspiracy in the assassination of Senator Robert F. Kennedy in June 1968.

Many citizens of the United States have thought that some things were strange about the RFK assassination. However, most have believed firmly that, whether or not there was a conspiracy, Sirhan B. Sirhan fired the only shots and was certainly the assassin.

The Charach suit, however, claims that another man also fired shots, and that it is likely that he, not Sirhan, was the killer. Charach and his lawyer, Godfrey Isaac, held a press conference on Thursday, June 4, 1970, in Los Angeles to announce the filing of the suit and its withdrawal. The withdrawal was made so that the defendants would have an opportunity to assess all of Charach's findings.

The only news organization apparently that reported this story was the Los Angeles Free Press (7813 Beverly Blvd., Los Angeles, Calif. 90036) in their June 12-18, 1970, issue. The news of this suit was not published in any of the other Los Angeles papers, nor distributed by the Associated Press, United Press International, or Reuters, nor published in The New York Times, nor published or broadcast by many other important national news media. This uniform silence is an indication that a "second conspiracy" (one aimed to cover up the first conspiracy) may be operating in the RFK assassination, comparable to the similar second conspiracies that may be operating in the assassinations of President John F. Kennedy and Dr. Martin Luther King.

In the August 1970 issue of Computers and Automation, the June 4 statement to the press of Theodore Charach was printed starting on page 50; and his "Complaint for Disclosure of Information", the suit, was printed starting on page 53.

Statements in the Charach Suit

The assassin that is suggested in the suit of Theodore Charach was a uniformed security guard employed on a contract basis by the Ambassador Hotel to guard Senator Kennedy. His name is Thane Eugene Cesar, a parttime employee, at the time, of the Ace Security Guard Service in Los Angeles, and a known right-wing supporter of George Wallace and hater of the Kennedys.

Cesar's name is mentioned in a book and in an article, both by Robert Blair Kaiser. The book is to be published in the fall of 1970. The article was published in Ladies Home Journal magazine in May 1970 and is entitled "RFK Must Die". Cesar is quoted in the article as saying he did draw his service revolver at the time Senator Kennedy was hit, but replaced it in his holster because Sirhan was by then under control.

Charach's suit says that District Attorney Evelle Younger, Chief of Police Edward M. Davis, and Deputy Chief Robert A. Houghton (also author of the book Special Unit Senator on the assassination published 1970 by Random House) have all purposely concealed from the people of California, without the legal right to do so, the following alleged facts:

1. Senator Robert F. Kennedy was not killed by a bullet from the gun of Sirhan B. Sirhan.
2. Another gun was fired at RFK at the same time.
3. The fatal shot did not come from the direction of Sirhan's position.
4. A witness, Donald Schulman, an employee of KNX-TV, saw Cesar fire his gun while standing directly behind Senator Kennedy. Schulman saw Kennedy being hit from behind by three bullets. Schulman was interviewed about what he saw within minutes after the assassination; but he was not called as a witness at Sirhan's trial; nor was he mentioned in Evelle Younger's report to the

people of California; nor was he mentioned in Houghton's book, Special Unit Senator. (Note: The search made by Computers and Automation in compiling the index to Special Unit Senator confirms that Donald Schulman is not mentioned in the book; this is evidence of suppression of important information independent of the statements in Charach's suit. C&A's index for Houghton's book is published in this issue.)

5. Karl Uecker, the maitre d' who was escorting Senator Kennedy through the pantry where he was shot, saw Cesar with his drawn gun in his hand, immediately after Uecker helped subdue Sirhan. Younger, Davis, and Houghton (asserts Charach) did not present this evidence to the grand jury or at the Sirhan trial.
6. Cesar's presence in the pantry, his possession of a gun, his drawing of the gun from his holster, and his close proximity to Kennedy's back were all suppressed. Cesar was never called to testify before the grand jury or at the trial. (Houghton's book even states that there were no security guards at the doors to the kitchen at the time of the shooting, and that no persons of right wing connections were in the pantry; this is simply not true.)
7. The facts determined at the autopsy by Dr. Thomas T. Noguchi, coroner, were glossed over, changed, or not allowed to be presented before the grand jury or at the trial.
8. One of these facts was that the fatal wound was caused by a bullet in the head, the trajectory of which was back to front, right to left, and upward. Sirhan was never in a position to have fired on that trajectory. Cesar was.
9. A second of these facts was that the fatal wound was inflicted from a distance of one inch to three inches, while two other wounds fired from the rear were inflicted from a distance of less than six inches away. Sirhan was never closer to Kennedy than several feet away. Cesar was right behind him and to his right.
10. Dr. Noguchi started to testify about the wounds at the Sirhan trial, but was stopped by the judge.

Other Evidence

Let us examine what other evidence exists to confirm the claims of Charach's suit.

A group of California researchers, members of the National Committee to Investigate Assassinations, have obtained evidence that at least ten bullets were fired in the pantry. A summary of their evidence was published on pages 49 to 53 in the August issue of Computers and Automation.

This evidence corroborates Charach's suit. If Sirhan fired eight shots and Cesar fired three shots, there should be a total of eleven bullets. Further, the location of ten bullets found shows that Cesar would have had a chance to produce the wounds in Kennedy whereas Sirhan would not.

The Sounds of Three Shots Recorded on Tape

Several TV and radio network microphones were open and operating during the shooting. They were all in the Ambassador Ballroom, quite a distance from the pantry. One of these microphones, attached to an American Broadcasting Corp. TV camera, produced a live TV and video tape recording of the event. Researchers in New York City have examined this tape and found that only three shots can be heard above the noise of the crowd.

The microphone was continuously open from the time Kennedy left the podium until all the shots had been fired and for some time beyond that. The TV video tape with sound shows there were no breaks in either picture or sound. The crowd noise is continuous, uninterrupted, and of constant volume, indicating that nothing went wrong with the microphone during the entire sequence.

Now, the fact that only three shots can be heard confirms the probability that more than one gun was being fired, and that shots from a second gun are those recorded on the tape. Sirhan's gun shots were apparently not loud enough to be recorded. If they had been, all eight of his shots should have been audible also.

Sound Test by the Los Angeles Police

Confirmation of the evidence that Sirhan's gun could not have been heard above the crowd noise from the position of the ABC microphone on the other side of the ballroom is presented on pages 118-119 of Special Unit Senator, Houghton's book. Unwittingly, thus, Houghton presents evidence of a second gun, whereas he had intended the evidence to help prove there was no conspiracy.

The following is quoted from the book:

> The next day, June 20, Pena [L.A. Police Lt. Manny Pena] ordered sound level tests to be conducted at the Ambassador to determine whether a gun fired in the pantry could be heard by the stairs outside the opposite end of the Embassy Room. The two locations were approximately a hundred yards, and many walls, drapes and doors apart.
>
> Officer DeWayne Wolfer conducted the sound tests at the hotel between 11:30 a.m. and 1:30 p.m. when no functions were being held in any of the major ballrooms or neighboring foyers. Thus, there was no talking, shouting, or music to deaden the sounds of the shots.... Sirhan's gun was fired with the same caliber of mini-mag ammunition, at approximately the spot where Senator Kennedy fell. The weapon was held horizontally, its muzzle pointed toward the door at the west end of the kitchen, the direction in which Sirhan had snot.
>
> Several series of sound tests were made. ... The meter on the stairs from which Miss Serrano [Miss Sandra Serrano, a Kennedy worker] claimed to have heard the shots, registered no greater change than one half decibel during any of the tests. ... The minimum change in noise level discernible for people with normal hearing is two decibels....
>
> She [Sandra Serrano] obviously thought, in the furor of the moment, that she heard and saw certain things which were not physically possible or did not actually occur. It happens every day. ... People ... hear something which can barely be detected by the most sensitive electronic device.

Now Houghton is right on one count; Miss Serrano did not hear the shots from Sirhan's gun. What she did hear, however, and what is recorded on several microphone tapes further away than Miss Serrano, was the sound of a second gun firing three shots, not a gun firing eight. An examination of the Ambassador Hotel floor layout shows that the TV microphones on the podium in the Ballroom were located about as far from the pantry as the stairs from which Miss Serrano claimed to have heard the shots.

Also, the crowd noise was present. Nearly everyone in the ballroom interviewed heard a few shots.

(Please turn to page 62)

INDEX TO "SPECIAL UNIT SENATOR: The Investigation of the Assassination of Senator Robert F. Kennedy"

By Robert A. Houghton with Theodore Taylor, published 1970 by Random House, 501 Madison Ave., New York, N.Y.

