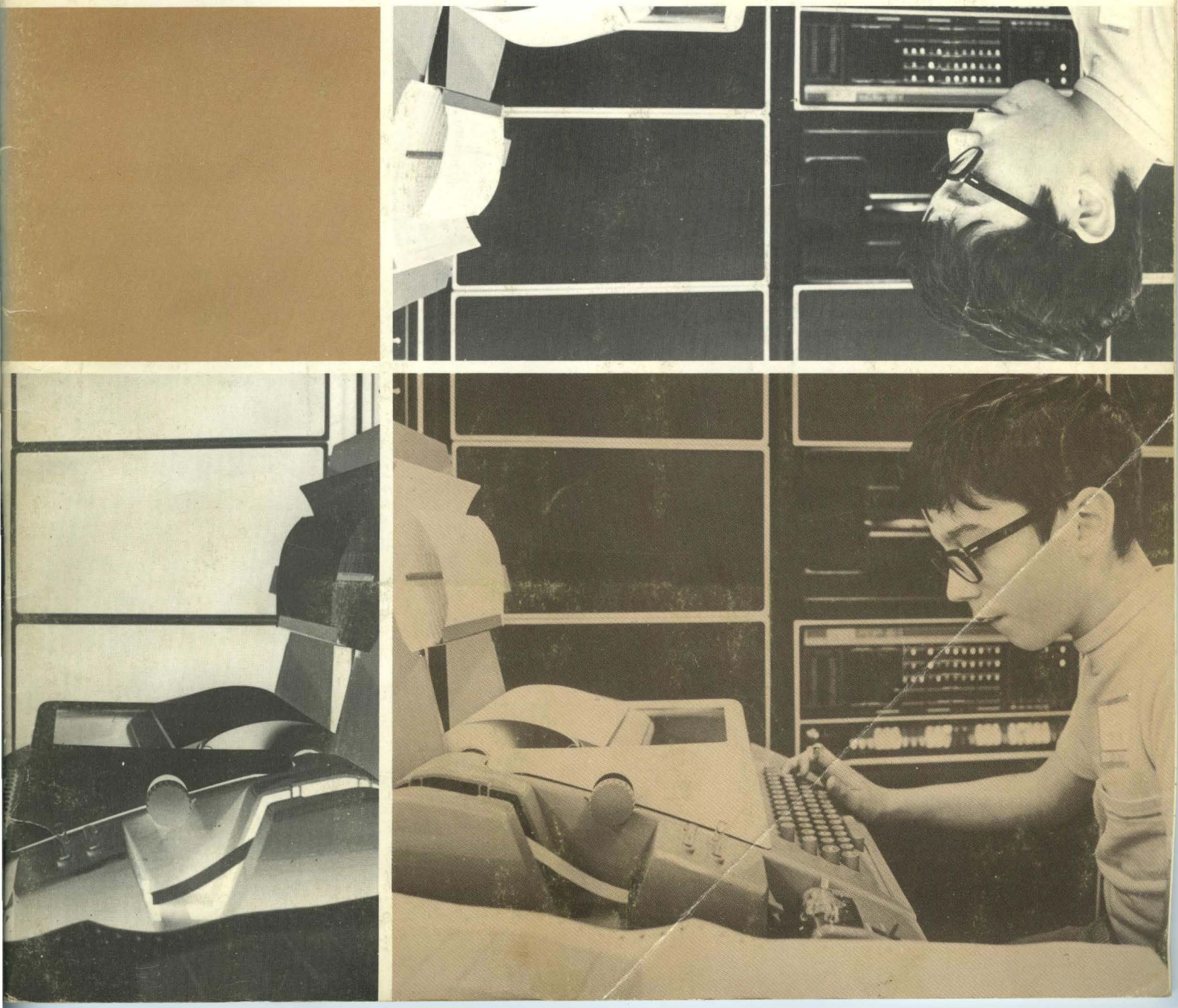
SCIENCE & TECHNOLOGY
July, 1970
Vol. 19, No. 7

computers and automation

Thinking . . . . Computer — Aided



THE MAY ARTICLE

THE ASSASSINATION OF PRESIDENT JOHN F. KENNEDY:

THE APPLICATION OF COMPUTERS TO THE PHOTOGRAPHIC EVIDENCE

Computers and Automation, published in its May issue a 32-page feature article, "The Assassination of President Kennedy: the Application of Computers to the Photographic Evidence".