Index compiled June 1970 by Berkeley Enterprises, Inc. of New York, 815 Washington St., Newtonville, Mass. 02160

A: Abe, George, Dr.: 212
Abo, Stanley, Dr.: 293
Aeschylus: p.78
Aharonian, B., Detective: 134
Alarcon, Arthur, Judge: 82
aliens (Sirhan brothers): 69, 180
Aljamal, Mohammed Hazzan: 257
Allfillisch, Bert: 187
Ambassador Hotel,
  Arab employees questioned: 135
  blueprint of kitchen made: 55
  business meetings: 271
  clipping in Sirhan's pocket: 7
  coffee shop: 138
  Colonial Room (press room): 223
  crime re-enactment: 259
  crisis after assassination: 9-13
  diagrams and models: 108-109
  Embassy Room filled to capacity: 276
  Embassy Room just prior to shooting: 19
  kitchen chaos after crime: 13
  LAPD Command Post: 12
  "Mexican-American" male and a girl on 2nd floor: 28
  "Minister of God" and Sirhan: 132
  police converge: 12
  possible exit routes: 172
  public rally in Cocoanut Grove: 262
  reception in Palm Court: 263
  records of guests and employees: 108
  security guards: 173
  security perimeter: 12
Ambrose, John: 121
ambulance requested: 9
American Civil Liberties Union: 83
American-Jordanian Society: 172
Ancient Mystic Order Rosai Crucis: 246
Appell, Ruby: 248
Aqaba, Gulf of: 245
Arab-El Fatah "conspiracy": 157
Arab-Israeli conflict: 166
Arab Leaders of Liberated Party: 244
Arab Legion, The: 241-242
Arab pharmasist: 171
"Arabic conservation" at RFK headquarters: 88
Arabs connected with Sirhan: 170-171
Argonaut Insurance Co.: 210
Arnot, Larry Kenneth,
  interviewed: 111-112
  polygraph test: 227
  willing to identify Sirhan's companions: 214
ascariasis disease: 242
autopsy,
  confirms ballistics report: 99
  on Senator Kennedy: 81

B: Background/Conspiracy Team: 111, 186
Background exploration by SUS: 104
bad check incident: 297-298
Badran, Marouf: 267
bail for Sirhan: 65
ballistics report: 97-99
Barry, William,
  checks route to Colonial Room: 284-285
  grabs Sirhan's gun hand: 289
  interrogated: 59
  Kennedy's bodyguard: 42
  leaves Royal Suite: 281
  reaches for Sirhan: 288
  in Royal Suite: 273
  unable to flank Kennedy: 286
Bazilauskus, Dr. Faustin, staff surgeon: 7
BBC Broadcast: 232-233
Beeson, Frank, Lieut.: 131
Bennett, Ronald: 278
Bell, Willie: 173
belly dancers at Arab bar: 171
Berman, Max: 232
Besant, Annie: 248
Beveridge, William: 240
Bidstrup, Hans Peder: 275
Biltmore Hotel information clerk: 184
Black Panther members: 59
Blackslee, Olive: 248
Blavatsky, Helen: 248
Blishak, Officer: 10
blood stains removed from kitchen floor: 55
blueprint of scene of crime: 55
Blume, Bert: 263
Bob's Big Boy Restaurant, Pasadena: 165, 267
Book Depository Building: 201
Bookkeepers, The: 198-199
Bouzmand, Ali Khan: 169
Bowles, Morris O., Officer: 224
Bowsher, Gordon: 187
Brandt, W. E., Sergeant: 67, 70
Brasio, Robert: 96
Breathalyzer room of LAPD: 10
Breslin, James: 271
Brennan, Charles, Lieut.: 86
Brown, Hugh, Capt.,
  head of Special Unit Senator: 101
  Homicide Chief: 88
  plans phase-out of SUS: 243
Buckley, Richard: 83
Buckner, Everett C., Sr.,
  fails polygraph: 208-209
  interrogated by McGann: 114
bullet (see "cartridge")
Bullova Watch Co. sales meeting: 271
Burba, Harold, fireman: 270
burial of RFK: 93
Burgoyne, Gilbert, Sgt.,
  Advanced Planning Group, LAPD: 106
  develops PERT charts: 110
Burke, W., Sgt.: 234
Burns, Frank Jr., attorney
  arrives at Presidential Suite: 271
  grabs Sirhan's legs: 289
  requested to send Unruh-signed letter: 237
Byrne, W. Matt, US Attorney: 96
By These Things Men Live: 248

C: California Bureau of Identification and Investigation (CII): 38
California Cadet Corps: 164
California State College: 135
cartridges,
  ballistics report: 97-99
  bought at Lock Stock 'n Barrel: 252
  in DeSoto: 80
  examined by expert: 266
  Johnson Cadet label: 81
  at San Gabriel Valley Gun Club: 114
  Sirhan buys mini-mags: 112
  .357 caliber, armor-piercing: 113
  two (unexpended) in Sirhan's pockets: 7
Cascade Cartridge, Inc.: 112
Casden, Robin,
  eats in pantry: 285
  enters Embassy Room: 272
  Schrade falls against him: 289
  shook Kennedy's hand: 288
Case Prep team,
  establishes position of Valarie Schulte: 126
  interviews kitchen witnesses: 224
  ready for trial: 297
  report to Pena: 211
Case Preparation by SUS: 104
Cat Patch Bar: 168
CBS projects Kennedy victory: 280
Cemente Politie, Utrecht, Holland: 299
Cesar, Thane: 174
Cetina, Gonsalo,
  held Sirhan's drink: 277
  in pantry: 284
charts,
  Comparative Study of Activities, RFK and Sirhan: 261
  PERT: 212
  RFK's itinerary: 106
  Sirhan's activities June 1-4: 261
  Sirhan's itinerary: 106
Chiquet, J., Sergeant,
  interrogates Roosevelt Grier: 42
  interrogates S. Serrano: 27
Chihuahua State Judicial Police: 144
Christian Defense League: 155
Christian, Teresa: 277
Chrysler car,
  false lead: 72
  owner's name discovered: 58
Church of Nazarene: 163
Church World Service: 163
CIA "conspiracy": 160
City News Service, Los Angeles: 72
Claborn, J. E., Officer: 80
Clark, Alvin: 244
Clark, Ramsey, Attorney General: 90
clothes of RFK examined after crime: 99
Cocoanut Grove, Ambassador Hotel, clipping: 7
Coliseum Hotel: 134
Collins, Charles, Sgt.,
  Case Prep Team: 104
  staged crime re-enactment: 259
Committee, The: 198-199, 201-202
"Communist connections",
  Mayor's statements: 89
  Sirhan's notebook: 95
Communist Party: 161
Comparative Study of Activities, RFK and Sirhan: 106
Compton, Buck, Chief Deputy,
  at Inter-agency meeting: 96
  stages crime re-enactment: 259
  use "any and all" witnesses: 213
Connow, R.D., Officer: 239
"conspiracy",
  acquaintances of Sirhan at S.G.V. Gun Club: 114
  Arab El Fatah: 157
  assassination of top US officials: 299
  business-card mixup closed: 300
  CIA: 160
  Communist friend of Sirhan: 161, 165-168
  Corona gun range account: 251
  Duane's account: 138
  Duane story discounted: 252-254
  first suspicions of police: 32
  Forty Thieves case closed: 298
  Gonzalez: 144
  Gun shop companions: 215
  Herricks story discredited: 228
  Houghton's suspicions: 86, 89, 94
  Khoury affair: 135
  Letter from Holland hoax: 299
  Martigani brothers account: 134-135
  Marxist: 221
  "Minister of God": 129-134, 148
  Minutemen: 151
  national: 101
  Nixon, Richard, assassination plot: 257
  no factual information: 186
  no indication: 304-305
  "polka-dot dress" girl, DiPierro account: 48
  "polka-dot dress" girl not K.R. Fulmer: 83
  "polka-dot dress" girl, Serrano story: 117
  progress: 214
  Serrano's account discredited: 122
  Sirhan talks to someone in kitchen: 56
  Sirhan's companions buying ammunition: 111-113
  Wayne cleared: 156
  Wayne, M.L.: 153
Conspiracy work of SUS: 104
contents of Sirhan's DeSoto: 80
contents of Sirhan's pockets,
  car key: 11
  clipping: 7
  note: 7
Cooke, Alistair,
  in Colonial Room: 284
  rushes into pantry: 293
Cooper, Grant: 213
Cordero, Humphrey: 275
Corona Community Hospital: 187
Corona Police Dept. Gun Range: 251
Cortez, Roberto: 58
Corvair driven by "Chick" Erhard: 72
County Records Bldg.: 201
Covelli bombing: 129
Cranston, Alan,
  at Ambassador Hotel: 270
  celebrating his primary victory: 12
crime scene preservation: 301
crime walk-through: 259
Critical Path Analysis (CPA) charts: 106
Crose, Jack: 281
Cuban anti-Castro group: 168
Cuban leader: 169
Cuneo, Dr. Harry, operates on Kennedy: 38

D: Dallas tragedy, 1963: 6, 9

Davies, Jack: 264
Day, Donald, Sergeant: 64
Deeb, Paul, Dr.: 188
Del Mar Race Track: 191
Denny's Restaurant: 236
Dept. of Immigration and Naturalization: 163
"diminished capacity": 238, 240
DiPierro, Angelo, telephones for help: 290
DiPierro, Vincent,
  dress test: 118
  interrogated: 46
  in pantry area: 281
  "polka-dot" girl conspiracy: 117
  polygraph test: 124
  sees "polka-dot" girl: 94
  shook Kennedy's hand: 288
"discovery" motion: 255
Division 40, Municipal Court: 64
Dominguez, Gilbert, Sgt.: 206-207
dreamsayer on assassination: 170
Droz, Fred: 136
Drysdale, Don: 283
Duane, Robert: 138
DuBois Clubs of America: 162
Dutton, Fred, campaign manager,
  checks route to Colonial Room: 284-285
  en route to Ambassador Hotel: 268
  leaves Royal Suite: 281
  loosened Kennedy's clothing: 291
  in Royal Suite: 273
  unable to flank Kennedy: 286
dynamite in Glendale garage: 154

E: Echart, Sherlie, on Sirhan's eye
  injury: 73
Economides, James, Investigator: 136
Eilat, Israeli war ship: 245
El Fatah, Arab terrorist group: 157-158,
  166, 244
Eliot Junior High: 163-164
Ellis, Albert: 270
Elmore, Ralph: 286
Encino car bombing: 127
Eppridge, Bill: 287
Erhard, George,
  brought to Parker Center: 61
  "Chick" to "Joe" Sirhan: 69
  companion when selling gun: 72
  had murder weapon: 39
  interrogated by Hernandez: 175
  sells Sirhan gun: 72
Ernie's Taco House: 168
Esher, Marvin, Dr.: 293
Eulogy for RFK by Senator E. Kennedy: 90
Evans, Elizabeth,
  hit by bullet: 290
  gun wound victim: 12
  near pantry: 287
Evans, Officer: 70
Evers, Charles: 273
exit route of Kennedy from stage
  changed: 42

F: Fairfax, Kenneth: 233
FBI,
  contacted by Duane: 138
  limits of case responsibility: 97
  at Lock Stock 'N Barrel: 113
felony counts, six against Sirhan: 64
Fick, Jim, Chief of Police: 101
fingerprints: 80, 99
Fisher, Alfred, Fire Inspector: 223
Fisher, Joel, professor: 135
Fitts, David, Deputy DA: 147
  Trial Prosecuting Attorney: 259
"Forty Thieves": 157-158, 298
Foss, Rent: 249
Foster, Frank, Officer: 23
Fraley, Floyd: 162
Francks, Frankie E., Officer: 206
Frankenheimer, John: 265, 268
Friars Club case: 214
Fulmer, K.R. (alias C.S.): 83, 146
funeral of RFK: 91
Funk, Robert: 287
Furns, Frank, Attorney: 105

G: Gallivan, Jack,
  converges on Sirhan: 289
  in pantry: 286
  struggles with Sirhan's hand: 291
Gardner, William,
  deploys guards: 173
  on Wayne case: 156
General Electric, product introduction
  meeting: 271
Garrison, Jim, DA,
  discussed CIA "conspiracy": 160
  investigator: 198
  story of JFK shooter: 200
Gazarri's Hollywood A Go Go: 128
Gilbert, Keith Dwayne: 154
Goel, Mohan: 231
"gold sweater" male suspect: 28f, 37
Goldberg, Ambassador: 266
Golden Garter Inn: 134
Goldstein, Ira,
  gun wound victim: 12
  meets Robin Casden: 272
  in pantry: 285
  wounded in hip: 290
Gonzalez, Crispin Curiel: 144
Good Samaritan Hospital,
  crowd gathers outside: 58
  operating room: 38
  Kennedy's last 22 hours: 78
  Kennedy transferred to: 8
Goosen, Officer: 250
grand jury indicts Sirhan: 82
Grande Vista Del Rio Ranch: 187
Grande Vista Del Rio payroll check: 298
Greek Orthodox Church: 244
Grier, Roosevelt,
  closes in on Sirhan: 289, 290
  describes gunman: 43
  following Kennedy closely: 281
  gets gun from Sirhan: 291
  grabs Sirhan: 21
  in Kennedy's suite: 273
  separated from Kennedy: 286
  testimony to Sergeant Chiquet: 42
Griggs, Harry: 282
Grohs, Mary,
  identifies Sirhan: 294
  Sirhan behind: 276
  Western Union Operator: 224
gun (see "pistol")
gun range rosters: 250-251
gunshots,
  ballistics report: 97-99
  in brain, cause of death: 81
  8 shots fired from small pistol: 22
  Rafer Johnson reports 4 or 5: 21
  2nd or 3rd hits Kennedy: 47
  shot around Karl Uecker: 53
  sound tests at Ambassador: 119
  3rd or 4th hits Kennedy: 289
  Unruh says 5 to 10: 21
gun wound victims: 12, 290
Gutierrez, Manuel, Sgt.,
  Valley Arab group case: 298
  on Wayne case: 155

H: Hager, Lloyd: 79
Haggerty, Michael: 235
Harrison, Officer: 76
Hawkins, Bud: 105
Heacock, Margaret: 229
Healy, Robert: 290
Heath, Thadis,
  aids Paul Schrade: 291
  arrives at Ambassador Hotel: 272
Hegge, Albin, Lt.,
  affidavit for search: 33
  searches Chrysler car: 72
Held, Kenneth, Capt., Los Angeles Fire
  Dept.: 223
Hernandez, E.H., Sgt. or Lieut.,
  interrogates Miss Kean: 143
  interrogates Michael Wayne: 155
  interviews Bert Allfillisch: 187
  interviews "Minister of God": 147
  to investigate Sirhan's background: 111
  polygraph test to Serrano: 120-123
  returned to normal duties: 304
  searches Sirhan employment record: 186
Herrick, Jeanne: 193, 228
Herricks, gun shop owners: 111, 113
Hertz, A. L., Lt. Col.,
  brief biography: 39
  purchased suspect's pistol: 38
Hertz, Sarah, gave gun to daughter: 39
Hi Life Bar: 168
Hicks, Douglas, Officer: 233
Higbie, Charles A., Lieut.,
  completes interviews: 243
  to interview witnesses: 107
  report to Captain Brown: 211
  returned to normal duties: 304
Hindu seer: 226
"hippie kids" and "Sirhan": 130
"hired killer" pattern: 89
hitchhikers picked up by Minister of
  God: 130
Hoffa, James, Jr.: 127
Hoffa, James, Sr.: 127
Holt, Albert, Dr.: 7
hospital administrators conference: 271
Houghton, Robert A.,
  arranges channels of investigation: 104-106
  begins Special Unit Senator: 100
  interagency meeting: 97
  learns of assassination: 85
  log notation: 304
  SUS pep talk: 107
  suspects conspiracy: 89, 94
  telephone talks with Powers: 87, 89
Howard, John, DA,
  hearing to indict Sirhan: 82
  interagency meeting: 96
  interrogates Sirhan: 14, 24
  stages crime re-enactment: 259
Huerta, Dolores: 281
Hughes, Charles, Lieut.,
  briefs Brown and Powers: 31
  responsible for investigation: 87, 93
"hundred dollar bills": 72, 210
Hyatt House: 146
hypnotization: 149, 157

I: Immigration and Naturalization files: 104
Independent Star News: 7, 163
indictment of Sirhan: 82
insanity: 243
Interagency conference,
  first: 96-100
  second: 213
  third: 297
Interrogation Room B, LAPD: 3, 9, 10, 295
Interrogation Rm 318, LAPD Headquarters: 15
interrogations,
  Allfillisch, Bert, by Hernandez: 187
  Arnot, Larry, by Hernandez (polygraph): 227
  Arnot, Larry, by Y Team: 111-113
  Barry, William, by Henderson and Chiquet: 59
  Buckner, Everett, by McGann: 114, 209
  Communist friend of Sirhan (polygraph): 167
  Cuban leader, by Hernandez (polygraph): 169
  DiPierro, Vincent, by Hernandez (polygraph): 124-126
  DiPierro, Vincent, by Patchett and
    Melendres: 46
  Duane, Robert, by FBI: 138
  Duane, Robert, reinterviewed by Hernandez
    and Alexander: 252
  Fulmer, K.R., by Pitchess: 83
  Gilbert, Keith, by Gutierrez: 155
  Gonzalez, C.C., by FBI: 144
  Grier, Roosevelt, by Chiquet: 42
  Haggerty, Michael, by Layton: 235
  Heacock, Mrs., by Hernandez: 229
  Herrick, Mrs., by Hernandez (polygraph): 228
  Herrick (Mrs.) by Strong and Harris: 193
  Johnson, Rafer, by McGann: 21
  Kean, Cynthia, by Hernandez (polygraph): 143
  Kean, Cynthia, by Sorensen: 74
  Kendall, Charles, by McGann: 115
  Khoury, John, by Economides: 136
  Lebeau, Albert, by Staudenmaier: 141
  Licher, Robert, by George Putnam on
    TV: 222
  lying girl, by Stahl: 127
  lying girl's husband by Stahl: 128
  Martigani brothers by Aharonian: 134
  "Minister of God" by Beeson: 129
  "Minister of God" by Hernandez (polygraph): 147
  "Minister of God" by Nielsen: 146
  Office Worker by Hernandez (polygraph): 198
  Osterkamp, Peggy, by Hernandez: 191
  Patrusky, Martin, by Calkins: 49
  Perez, Jesus, by Calkins: 55-56
  Peters, Henry, by Hernandez and Miner:
    229
  Plimpton, George, by McGann: 36
  Serrano, Sandra, by Chiquet and
    Henderson: 27
  Serrano, Sandy, by Hernandez (polygraph): 120-123
  Sheets, Millard, by Hernandez: 188
  Sirhan by Foster: 61
  Sirhan by Howard: 15, 24
  Sirhan by Jordan: 3
  Sirhan by Melendres and Howard: 35
  Sirhan by Murphy: 50, 52, 54
  Sirhan by Murphy and Jordan: 40, 44
  Sirhan, "Joe", by Harrison: 76
  Sirhan, "Joe", by Lodolo: 68, 71, 75
  Sirhan, Munir, by Hernandez: 174
  television producer by Sandlin and
    Strong: 198

Uecker, Carl, by Calkins and McGann: 51
Unruh, Jesse, by Jordan: 18
Wayne, Michael, by Hernandez (polygraph): 155
Weidner by Strong: 195
Westerfield, Rex, by Sandlin and Dominguez: 221
investigation critique: 300
An Investigation Summary of the Senator Robert F. Kennedy Assassination, June 5, 1968, 10 volumes: 303
Iranian volunteers in Kennedy Headquarters: 205
Ironside, Paul, Dr.: 8, 63