In this article, Richard E. Sprague, President, Personal Data Services, Hartsdale, N.Y., states that analysis of the evidence proves:

- that the Warren Commission conclusions (that Lee Harvey Oswald was the sole assassin, and that there was no conspiracy) are false;
- that there were at least four gunmen firing from four locations, none of whom was Oswald;
- that the conspiracy to kill Kennedy involved over 50 persons (of whom several are identified in the article) including members of the Dallas police, and elements of the Central Intelligence Agency of the United States; etc.

The evidence published in this article includes eleven important photographs. One of them shows Jim Hicks, who admitted he was the radio communicator among the firing teams at Dealey Plaza, with his radio transmitter in his back left pocket. The article includes a tabulation of over 500 photographs (counting a movie sequence as one photo) taken in and around Dealey Plaza, Dallas, Texas, Nov. 22, 1963, at the time of President Kennedy's assassination and shortly thereafter. Both a spatial chart and a timing chart of the events and the photographs are included in this article.

Sprague, a computer professional for over 24 years, has as an avocation, studied the old and the new evidence for over 6 years, and has analyzed over 400 of the 500 photographs.

The work in computerized analysis of over 300 still photos and over 25,000 frames of movie sequences has been started.

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An excerpt from the May article

Part 2. The Photographic Evidence

The assassination of President John F. Kennedy was the most photographed murder in history. Approximately 75 photographers took a total of approximately 510 photographs, either before or during or within an hour after the events in Dealey Plaza, and either there or nearby or related to those events. The word "photograph" in this context includes both still photos and movie sequences. The number of frames in a movie sequence ranges from about 10 to about 500; and in the count of 510 photographs given above, the 10 to 500 frames of a single movie sequence are counted just as one photograph. The total number of frames is over 25,000.

The Warren Commission examined 26 photographs, about 5 percent of the 510. The FBI examined about 50 photographs, or about 10 percent. The most famous of all the photographs is the Zapruder film, which had over 480 frames.

Many of the photographs were taken by professional photographers. About 30 of the photographers were professionals who worked for newspapers, television networks, and photographic agencies.

The Warren Commission did not interview a single one of the professional photographers, nor did the Warren Commission see any of their photographs.

Fifteen of these professionals were actually in the Kennedy motorcade, no further than 6 car lengths behind the Kennedy car. Five of these photographers were television network cameramen. The Warren Commission looked at none of their photographs.

Two of the photographers were from the White House. One of these men (Thomas Atkins) was the regular photographer for the White House. He made a special film for Lyndon B. Johnson. Atkins used his own film plus some footage obtained from the television photographers. Johnson looked at the film and then put it away. This film is now stored with the Kennedy Memorial Library materials in a warehouse in Washington, D.C.; it is stated to be "unavailable" to researchers. The Commission did not see this film, nor did they interview Atkins.

Because the professionals used movie cameras of professional quality, their films are exceedingly revealing and valuable as primary evidence. The Warren Commission looked at none of these films.

Chart 2 of this article shows the times of about 50 of the photographs taken in Dealey Plaza during Kennedy's passage through it.

Table 3 of this article lists over 510 photographs so far identified and known to exist or to have existed — with possibly a few borderline cases.

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Letters To The Editor

Tremendous Reader Interest

I am writing to tell you about the tremendous interest our article "Automated Experiment Control and Data Acquisition – A Minicomputer Application" [December, 1969 issue, page 32] generated among a wide readership of your magazine. We all appreciate the interest of your readers in this exciting field of mini-computers.

MIKE SHAH
Digital Equipment Corp.
146 Main St.
Maynard, Mass. 01754

Computer Directory

The State University of New York is a multi-university which comprises in one system over sixty universities and colleges. Our Office of Educational Communications supplies, supervises, and assists in the use of audio-visual materials for this vast system.

At present, we are engaged in a search for materials to construct a course introducing basic computer concepts and the FORTRAN and COBOL programming languages. I am collecting information on what is available in the field.

The National Association for Educational Data Systems tipped me off about your annual "Computer Directory and Buyers' Guide". I would like to receive last year's copy as soon as possible, and this year's when it is published. Please bill me.

THOMAS J. TURLEY
Research Assistant
State University of New York
Thurlow Terrace
Albany, N.Y.