J: Jackson, Larry: 287
Jalalipour, Reza: 169
James, D.J., Sergeant: 67
Jayne, David: 287
Jerusalem: 76
"Joe" purchased gun from George Erhard: 61
John Birch Society: 159
Johnson, Lyndon, Pres.: 269
Johnson Cadet label: 81
Johnson, Rafer,
closes in on Sirhan: 289
delivers gun: 21
follows Kennedy: 281
interrogated by Sergeant McGann: 21
in Kennedy's suite: 273
pockets murder weapon: 292
receives pistol from Grier: 44
separated from Kennedy: 286
subdues Sirhan: 291
Jones, James, Fire Inspector: 223
Jordan,
Sirhan birthplace: 76
Sirhan's father returns: 162
Jordan, W.C., Sergeant,
gaining Sirhan's confidence: 33
interrogates Sirhan: 3, 40, 295
interrogates Jesse Unruh: 18
transfers Sirhan to Parker Center: 3, 13
journalists' theory of "organized far right": 148
Juarez, Mexico: 144

K: Kawalee, Stanley: 174
Kean, Cynthia,
interrogated by Hernandez (polygraph): 142
the "three men": 74
Keene, Roy, Lieut.,
in charge gun range investigation: 250
in charge SUS paperwork: 110, 225
retired: 304
SUS liaison with CII: 106
Kendall, Charles,
gun club member: 79
interrogated by McGann: 115
Kennedy, ("Ted") Edward M.: 78, 90
Kennedy, Ethel,
in ambulance: 7
asks if husband is shot: 290
at Good Samaritan Hospital: 8
holds husband's hand: 291
thanked by husband: 284
Kennedy, Jacqueline: 78
Kennedy, John F., Pres.,
assassination: 158
debate with Nixon: 261
4 gunmen in assassination: 201
killing: 202
New Orleans version of assassination: 198
number of shots: 201
object of hate group: 199
Kennedy, Robert F., Senator,
activities June 3: 264
Ambassador Hotel Rally: 262
assassination according to DiPierro: 46
autopsy: 81
body flown to New York: 82
buried: 93
collapsed at El Cortez Convention Center: 273
concludes speech: 285
constituents: 269
debate with Senator McCarthy: 261
debate quote: 262
emergency treatment: 7
en route to Ambassador Hotel: 268
eulogy for Dr. Martin Luther King: 78
events just prior to the shooting: 18
at Fisherman's Wharf: 264
funeral: 91
Grier's account of assassination: 43
hit by small missile: 234
and Hoffa: 127
in kitchen corridor: 282
last words: 291
leaves Royal Suite: 281
Los Angeles Sports Arena rally: 246
medical treatment: 8
moments before shooting, by R. Grier: 42
object of hate group: 199
Oregon primary: 269
in pantry: 223
Plimpton's account of assassination: 44
Pomona, May 20: 140
post-mortem exam of clothes: 99
pronounced dead: 78
quip about "resurrection city": 270
in Royal Suite, Ambassador Hotel: 271
reported shot by anonymous caller: 9
reported shot in May: 232-233
at San Fernando Valley State College: 233
shaking hands in kitchen area: 288
the shooting: 21, 289
Sirhan's notebook references: 70
speech at Cleveland's City Club: 274
speech at Temple Isaiah: 245
surgery: 38-39
surgery completed, intensive care: 63
taped interviews: 278
thanks family: 283
"three men" plot against him: 74
tragedy to family: 177
victory projected by CBS: 280
victory speech: 19
worsening condition, death: 78
wounds and prognosis: 38
Kennerly, Dave, press photographer: 278
Khoury, John Antoine: 135
Kiehn, E. Gordon, Dr.: 190
King, Martin Luther,
eulogized by RFK: 78
killing: 202
in Los Angeles: 154
struck down: 244
Kirschke case: 17, 26, 57
Klein, Joan D., Judge: 64-65
Knight, Stewart, Secret Service: 96
Kol Yisrael (Voice of Israel) bulletin: 234-235

L: LaGuerre, Michael: 288
LaHive, Joseph: 291
"Latins": 131, 138
Latins (see "Mexican-Americans" also)
LaVallee, A.L., Sgt.,
blueprints scene of crime: 55
drafts diagrams of hotel: 108
Lawn, Constance: 277, 282
Lawrence, David, column clipping: 7
Lawrence, John: 172
Layton, Alexander, Officer: 235-236
Leadbeater, C.W.: 248
"leads" (see "tips")
Lebeau, Albert: 140
Levin, Julius: 137
Lewis, Dean: 193
Lewis, John: 287
Licher, Robert: 222
Lillenas, Haldor, Rev.: 163
Littlefield, Wilbur: 83
Lloyd, Curtis: 173
Lock Stock 'N Barrel Gun Shop: 80, 111, 113, 214, 227, 252
Locke, Suzanne: 288
Lodolo, D.A., Officer: 67
Longfellow Grammar School, Pasadena: 162
Los Angeles Central Receiving Hospital: 7
Los Angeles Herald-Examiner extra edition: 67
LAPD,
Emergency Control Center activated: 13
loses investigative access to Sirhan: 64
prime responsibility for investigation: 97
Lowe, James: 271
Lynch, Cecil R.: 118, 276
Lynch, William, Attorney: 96

M: Maas, Felicia: 142
MacArthur, James, Sgt.,
Case Prep team: 104
stages crime re-enactment: 259
Maddox, Arthur: 173
Mafia: 158
Magnin and Co.: 220
Malki, Abdo Jabra: 268
Mankiewicz, Frank,
checks newspaper credentials: 271
leaves Royal Suite: 281
Mann, D.W., Lieutenant: 51
Marcus, Eric, Dr.: 212
Margetich, J.A., Officer: 250
Markot, Ted, Officer: 135
Marks, William: 251
Marshall Junior High School: 162
Martigani brothers: 134
Marx, Karl: 95
"Master Prophet" of Minutemen: 152
Mastery of Life: 247
Maxwell, Sgt., describes fingerprints: 99
McCarthy, Eugene, Senator,
constituents: 269
debate with Senator Kennedy: 261
leading in primary returns: 273
McCauley, K.J., Inspector: 87
McDevitt, Gordon, Sgt.,
closed out SUS: 304
McDonald, Hugh: 291
McGann, Michael, Sgt.,
interrogates Everett Buckner: 113-114
interrogates George Plimpton: 36
interrogates Rafer Johnson: 21
McGowan, Michael: 157
McGroom, Marcus, Dr.: 279
Meese, Edwin, Governor's adviser: 105
Mein Kamph: 231
Melendres, Adolph, Sergeant: 17, 24
Merritt, Jack,
closes main doors of Embassy Room: 277
outside ballroom: 173
"Mexican-American(s)" - (see "Latins" also)
"Mexican-American(s)",
description of gunman: 36
on hotel stairs: 28
implicated in shooting: 30
"Mexican" male: 131
Miller, Ross, Dr.: 293
Miner, John,
at hearing to indict Sirhan: 82
at interagency conference: 96
witnessed autopsy: 99
"Minister of God",
contradiction: 264
interrogated by Nielsen: 146
polygraph test: 147
volunteers story: 129-134
Minutemen,
rightist group: 149
San Diego male arrested: 151
Miranda decision: 4
Mistri, Gaymoard: 267
Mitchell, Charles: 229
Models of assassination scene: 109, 256
Montgomery, Clifford, Capt.: 96
Most, Vernon: 65-67
Motor Vehicles Dept., Sacramento: 73
Mount, Jerry, Officer: 115
Mudd, Roger: 291
Muir High School, Pasadena: 69, 164
Mulligan, Gloria: 290
Mundel, J.W., Reverend: 8
Murder, First Degree: 238
Murphy, Fred: 173
Murphy, George, Investigator: 15
mysterious deaths of members of The Committee: 202

N: Namer, Abdo: 257
Namer, Ahmed Rageh: 257
Namer Case: 299
Namer, Hussain: 257
Namers arraigned on conspiracy charges: 258
Nash's Dept. Store,
employs "Joe" Sirhan: 65, 67
location: 61
parking lot: 180
National States Right Party: 199
Navarette, Norberto Salinas: 145
NBC's Huntley-Brinkley: 294
Neal, Carol: 164
Nelson, Richard, Dr.: 188
New York Police Dept., Bureau of Special Operations: 257
Newman, Robert, State Dept.: 115-116
Nielsen, Michael, Sgt.,
drafted final volume of report: 304
reinterviews "Minister of God": 146
Wayne business-card mix-up: 300
Niwa, Yoshio: 292
Nixon, Richard,
assassination conspiracy: 257
debate with JFK: 261
"No martyr's cause ... stilled by an assassin's bullet": 274
Noguchi, Thomas, Dr., supervises Kennedy's autopsy: 81
Nolan, William, FBI: 96, 100
note in Sirhan's pocket: 7

notebooks of Sirhan,
found in room: 70
lists grievances against U.S.: 166
Marx: 95

O: office worker witness: 197
oil-man "conspirator": 158
Oppenheimer, Gilderdine: 138-139
Organic Health food store: 195
Organization of Arab Students (OAS): 165, 268
Organizing Committee for Clemency for Sirhan: 172
Osterkamp, Peggy: 191
Oswald, Lee Harvey,
memory of: 9
in Russia: 200
as stooge: 201
Oxnard: 138-139