The Future of Computers

I read with interest your article in your January, 1970 issue, "The Future of Automatic Computers: 1949, 1961, 1970" [page 18]. You did an excellent job of forecasting at the time the article was written.

As a student in technological forecasting, I would like to know if you have made a recent prediction on the future of computers, especially in the area of information services or information retrieval.

CARLOS RIVERA ABRAMS
922 State St., Apt. #7
Schenectady, N.Y. 12307

Ed. Note – Your kind comments are appreciated. I have not made any prediction on the future of computers in the areas you mention.

Teacher Seeks to Correspond on Computer Subjects

I would very much like to correspond with teachers of computer subjects in non-British schools. I am a teacher in a British senior high school for pupils aged 14 to 19. I teach mathematics mainly, but we have introduced computer studies in our curriculum. I would find it most helpful and interesting to be able to exchange ideas with others who are doing similar teaching.

M. G. PAUL HUTCHINSON
Asst. Mathematics Teacher
Hreod Burna School
Akers Way, Moredon
Swindon, Wiltshire, England

The "Humanistic" Aspects of Technology

I began my subscription to your magazine several months ago. I have been quite pleased with the materials that I have found in your journal.

What has struck me most is the emphasis which you place on the more "humanistic" aspects of the work of the technologists. This pleases me greatly, since it is my conviction that the prime importance of what we are all engaged in, in the area of technology is that what we do must be for the benefit of man.

BROTHER AUSTIN DAVID, FSC
Director, Educational Data Systems
Archdiocese of New York
650 Grand Concourse
Bronx, N.Y. 10451

computers and automation

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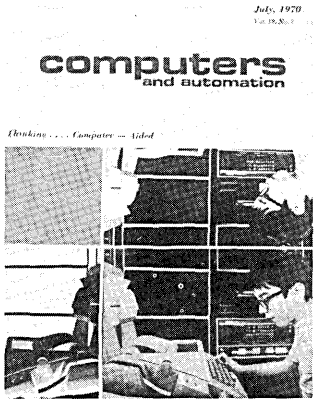
computers and automation

Vol. 19, No. 7 — July, 1970 *The magazine of the design, applications, and implications of information processing systems.*



Important decisions are something even young programmers must face, as can be seen in the front cover photograph of Charles Hornig, age 12. Charles is pondering his next move as he develops a program on a small time-sharing computer during a visit to Digital Equipment Corporation's plant in Maynard, Mass. He learned programming while a sixth grader in Lexington, Mass. Besides computers, Charles is interested in football, baseball, and is a Boy Scout.

NOTICE

* D ON YOUR ADDRESS IMPRINT MEANS THAT YOUR SUBSCRIPTION INCLUDES THE COMPUTER DIRECTORY. * N MEANS THAT YOUR PRESENT SUBSCRIPTION DOES NOT INCLUDE THE COMPUTER DIRECTORY. SEE PAGE 64.

Computer-Assisted Political Analysis

There are many great problems in political affairs where a computerized data base and computer-assisted analysis either will shortly become essential or have become essential already. These are problems where:

- It is very hard to know the facts;
- The facts are changing importantly from day to day or from week to week;
- The issues are undeniably important;
- A great many people who want to stay informed about these problems are already reading newspapers and magazines, listening to radic, watching TV, and are already paying over $100 to $200 per year for current information of political importance;
- And these people are having trouble finding out, learning, and remembering the important parts of the information.

For a personal example, let me take the "highway lobby" and the gasoline tax (which seems very high). I have only some vague information about this field. About a year ago a friend of mine told me that all gasoline taxes had to be spent on highway construction; this shocked me; that clearly was unreasonable. Also, it is clear to me that the environment has suffered from: the construction of many rather unnecessary and undesirable super-highways; the resulting displacement of large numbers of unfortunate people; the production of quantities of polluted air from motor vehicles; huge traffic jams; etc. But in this field there is a great deal I do not know and have not verified:

- I do not know the facts;
- I do not know any good references in which to look up the matter;
- I do not know whose information to believe in this field, which is outside of my own fields of concentration;
- I am not likely to have time to find out what I need to know.

Suppose some client came to me as a consultant and said:

> I have heard that you are a good computer professional, with a good reputation. I wish to apply computers to the study of the highway problems in the United States, and to reaching good decisions in the interests of all the people in the United States. I want your help.

I would have to say to him: "I don't see how I can help you. I have no foundations of knowledge for this problem."

This area is typical of many giant political problems today in the United States (and undoubtedly elsewhere besides). The pattern is very much the same in dozens of situations:

1. A political need is observed, which businessmen can fulfil.
2. They stimulate the need; that is, they organize attention from various branches of government, formal and informal; they succeed in exerting enough influence so that public funds start to pour into this field.
3. In this field, business and industry develops; the momentum grows; firms develop; jobs develop; suppliers develop; construction develops; the finished goods such as highways are delivered to the public, sometimes with scandal, most of the time without scandal.
4. For a few years, the field blooms – and much useful work is done.
5. Then the law of diminishing returns begins to operate. The need tends to be overfulfilled, because the public, the legislatures, the city, state, and federal governments have a slow reaction time.
6. But vested interests have now developed; waste, unnecessary activities, intense lobbying, become conspicuous. Many kinds of conflicting, emotional arguments fill the media.
7. It becomes very difficult for everybody to turn off the great flow that has been stimulated.

It is the old parable of the Sorcerer's Apprentice in modern terms.

Even some projects which have almost no reasonable justification receive public funds in huge quantities – such as the supersonic transport.

The people of the United States do not have enough knowledge, unbiased facts, understanding, so that they can exert reasonable controls over dozens and dozens of important projects – so that they can correct the situation at the time and in the way that the situation needs correction. This kind of out-of-control process would not be tolerated within a business or a factory. These problems demand computerized presentation of facts, background information, and proposed solutions. They need to be offered by competing public services.

What shall we do as computer professionals? What shall we do as concerned human beings with professional training in an almost miraculous technique of the present century – electronic data processing?

I think the answer is clear. In the capacity of computer businessmen and professionals, we need to become experts also in producing and providing data for the big problems of society and politics. We need to become what might be called a branch of Nader's Raiders so as to apply our knowledge and our computers to the great aching problems of society. We need to think about, plan, and prepare PMIS's – Political Management Information Systems.

To this end, *Computers and Automation* has in the past and will even more vigorously in the future regularly assign a portion of its pages to discussion and presentation of the aching problems of our society and our times. We shall seek important news and reliable interpretations to publish. We shall look for reliable references and publish citations, for information and action. We hope we can publish something like "Environment Hot Line" as it appears in the *Boston Globe* from time to time (see sample below).

We invite explanatory articles on these subjects, to point out the benchmarks of facts and systems, and the ways in which computers can be applied to provide better data on problems, facts, proposed solutions, and better use of resources: PMIS's.

We plan to deal particularly with the input of reliable knowledge that is needed for successful computerized data banks and computer-assisted analysis, and to avoid the curse of "garbage in, garbage out".

Edmund C. Berkeley

Editor

FOR MORE HOT LINES

The adjoining box of information "Environment hot line" is printed from time to time in the *Boston Globe* – a daily newspaper that has a large circulation in the Boston metropolitan area and displays a social responsibility. We publish this here as an example of the way in which a periodical can provide useful information so that its readers can take specific actions that they may be moved to take. This example is particularly interesting because it is NOT news, but instead reference information for the purposes of action, for the purposes of making an individual's own influence felt in a democratic society – a society where a citizen who protests does not disappear into prison or a concentration camp, but continues to live normally and has a fairly good chance of helping to produce useful change.

Environment hot line

Tired of having your eardrums rattled by jet noise, your nose twitching from stinking air or reeking water, your eyes assaulted by the steady erosion of the quality of the environment? Next time, don't just grimace and bear it, call the following agencies to take action:

Air Pollution—General (smoke, odors, burning dumps). Massachusetts Department of Public Health, Metropolitan Air Pollution Control, Frank Reinhardt 727-5194
From motor vehicles. Registry of Motor Vehicles, J. L. Hourihan, Vehicle Inspection Section, 160 North Washington St., Boston
City of Boston: Boston Air Pollution Control Commission 227-4890

Noise—From airplanes. Massachusetts Port Authority, Thomas P. Callaghan 482-2930
From motor vehicles. Registry of Motor Vehicles, J. L. Hourihan, Vehicle Inspection Section, 160 North Washington st., Boston. License number, color and make of vehicle. Written complaints only. Other noises. Local police department.