P: Pacific Telephone seminar: 271
Palestine: 76
"Palestine refugees": 116
Parker Center, LAPD,
Felony Jail: 22
Sirhan transferred to: 13
Special Unit Senator home: 102
Parker, Larry: 236
Parsons and Gritz law firm: 214
Parsons, Russell,
receives LAPD letters: 149
requests continuance for date of trial: 255
requests continuance for "pleading": 185, 212
"show-up" request: 214
at Sirhan's pleading: 225
Pasadena Branch, United States Bank: 210
Pasadena City College: 165
Pasadena Gun Shop sold murder weapon: 38
Pasadena Park Dept. Rifle and Revolver Range: 249
Pasadena Post Office C: 222
Patchett, Frank, Sgt.,
Case Prep team: 104
staged crime re-enactment: 259
patrol car unit 2A68: 9
Patrusky, Martin,
interrogated by Calkins: 49
near pantry: 280
shook Kennedy's hand: 287
Peace and Freedom Party: 168
Pearl, Bill: 294
Pena, Manuel, Lieut.,
first progress report: 185
interviews "Minister of God": 147
"polka-dot dress" girl tapes: 117
returned to normal duties: 304
second progress report: 212
staged crime re-enactment: 259
supervisor Day Watch, SUS: 103
third progress report: 243
Penrose, Jerry: 108
People of the State of California vs. Sirhan Bishara Sirhan: 255
Perez, Jesus,
interrogated by Calkins: 55
shakes Kennedy's hand: 288
Sirhan speaks to him: 279
Perez, Thomas: 174
Peters, Henry: 229
Peters, Larry: 191
phone reports on Kennedy shooting: 73
photographs of assassination scene: 109
Piampiano, P.J., Officer: 234
pistol,
delivered by Rafer Johnson: 22
description: 22
discussed by Sirhan and brother: 70
given by Mrs. Hertz to daughter, Mrs. D. Westlake: 39
given by Mrs. Westlake to George Erhard: 40
possibly seen by Cynthia Kean: 74
purchased by A.L. Hertz: 38
Sirhan buys it: 75
Pistol and Rifle Range Investigation: 250
Pitchess, Peter J., Sheriff: 83
Placencia, Art, Officer,
brings Sirhan to Rampart Station: 10
enters pantry: 294
Plimpton, George,
converges on Sirhan: 289
helps subdue Sirhan: 291
Polek, Chester: 250
police broadcast,
cancels search for blond "second suspect": 31
emergency: 9
girl and "Mexican-Americans" male: 31
suspect description: 11
"polka-dot dress" girl,
DiPierro's account: 94
DiPierro's account discredited: 124
Fulmer calls Sheriff's Office: 83
Fulmer's suicide: 145
implicated by DiPierro: 48
Serrano's account: 28-31, 122-124
SUS closes case: 126
tapes of story: 117
"tips": 28f, 37
test: 118
Pollack, Seymour, Dr.:
discusses Sirhan's medical background: 238
gives Sirhan psychiatric exam: 213
Polygraph Room B, Parker Center: 120
polygraph test fallibility: 178
Poppen, James L., Dr.: 78
Potter, Mrs.: 172
Powers, John, Inspector: 31
premeditation,
Sirhan at Kennedy Rally: 246
Sirhan's lack of identification: 89
suspected of Sirhan by Inspector Powers: 32
Preston, Jack: 249
Primary,
ballots at IBM Bldg.: 12
California: 265
returns counted: 272
voting turnout: 269
Progress and Evaluation Review Technique (PERT): 110
Prosecution witness list: 213
Putnam, George: 222

R: Rabago, Enrique: 275
race-track background of Sirhan: 72
RCA Building, Hollywood: 137
Rafferty, Max,
requests police protection: 12
victory party: 270
Rampart Division,
heads investigation: 87
Los Angeles Police Dept.: 3
Rampart Station, LAPD: 10
Reddin, Thomas, Police Chief: 65
Redding, Susan: 262
Reid, N.D., Dr.: 39
reports, handwritten: 302
Reuters News Agency: 233
Review of the News: 221
"R.F.K. must be disposed of ...": 70, 81
"R.F.K. must die": 244
Rich, Timothy: 286
Richfield Gas Station: 264
Ritchie, Hubert, Mrs.: 232
Robbie's Restaurant: 140
Rogers, Warren: 273
Romero, Juan,
places rosary in Kennedy's hand: 291
shakes Kennedy's hand: 288
Rosen, Richard: 286
route between Ambassador and Rampart Station: 10
Royer, Judy,
"polices" behind stage: 271
refuses Sirhan admittance: 279
Rubalcava, José Refugio: 144
Ruby, Jack,
informant: 201
lesson: 256
memory of: 9

S: "Sahara, Joe": 133
St. Patrick's Cathedral: 91
"Saints and Sinners": 131, 133
Salinger, Pierre: 271, 278
San Gabriel Rifle Range sign-in-sheet: 207
San Gabriel Valley Gun Club,
Charles Kendall at: 79
Range Master: 114
Sirhan helps blonde: 267
San Quentin Prison: 155
Sandlin, Lyle, Sgt.,
at Hyatt House: 146
Y team, SUS: 111
Sartuche, Philip, Sgt.: 204-205
Saudi Arabian friend: 235-237
Sayegh, Anwar: 267
Sayidi, Ali Ali Ahmed: 298-299
Schauer, Richard, Judge,
continues proceedings for Sirhan's pleading: 212
convenes Superior Court: 185
sets trial date: 225
Schneid, William, Officer: 141
Schrade, Paul,
arrives at Presidential Suite: 273
examined by Dr. Abo: 293
follows Kennedy: 282
gun wound victim: 12
hit by bullet: 288
"Take Care of the Senator": 291
Schulberg, Budd,
follows Kennedy: 282
in Royal Suite: 273
Schulte, Valarie,
arrives at Ambassador Hotel: 277
in kitchen: 126
knocked off crutch: 290
near pantry: 287
second suspect located: 14
search,
for Chrysler products: 11
for Chrysler a success: 33
pistol-owners sought: 39f
search warrant for Chrysler: 33
Secret Doctrine, The: 248
security,
at Ambassador Hotel: 270-271
Colonial Room (press room) Ambassador Hotel: 223-224
Embassy Room filled to capacity: 276
hotel guards: 173
at Parker Center: 14
perimeter around Ambassador Hotel: 12
Room 832, Hall of Justice: 256
Sheriff's office guards Sirhan: 97
Sirhan's house: 81
Serrano, Sandra,
account summarized by Lieut. Hughes: 94
dress test: 118
Fulmer not "polka-dot dress" girl: 84
interrogated: 27-31
lie detector test: 120-123
time of interview transcript: 117
Shaw, Jerry, Officer: 186
Sheehans notice Sirhan at Kennedy Rally: 246
Sheets, Millard: 188
Sheills, Michael, Officer: 109
shell (see "cartridge")
The shooters: 198-199
shots (see "gunshots")
"show-up",
Herricks to view: 214
Sirhan, Mrs., to have sons appear: 215
Sirhan, Adel & Munir to appear: 214
Sillings, Robert, Lieut.: 9
Sirhan,
acquires gun: 75
activities June 3: 265-267
"against Peace & Freedom party": 168
anti-Jewish: 165, 196, 231
appears to speak to Polka-dot girl: 48
applies for job as Executive Trainee Safeway Food Stores: 193-194
at Arab bar: 171
at Arab refugee fund-raising dinner: 244
Armenian descent: 62
arraigned: 64
arrives at Ambassador Hotel: 274
asks about processes of law: 56-57
asks brother about a gun: 69
attends Ancient Mystic Order Rosai Crucis meeting: 246
bail: 65
bank account: 210
birthday: 241
booked by police: 23
brought to Rampart station: 10
cadet: 164
car key mystery solved: 72-73
car (DeSoto) located: 72
car parked: 220
charged with assault with intent to murder: 23
chart of activities June 1-4: 261
Chinese checkers: 248
classmate: 235
clothing examined: 51
at Cocoanut Grove, Ambassador Hotel: 262-263
Communist friend: 161, 165-167
companion at Robbie's Restaurant: 141
companions buying ammunition: 111-113
compensation for fall from horse: 210
Consul Zrakat: 116
contents of his DeSoto: 80
on Corona Police Dept. Gun Range roster: 251
denies "Minister of God's" theory: 149