Water and/or Oil Pollution—Massachusetts Department of Natural Resources, Water Pollution Control, Thomas McMahon...727-3855

Pollution and Contamination From Pesticides—Massachusetts Department of Public Health, Pesticides Board, Lewis F. Wells 727-2670

Rubbish and Garbage—City of Boston, Public Works Department, Sanitary Division 536-7150

Litter and Street Cleaning—City of Boston, Public Works Department, Highway Division 536-7150
City of Boston, Parks and Recreation (Re litter in parks) 722-4100
Other cities and towns, local police or local city halls.

Wetlands (Filling In Ponds and Marshes)—Massachusetts Department of Natural Resources, Division of Conservation Services, George R. Sprague 727-3170

Prepared by John Putnam, executive director of Boston Environment, Inc., 14 Beacon st. Phone: 227-2669. Volunteers should apply there.)

MULTI-ACCESS FORUM

"THE INVASION OF PRIVACY" — COMMENT

William K. Berglund, Professional Engineer
1923 Highland Dr.
Fernandina Beach, Fla. 32034

Your editorial in the April issue, "The Invasion of Privacy" [page 6] contains some introspective reflections on a serious problem. It also poses some asinine suggestions as "solutions".

The most fundamental error is the division of the citizens into two groups: " . . . . a minority in charge of the government who stand for 'law and order' and who are firmly carrying on a most unpopular war in Vietnam", and "a vocal majority of the people of the country who want domestic change and progress, the stopping of the war in Vietnam, and the diversion of large funds from the military industrial complex to cities, health, environment, improvement, and socially useful goods and services".

This premise of such a division is indefensible. One cannot be sorted-out so as to fall neatly in one group or another.

To imply that advocates of "law and order" are the only ones wishing to pursue the war in Vietnam is to make a connection that cannot stand logical scrutiny. To imply that all the advocates of the war in Vietnam are, *ipso facto,* for "law and order" is equally ludicrous. To imply that people who want "law and order" are in the minority in this country is incorrect. And to imply that persons interested in "socially useful goods and services are neither interested in nor advocate "law and order" does them a great disservice. I quarrel, too, with "a vocal majority . . . want . . . the stopping of the war in Vietnam". My quarrel here is that you stopped short. It is practically *unanimous* in this country that we want the war stopped. The difference is in methods.

Because I want a community with sufficient "law and order" to make the streets safe to walk at night for *all* citizens, to be free from the snipers, to be free from the fire bomb, to bring up my children secure from panderers, molesters, and drug pushers, you have classified me as a hawk on Vietnam, against change and progress, opposed to environmental improvement, health, and socially useful goods and services! What gall! What presumption! What utter nonsense!

The tragedy of the matter is not that you have besmirched me. The tragedy is that too many of your readers (*one* is too many), may accept your classifcation of our citizenry which will further polarize a society already rent.

II. From the Editor

Thank you for your letter and for your challenge to my remarks in my April editorial.

To deal with what you call my "most fundamental error" and to make clearer what I am asserting, I think I must first quote the paragraph where I refer to "law and order":

> The United States appears to be heading into a period where there will be a substantial conflict between a minority in charge of the government who stand for "law and order" and who are firmly carrying on a most unpopular war in Vietnam, and a vocal majority of the people of the country who want domestic change and progress, the stopping of the war in Vietnam, and the diversion of large funds from the military industrial complex to cities, health, environmental improvement, and socially useful goods and services. . . .

To stand for "law and order" is to support a slogan with two meanings.

One meaning is a literal meaning, desiring law and order (and equal protection from the laws) all over the United States and for all members of our society including minorities, sharecroppers, grape pickers, ghetto residents, and persons walking on streets at night.

But any person who looks clearly at what actually goes on in the United States realizes that there are two kinds of law and order actually working; one is for the rich and middle class people, and the other is for the poor people and various minorities.

All persons of good will, including you I am sure, want one kind of law and order actually working – a fair and equal kind, which does not favor or disfavor people because of their property or wealth or education or skin color or ethnic origin. But it does not happen that way – there is not money enough in the governmental system of justice, there is not time enough in the courts, there are not enough trained people in prisons, etc.

The second meaning of "law and order" is a meaning by connotation. When George Wallace of Alabama stands for "law and order", he is to be included among people supporting the status quo and who desire vigorous repression of anybody who is "violent"; but these people do not include as "violence" the violence of police beating students, the violence of the National Guard killing students at Kent State College, the violence of "free fire zones" in

THE PURPOSES OF MULTI-ACCESS 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.

Vietnam, the violence of defoliating 20% of Vietnam with chemicals poisonous to human beings, the violence of a manufacturer and his employees making antipersonnel bombs that bounce and bounce and finally explode hundreds of razor-sharp pieces of steel.

A status quo as a general rule regularly requires "law and order", and regularly uses repression and, if necessary, violence in order to maintain the status quo.

The same is true of the status quo in the Soviet Union. Many citizens who protest the lack of freedom of speech guaranteed by the Soviet Constitution, or who picket with signs condemning the Soviet invasion of Czechoslovakia, are whisked away and disappear, sometimes for years, sometimes forever. Of course, violence also includes such actions performed in the name of "law and order"

In my opinion, there is a high correlation among the people in the United States who utter the slogan "law and order", and the people who are in favor of vigorous repression of dissent, and finishing a most unpopular war in Vietnam by "bombing them back into the stone age."

But of course real law and order is a much deeper thing. I sometimes think that the persons who shout the slogan loudest have the least conception of how far the status quo in the United States needs to be changed to really attain it. ☐

"THE HOUSE IS ON FIRE" – MORE COMMENT

Norwood Jones, Data Processing Manager
First National Bank
El Dorado, Ark. 71730

With regard to the Multi-Access Forum in your May issue ["The House is on Fire" – Comments, page 8-9], I would like to make several comments.

Mr. H. Lynn Beus is correct in asserting there are moral issues deeper than the population explosion and Vietnam. However, when one has committed himself to these deeper, overall moral principles, then finding solutions to our problems becomes a necessary action. Without this action, the commitment is meaningless.

Mr. Frank Mleko is also correct in his statement that *Computers and Automation* contains less technically useful information than other magazines. This is why I continue to spend my firm's money on it. Technically superior systems help any business, but superior personnel are at least as valuable. I feel that C&A improves the people in my department and thereby contributes to the success of our business.

OVER 700 COMPUTER PEOPLE RECEIVE THEIR CERTIFICATE IN DATA PROCESSING (CDP)

R. Calvin Elliott, Executive Director
Data Processing Management Association
505 Busse Highway
Park Ridge, Ill. 60068

A total of 718 computer people have passed the 1970 examination for the Certificate in Data Processing (CDP) given by the certification council of the Data Processing Management Association.

There were 2,312 who took the exam last February at over 100 test centers at colleges and universities in the U.S. and in Canada. Scoring and analysis of the exam results were performed by an independent testing and research organization.

The new CDP recipients bring to 11,069 the total number who have been granted the certificate since the first examination in 1962.

The exam establishes a method for recognizing individuals having knowledge considered important to data processing and information management. Exam applicants must have had three years of EDP experience and also possess certain academic qualifications.

The exam covered five general areas: data processing equipment; computer programming and software; principles of management; quantitative methods; and systems analysis and design. ☐

REPRESENTATIVES OF 40 PROFESSIONAL ORGANIZATIONS PLAN A "NATIONAL COMPUTER YEAR"

Sam Matsa, Chairman
ACM '70
Association for Computing Machinery
1133 Ave. of the Americas
New York, N.Y. 10036

First steps toward making the ACM-proposed National Computer Year a reality have been taken by the Provisional Co-ordinating Committee. The Committee is composed of representatives of more than 40 diverse professional organizations representing science, engineering, finance, medicine, law, government, education and other professions. The members of the Committee have unanimously agreed that the concept of a National Computer Year is in the national interest and have appointed an ad hoc committee to develop a plan and program.

Members of the Ad Hoc Committee are:

John J. Alexander, Jr., New York Stock Exchange
Barry W. Boehm, American Institute of Aeronautics & Astronautics
Alec Bumsted, Association of Education Data Systems
John Jacka, National League of Cities
John H. McLeod, Jr., Simulation Councils, Inc.
Noel K. Zakin, The American Institute of CPA's
Herbert R. Kolleor, American Society for Information Service (AFIPS Representative)

The initial objectives of the National Computer Year are to:

Maximize the use of computers in serving national goals.
Deepen the public understanding of the role and potential value of the computer.
Improve the decision-making ability of government, education, and private enterprise. □

SYSTEM/3 USERS' GROUP IS FORMED

Tom Adamski, Secretary-Treasurer
c/o Trilog Associates, Inc.
1700 Market St., 15th Floor
Philadelphia, Pa. 19103

Representatives of several companies with an active interest in the IBM System/3 have formed the Delaware Valley System/3 Users' Group. At the first meeting of the group, bylaws were adopted and temporary officers were selected. The objectives of the organization are:

– To provide a forum for the discussion of topics of mutual interest to System/3 users.
– To serve as a focal point for information relating to System/3
– To enable System/3 users to establish working relationships with each other.
– To become a representative group for the System/3 community.