Sirhan (Cont.),
described by R. Grier: 43
described by George Plimpton: 36
"Don't Hurt Me": 22
"downpayment" on a horse: 133
driven to Rampart Station: 295
early background: 241-242
El Fatah: 158
electrician in sound booth: 275
at Eliot Junior High: 164
employed Del Mar Race Track: 191
employed Weidner's Organic Health food store: 195
employment record: 186
garbage collector: 244
"at" Golden Garter Inn: 134
Gonzalez, C.C.: 144
granted continuance to plead: 185
at Gun Club on June 4: 79
gun purchase from George Erhard: 175
handwriting samples: 206-207
helps blond woman fire pistol: 266
helps Mrs. Williams at gun range: 208
high school: 163
home guarded: 81
"hot walkers license": 187
hundred-dollar bills: 210-211
identified by brothers: 66
identified by Cynthia Kean: 75
indicted: 82
informed of telephone rights: 16
injured while working colt: 189-190
interrogated by Howard: 15
interrogated by Johnson: 3
interrogated by Murphy: 50, 52, 54
interrogated by Murphy and Jordan: 36
"jigsaw puzzle": 60
John Muir High School: 164
at Kennedy Campaign Headquarters: 204-205
at Kennedy Rally: 246
Kirschke case: 17, 25-26
leaves Ambassador Hotel: 294
Lebeau recognizes him: 141
link to Communist Party: 161
link to DuBois Clubs: 162
"loves" but would shoot Jordan: 45
medical background: 238
"Minister of God's" hitchhiking account: 130-131
Minuteman "relations": 152
Mistri, Gaymoard: 267-268
mysticism: 230
not the owner of the Chrysler: 58
notebook--Ambassador Goldberg: 266
notebook--grievances against U.S.: 167
notebook--killing 36th President: 265
notebook--Peggy Osterkamp: 191-192
notebook--"R.F.K. must die": 244
notebooks: 70
noticed preparations in pantry area: 281
in pantry: 174
paperboy: 164
parents split up: 163
at Pasadena City College: 165
pleads "not guilty": 225
pocket contents: 6
police lack motive, June 6: 89
police record: 51
preliminary psychiatric exam: 213
"programmed" to hate: 203
protected after shooting: 292
pulls pistol: 288
quarrels with family: 239
read Miranda admonishment: 295
refuses to respond to interrogation: 24, 36
refuses to reveal his name: 15
registration card at Biltmore Hotel: 184
religious background: 229-230
at Richfield Gas Station: 264
room searched: 70
at San Gabriel Valley Gun Club: 114, 265
sanity at age 12: 242
sentenced: 297
separate room: 75
sixth grade records: 162
speaks about truth and facts: 41
speaks to someone in kitchen: 56
struggle to subdue: 290
at Theosophical Society meeting: 249
theosophy: 248
transferred to Hall of Justice: 64
transferred to Municipal Court: 63
transferred to Parker Center: 14
trial: 297
un-American mail: 222
unavailable to detectives: 219
Western Union Operator: 276
what he wants out of life: 61
Sirhan, Adel,
allows search of Sirhan house: 67
identifies brother for police: 66
not recognized by Arnot: 113
Sirhan, Bishara,
iron discipline: 242
returns to Jordan: 162-163
Sirhan house, 696 East Howard, Pasadena: 65
Sirhan, Mary,
in Pasadena: 163
at Sirhan's pleading: 225
Sirhan ("Joe") Munir B.S.,
asked by Sirhan to get a gun: 68
identified by R. Duane: 138
identifies brother for police: 66-67
interrogated by Lodolo: 68
joins brother Adel: 65
purchased Erhard gun: 184
refuses permission for house search: 68
reinterviewed by Hernandez: 174
retells his account: 76
sees brother on TV: 65
Sirhan's brother: 113
Sirhan, Saidallah,
fight with Sirhan: 239
not recognized by Arnot: 113
Sirhan, Sharif: 113
Skipworth, Miss: 246
Sloan, Lawrence W.: 207
Smith, Stephen,
questioned about Irwin Stroll: 279
requests people leave: 292-293
in Royal Suite: 273
Smitty's Shine: 132
Soghomonian, Samuel: 164
Sorensen, Vern, Officer: 74
sound-level tests at Ambassador: 118
South Dakota primary returns: 276
Special Unit Senator,
access to information: 104-106
assembles photographs: 109
Background/Conspiracy Team: 111
beginning: 100
Case Preparation, Background, Conspiracy: 111
closed: 302
concludes registration card story: 185
files: 303
final meeting: 299
housed in Parker Center: 102
Night Watch interviews 400 people: 108
Night Watch interviews 171 people: 211
Night Watch interviews 243 more people: 225
phase-out begins: 243
Stahl, Lee, Sgt.: 127
Starr, Harry: 251
State Dept.: 115-116
Staudenmaier, Detective: 141
Stevens, Theodore: 247
Stevenson, Ivan, Professor: 226
Stoner, George,
arranges "polka-dot dress" test: 118
at Interagency conference: 96
Stowers, Albert: 173, 277
Strathmann, John: 231
Strathmann, Patricia: 231-232
Stroll, Irwin, gun wound victim: 12, 290
pillow for Kennedy: 279, 283
rushes forward with pillow: 286
Strong, Thomas, Sgt.,
interviews Minutemen friends: 152
Y team, SUS: 111
suicides,
Fulmer, Cathey: 145
Gonzalez, C.C.: 145
Sullivan, Acquiline: 288
"Sunday Rossi": 145
Superior Court, Dept. 100, Los Angeles County: 185, 212
"suppression of evidence" motion: 255
surgery on Senator Kennedy completed: 63
"Swear on Sis": 71
Sweeney, Marguerite, "saw" suspect in Kennedy headquarters: 74
Switzer's Fashions and Furs store: 220
Sylvan, Anna: 248

T: Tackaberry, Lieut., security guard: 63
Tactical Operation Planning Team: 87
Talk of Town Bar: 197
Talks on the Paths of Occultism, Vol. 1, At the Feet of the Master: 248
Tashma, Albert, Dr.: 191
Taylor, Hobert, Officer: 135
Theosophical Society, Adyar Lodge: 249
theosophy: 248
Thompson, Carl, Officer: 115
"three men" talking conspiracy: 74
Timinson, Uno: 282
Tippitt, Widow: 299
"tips" from citizens about prisoner: 73, 88, 170
Toomer, Anne: 206
Tourists hear Kennedy shot in May: 232
Trial date set: 225
Trial of Sirhan: 297
truck camper transfers Sirhan to Hall of Justice: 63
Trumble, Don, Officer: 135
Tuck, Dick, leaves Royal Suite with Kennedy: 281
TV stations news tapes: 109

U: Uecker, Karl,
interrogated by Calkins & McGann: 51
notices Sirhan's gunhand: 289
United Sporting Goods: 129
U.S. Attorney General receives investigation report: 303
Unruh, Jesse, Speaker of State Assembly,
accompanies police and Sirhan to Rampart Station: 10
eye-witness testimony: 18
headquarters, Presidential Suite: 271
letter to volunteer workers: 237
guards Sirhan: 292, 294
asks Sirhan "why": 295
spoke to crowd: 281
testimony about shooting: 20
thanked by Kennedy: 283
willing to help SUS: 105
UPI on "Minister of God": 147
Upton, Bobby: 304
Urso, Lisa: 288

V: Valley Arabs-rightists-Mafia: 160
Valley Arab Group: 298
Vanocur, Sander: 278
Varney, Dudley, Sgt.: 173, 250
Velasquez, R.J., Officer: 9
victims of gun wounds: 12, 290
victory speech of Senator Kennedy: 20
Vogel, Dave: 263

W: Wadi Musrara: 241
Walker, Herbert V., Superior Court trial magistrate: 255
Walinsky, Adam: 273
Walsh, George, Capt.: 184
warrant issued for Sirhan: 82
Warren Commission criticized: 218
Watts, rumor of riots: 59
Wayne, Michael (souvenir dealer): 156
Wayne, Michael (student),
Kennedy posters: 153
gets Kennedy autograph: 282
seeks second autograph: 286
suspicious person: 174
weapon (see "pistol")
weapons used in Pres. Kennedy and King killings: 202
Weidner, John: 195
Weidner's Organic,
letter addressed to: 299
Sirhan at: 263
Weisel, William,
gun wound victim: 12, 290
near pantry: 287
Wertlake, Paul, Dr.: 63
West, Andrew: 291-292
Westerfield, Rex: 221
Westlake, Mrs. Dana, involved with murder weapon: 39
Wheeler, Bob: 191
Wherton, Michael, Fire Inspector: 275
White, Officer,
brings Sirhan to Rampart Station: 10
enters pantry: 294
Wills, William: 249
Wilson, Jim,
in anteroom: 287
shoots movie film: 290
Winandy, Robert: 145
Williams, Claudia: 208
Williams, Ronald: 208
Wirin, A.L., A.C.L.U.: 83
witnesses,
contaminated: 126
film aids in identifying: 211
handling of: 300-301

(Please turn to page 62)

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 SEPTEMBER 15, 1970

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Part II. Manufacturers Outside United States							
A/S Norsk Data Elektronikk	NORD-1	8/68	2.0	0	20	20	10
Oslo, Norway	NORD-2B	8/69	4.0 (S)	0	2	2	3
(A) (Sept. 1970)	NORD-5	-	-	0	0	0	1
A/S Regnecentralen	GIER	12/60	2.3-7.5	0	40	40	0
Copenhagen, Denmark	RC 4000	6/67	3.0-20.0	0	11	11	6
(A) (Sept. 1970)							
Elbit Computers Ltd.	Elbit-100	10/67	4.9 (S)	-	-	120	75
Haifa, Israel							
(A) (Jan. 1970)							
GEC-AEI Automation Ltd.	Series 90-2/10/20						
New Parks, Leicester, England	25/30/40/300	1/66	-	-	-	13	X
(R)	S-Two	3/68	-	-	-	1	X
(Jan. 1969)	130	12/64	-	-	-	2	X
	330	3/64	-	-	-	9	X
	959	-/65	-	-	-	1	X
	1010	12/61	-	-	-	8	X
	1040	7/63	-	-	-	1	X
	CON/PAC 4020	-	-	-	-	0	X
	CON/PAC 4040	5/66	-	-	-	9	-
	CON/PAC 4060	12/66	-	-	-	5	-
International Computers, Ltd. (ICL)	Atlas 1 & 2	1/62	65.0	0	6	6	X
London, England	Deuce	4/55	-	0	7	7	X
(A)	KDF 6 - 10	9/61	10-36	0	58	58	X
(Sept. 1970)	KDN 2	4/63	-	0	1	1	X
	Leo 1, 2, 3	-/53	10-24	0	59	59	X
	Mercury	-/57	-	0	13	13	X
	Orion 1 & 2	1/63	20.0	0	17	17	X
	Pegasus	4/55	-	0	30	30	X
	Sirius	-/61	-	0	22	22	X
	503	-/64	-	0	16	16	X
	803 A, B, C	12/60	-	0	83	83	X
	1100/1	-/60	5.0	0	22	22	X
	1200/1/2	-/55	0.9	0	68	68	X
	1300/1/2	-/62	4.0	0	196	196	X
	1500	7/62	6.0	0	110	110	X
	2400	12/61	23.0	0	4	4	X
	1900-1909	12/64	3-54	0	1690	1690	C
	Elliott 4120/4130	10/65	2.4-11.4	0	160	160	C
	System 4-30 to 4-75	10/67	5.2-54	0	138	138	C
							Total: 525
Japanese Mfrs.	(Mfrs. of various models include: Nippon Electric Co., Fujitsu,						
(N) (Sept. 1970)	Hitachi, Ltd., Toshiba, Oki Electric Industry Co., and Mitsubishi Electric Corp.)					Total: 4150 E	Total: 800 E
Marconi Co., Ltd.	Myriad I	3/66	£36.0-£66.0 (S)	0	37	37	9
Chelmsford, Essex, England	Myriad II	10/67	£22.0-£42.5 (S)	0	17	17	12
(A) (Jan. 1970)							
Saab-Scania Aktiebolag	D21	12/62	7.0	0	37	37	-
Linkoping, Sweden	D22	11/68	15.0	0	20	20	6
(A) (Sept. 1970)	D220	4/69	10.0	0	6	6	6
Siemens	301	11/68	0.75	-	-	20	C
Munich, Germany	302	9/67	1.3	-	-	24	
(A)	303	4/65	2.0	-	-	66	C
(March 1970)	304	5/68	2.8	-	-	50	43
	305	11/67	4.5	-	-	58	C
	306	-	6.5	-	-	-	C
	2002	6/59	13.5	-	-	40	C
	3003	12/63	13.0	-	-	34	C
	4004S	-	4.0	-	-	2	C
	4004/15/16	10/65	5.0	-	-	103	C
	4004/25/26	1/66	8.3	-	-	38	C
	4004/35	2/67	11.8	-	-	154	C
	4004/45	7/66	19.8	-	-	167	C

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Siemens (Cont'd.)	4004/46	4/69	34.0	-	-	6	C
	4004/55	12/66	25.8	-	-	14	C
							Total: 300
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIR	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	ONEGA 2	-	-	-	-	C	C
	URAL 11/14/16	-	-	-	-	C	C
	and others	-	-	-	-	C	C
						Total: 6000 E	Total: 2000 E

THE CONSPIRACY TO ASSASSINATE SENATOR ROBERT F. KENNEDY

(Continued from page 55)

Why wouldn't they, if the microphones 300 to 400 feet away on the podium recorded the three shots?

In this way, Houghton, in an effort to invalidate Miss Serrano's report, unwittingly produced just the right test to prove that a gun, not Sirhan's but a second gun, was firing.

The Polka Dot Dress Girl

The evidence is quite clear that a girl "in a white dress with black polka dots" was with Sirhan in the pantry, before the shots were fired.

Miss Serrano stated to the Los Angeles Police (Special Unit Senator, by Houghton, pp. 29-30) that the girl in the polka dot dress:

> ...came running down the stairs. She practically stepped on me, and then said, "We've shot him. We've shot him." Then I said, "Who did you shoot?" And she said, "We shot Senator Kennedy." And I says, "Oh, sure." ...

Vincent DiPierro son of the Ambassador's head maitre d', stated to the Los Angeles Police Dept. (Houghton, pp. 48-49) that he had seen the girl with Sirhan in the kitchen. At the trial, at the grand jury hearing, and in Houghton's book, the Los Angeles officials made it appear that only these two witnesses said anything about the polka dot dress girl.

The Los Angeles Police finally took the official position that there was no girl in a polka dot dress, that she was a figment of Serrano's and DiPierro's imaginations.

But it turns out that six, not two but six, witnesses saw the girl in the polka dot dress with Sirhan before the shots and afterward.

It seems that all six told their stories to all of the TV networks immediately after the assassination, while their memories were fresh. The TV tapes reside in many locations all around the U.S. In addition, there are numbers of witnesses, newsmen, and researchers who have seen or listened to the tapes or talked to the witnesses. It will be difficult to discredit into "figments of imagination" the evidence of four more witnesses whose testimony corroborates that of Serrano and DiPierro.

Secrecy Over the RFK Autopsy Report

The reports on the autopsy of Senator Robert F. Kennedy have been suppressed in three separate ways: first, by the judge's ruling before the trial of Sirhan; second, by attempts to silence the coroner, Dr. Thomas Noguchi, by intimidation; and third, by passing a special California law making the autopsy reports secret for 75 years.

The attempts to intimidate Dr. Noguchi are like a scene out of the movie "Z". After he told in public the results of the autopsy, he was accused of being insane and fired. He took the issue to court, and won a victory, when his lawyer Godfrey Isaac threatened to subpoena the autopsy and introduce it in court. Then the Los Angeles Police Dept. rehired Noguchi.

Summary

To summarize, the officials of the Los Angeles Police Department have been and still are suppressing important evidence about the RFK assassination. This evidence points toward a conspiracy, with Sirhan being a patsy, toward a hotel security guard firing the three shots which hit RFK, and toward at least one other person, a girl, being involved in the conspiracy.

INDEX TO "SPECIAL UNIT SENATOR"

(Continued from page 60)

key: 257
list by DA: 256
names taken at Ambassador Hotel: 13
23 at hearing to indict Sirhan: 82
Wolfer, DeWayne, Officer
ballistic expert: 97
conducts gun shot sound tests: 118-119
examines shell casings: 266
"Wolfgang": 299
wounds of Senator Kennedy,
ballistics report: 97-99
description: 38
Wright, G. E., Lieut.: 67

XYZ: Y team, SUS: 111
Yaro, Boris: 287
Yegar, Moshe, Israeli Consul: 234
Yorty, Sam, Mayor,
press conference: 221
public statement: 95
Young, T.B., Officer: 81
Young, Marcus LeGrand: 164
Younger, DA,
represents the People: 185
at Sirhan's pleading: 225
Zandani, Abdo Dhafer: 257
Zandani, Ali Dhafer: 257
Zrakat, George, Jordanian honorary consul: 115

ADVERTISING INDEX

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

ADVANCED SYSTEMS INC., 9575 W. Higgins Rd., Rosemont, Ill. 60018 / Page 2 / John Vollbrecht Company

W. H. EVANS, 947 Old York Rd., Abington, Pa. 19001 / Page 3 / —

SCIENTIFIC DATA SYSTEMS ISRAEL, LTD., P. O. B. 5101, Haifa, Israel / Page 64 / Bing Linial Advertising

CALENDAR OF COMING EVENTS

Oct. 5-7, 1970: 1970 Symposium on Feature Extraction and Selection in Pattern Recognition, Argonne National Laboratory, Argonne, Ill. / contact: David Jacobsohn, Argonne National Laboratory, Argonne, IL 60440

Oct. 5-9, 1970: Computer 70—International Computer Exhibition, Olympia, London, England / contact: M. F. Webster, Leedex Limited, 100 Whitechapel Road, London, E.1., England

Oct. 7-9, 1970: American Production and Inventory Control Society 13th Annual International Conference, Ohio Convention Exposition Center, Cincinnati, Ohio / contact: APICS National Office, Suite 504, Watergate Bldg., 2600 Virginia Ave., N.W., Washington, D.C. 20037

Oct. 11-14, 1970: 33rd Annual Meeting of the American Society for Information Science (ASIS), Sheraton Hotel, Philadelphia, Pa. / contact: ASIS 1970 Convention Chairman, Dr. Eugene Garfield, Institute for Scientific Information, 325 Chestnut St., Philadelphia, Pa. 19106

Oct. 12-13, 1970: Sixth National Data Processing Conference of the Information Processing Association of Israel, Tel Aviv Hilton Hotel, Tel Aviv, Israel / contact: S. Shalish, Chmn., Information Processing Association of Israel, P.O.B. 3009, Jerusalem, Israel

Oct. 12-14, 1970: SIAM (Society for Industrial and Applied Mathematics) 1970 Fall Meeting, Hotel Lenox, Boston, Mass. / contact: General Chairman, SIAM 1970 Fall Meeting, 33 South 17th St., Philadelphia, Pa. 19103

Oct. 12-16, 1970: USE Fall Conference, Sheraton-Biltmore Hotel, Atlanta, Ga. / contact: User Group Relations, Univac Division, Sperry Rand Corp., P.O. Box 500, Blue Bell, Pa. 19422

Oct. 13, 1970: Second Annual TDCC (Transportation Data Coordinating Committee) Seminar on the Computerization of Transportation Data and Information Systems, Presidential Ballroom, Statler Hilton, Washington, D.C. / contact: Transportation Data Coordinating Committee, 1101 Seventeenth St. NW, Washington, D.C. 20036

Oct. 14-16, 1970: ADAPSO's 30th Management Conference & 9th Annual Meeting, Paradise Island Hotel, Nassau, Bahamas / contact: ADAPSO (Association of Data Processing Service Organizations, Inc.), 551 Fifth Ave., New York, N.Y. 10017

Oct. 14-16, 1970: IEEE Systems Science & Cybernetics Conference, Webster Hall Hotel, Pittsburgh, Pa. / contact: Prof. A. Lavi, Carnegie-Mellon Univ., Pittsburgh, Pa. 15213

Oct. 14-16, 1970: International Conference on Management Information Systems, Copenhagen, Denmark / contact: Harald Josefsen, Program Committee Chmn., The Danish EDP Council, Vesterbrogade 1, DK-1620 Copenhagen V, Denmark

Oct. 14-16, 1970: Conference on Earth Station Technology, London, England / contact: Helen Kaye, The Institution of Electrical Engineers, Savoy Place, London WC2, England

Oct. 14-17, 1970: International Symposium on Digital Computer Applications in Engineering Sciences, Technical University of Istanbul, Turkey / contact: F. A. Akyuz, I.T.U. Hesap Merkezi (Computation Center), Taskisla 114, Istanbul, Turkey

Oct. 15-16, 1970: 1970 Atlantic Div. of Assoc. for Systems Management Eighth Annual Atlantic Systems Conference, New York Hilton, New York City, N.Y. / contact: Malcolm B. Foster, A.S.C., Box 461, Pleasantville, N.Y. 10570

Oct. 19-20, 1970: 5th Annual Conference, Digitronics Users Association (DUA), Ambassador Hotel, Chicago, Ill. / contact: Executive Secretary, DUA, Box 113, Albertson, L.I., N.Y. 11507

Oct. 19-21, 1970: 11th National Meeting of The Institute of Management Sciences, Los Angeles Hilton Hotel, Los Angeles, Calif. / contact: Gene Saxby, Security Pacific National Bank, P.O. Box 2097 Terminal Annex, Los Angeles, Calif. 90054

Oct. 20, 1970: Division 11 Fall Conference of the Pittsburgh Chapter of the Data Processing Management Association, Pittsburgh, Pa. / contact: James J. Dean, P.O. Box 2004, Pittsburgh, PA 15230

Oct. 26-28, 1970: Data Processing Supplies Association, Fall General Meeting, The Park Sheraton Hotel, 7th Ave., and 56th St., New York, N.Y. / contact: Data Processing Supplies Association, 1116 Summer St., P.O. Box 1333, Stamford, Conn. 06904

Oct. 26-28, 1970: Forum of Control Data Users (FOCUS) Regional Conference, Statler Hilton Hotel, Washington, D.C. / contact: William I. Rabkin, FOCUS Exec. Sec., c/o Itek Corp., 10 Maguire Rd., Lexington, Mass. 02173

Oct. 26-29, 1970: 25th Annual ISA Conference & Exhibit, Civic Center, Philadelphia, Pa. / contact: K. F. Fitch, Meetings Coordinator, Instrument Society of America, 530 William Penn Place, Pittsburgh, Pa. 15219

Oct. 26-30, 1970: 12th Annual BEMA Business Equipment Exposition, New York Coliseum, New York, N.Y. / contact: Business Equipment Manufacturers Association (BEMA), 1828 "L" St. NW, Washington, D.C. 20038

Oct. 27-29, 1970: 12th Annual BEMA Management Conference, American Hotel, New York, N.Y. / contact: Business Equipment Manufacturers Association (BEMA), 1828 "L" St. NW, Washington, D.C. 20038

Oct. 27-30, 1970: Midwest Power Systems Conference and Symposium (IEEE co-sponsor), Iowa State University, Ames, Iowa / contact: H. K. Baker, Engineering Extension, 110 Marston Hall, Iowa State University, Ames, Iowa 50010

Oct. 29-30, 1970: IEEE Joint Engineering Management Conference, Drake Hotel, Chicago, Ill. / contact: AIIE Headquarters, 345 E. 47th St., New York, N.Y. 10017

Nov. 10-12, 1970: National Symposium on Criminal Justice Information and Statistics Systems, Sheraton-Dallas Hotel, Dallas, Texas / contact: Project SEARCH, 1108 14th St. Fifth Floor, Sacramento, Calif. 95814

Nov. 12-13, 1970: Canadian IEEE Symposium on Communications, Queen Elizabeth Hotel, Montreal, Quebec, Canada / contact: IEEE Headquarters, Technical Conference Services, 345 E. 47th St., New York, N.Y. 10017

Nov. 12-13, 1970: CAST '70 Conference (AIIE), The Americana Hotel, Miami Beach, Fla. / contact: Joseph P. Lacusky, American Institute of Industrial Engineers, Inc., CAST '70, P. O. Box 1081, Miami, Fla. 33148

Nov. 12-13, 1970: 11th IEEE Symposium on Man-Machine Systems, Langford Hotel, Winter Park, Fla. / contact: The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th St., New York, N.Y. 10017

Nov. 16, 1970: ACM Computer Graphics Workshop, Houston, Tex. / contact: Jackie Potts, ACM, SIGGRAPH, Box 933, Blair Station, Silver Spring, MD 20910

Nov. 17-19, 1970: Fall Joint Computer Conference, Astro Hall, Houston, Tex. / contact: L. E. Axsom, IBM Scientific Ctr., 6900 Fannin, Houston, Tex. 77025

Nov. 19-20, 1970: 1970 Data Processing Conference (sponsored by the Data Processing Management Association, Empire Division), Statler Hilton Hotel, New York City, N.Y. / contact: Conference Registrar, CONFERENCE '70, P.O. Box 1926, Grand Central Station, New York, N.Y. 10017

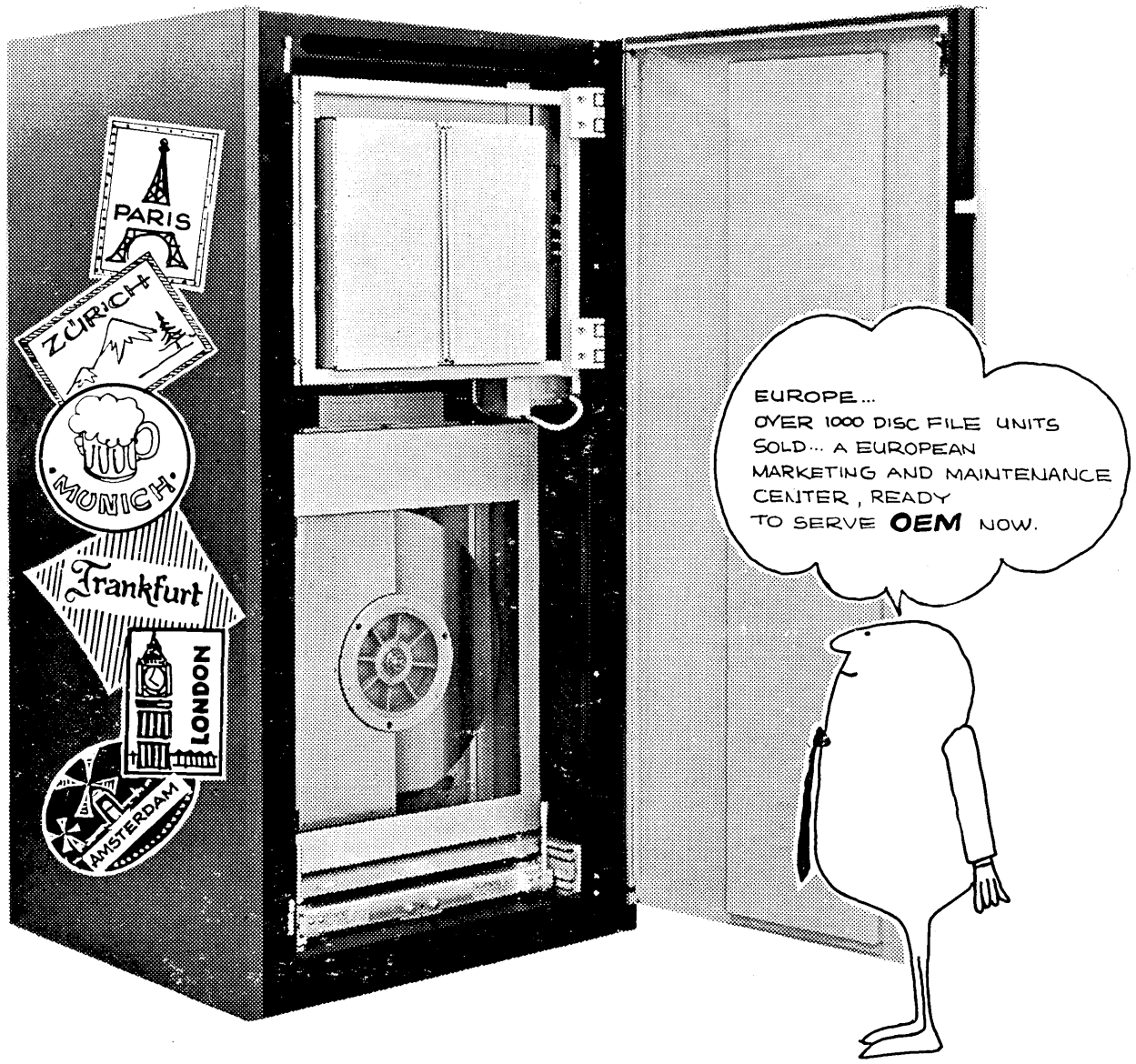
Nov. 19-21, 1970: DECUS (Digital Equipment Computer Users Society) 1970 Fall Symposium, Shamrock Hilton, Houston, Texas / contact: DECUS, Digital Equipment Corp., Maynard, Mass. 01754

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

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

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

Disc Files liked Europe so much... that we decided to stay !



The field-proven 720 Series head-per-track magnetic disc storage units provide up to 51.3 megabits (512 tracks) of fast-access, low cost storage. At 1800 RPM, average access is 16.9 msec, while serial transfer rate is 3 megabits per sec. Digital control electronics and a flexible recording scheme permit the user to select the number of fixed-sized sectors (blocks) per track. Reliability is ensured with self-clocked Manchester data-coding and an all-electronic, head-sparing system.

Our electronic interface design group will adapt both data organization and input-output logic systems to match OEM users requirements.

SDSi
SCIENTIFIC DATA SYSTEMS ISRAEL, LTD.

FOR INFORMATION: SCIENTIFIC DATA SYSTEMS ISRAEL, LTD., P.O.B. 5101, HAIFA, ISRAEL
OR: SDSI PERIPHERALS AG, GERTRUDSTRASSE 24, 8003 ZURICH, SWITZERLAND, TEL. (051) 23 89 33