The organization is interested in increasing its membership, and anyone interested in participating is invited to write me at the address above. □

SUMMARY OF COMPUTERS INSTALLED IN THE RAILWAY INDUSTRY

In Estimated Monthly Rental by Manufacturer

		Average Monthly Rental $(000)			Increase or Decrease	
Mfg.	Model	1/31/69	1/31/70	% Total	$ (000)	%
IBM	360/20	64.4	85.2			
	/25		43.2			
	/30	344.1	426.3			
	/40	798.0	939.0			
	/50	462.0	600.0			
	/65	630.0	840.0			
	1400	176.3	142.6			
	7000	437.5	225.0			
	Other	80.1	16.2			
		2992.4	3317.5	88.3	325.1	10.8
UNIVAC	III, 90 & Step 2	119.0	92.0			
	418	33.0	22.0			
	1000	19.0	20.5			
	9000	14.3	15.8			
		185.3	150.3	4.0	- 35.0	- 18.9
Honeywell	All	43.3	21.0	0.5	- 22.3	- 51.5
GE	All	104.2	118.5	3.2	14.3	13.7
Collins	-	20.0	20.0	0.5	0	0
RCA	All	172.0	118.0	3.1	- 54.0	- 31.4
Other	All	8.3	10.0	0.4	1.7	20.5
TOTAL		3525.5	3755.3	100.0	229.8	6.5

*Source: R. A. Petrash, Executive Director, Association of American Railroads, Data Systems Div., American Railroads Bldg., Washington, D.C. 20036.

THE MARTIN LUTHER KING MEMORIAL PRIZE CONTEST

Several entries have been received for the Martin Luther King Memorial Prize Contest. (For reference, see page 14 in the April issue of *Computers and Automation.)* The judges have not finished their appraisal of the entries. Consequently, the announcement of the results of the contest for its second year, 1970, and the publication of the winning entry (if one is selected), are now scheduled for the August issue. □

C.a PUNCH LINES . . .

In the immediate future, knowledge, rather than capital, labor or raw materials, will become the major source of economic growth. Knowledge, not things, will become the new basis of productivity. It will become the force which drives our economy. And the computer, as the central organizer and repository of information, will play a massive role in this new society. **But it is an exercise in futility to have massive data banks if we don't have the data transmission capacity to make their information immediate, accessible, and universal.** Unless we find a fast, efficient, reliable means of transporting digital data (i.e., knowledge) between computers, data banks, and terminals, we will severely limit our opportunities to make the computer a major instrument in human service during the 1970's.

– *Sam Wyly, Chairman*
University Computing Company
1300 Frito-Lay Tower
Dallas, Tex. 75235

A classic reversal in the value of information is occurring. Advance access to private stores of information, for all time, has been the source of power and wealth. But now commercial firms are finding new ways to share access to their privately and publicly created information stores with mass audiences. Because they can make more money from sharing information than from sequestering it, more and more, rather than less and less, information will be available.

– *Paul G. Zurkowski, Executive Director*
Information Industry Association
1025 15th St. N.W.
Washington, D.C. 20005

The day is past when computer manufacturers will invest large sums in developments simply because of the computer user's demand. It will become increasingly necessary for the user to ultimately bear the cost of not only the equipment he needs, but of the development of his system. This trend will bring increased emphasis to standardized systems and the production of "utilitarian" industry applications. Although new equipment will continue to appear at what may be a bewildering pace, it will be a simple and gradual extension of already-available devices which employ already-understood approaches. Changes in the seventies are going to be evolutionary, not revolutionary.

– *T. Paul Bothwell, Vice Pres. and Gen. Mgr.*
Honeywell Computer Control Div.
Old Connecticut Path
Framingham, Mass. 01701

The fastest growing segment of the small computer market is the minicomputer for monitoring and control applications. These machines are finding increasing use in discrete manufacturing systems, as well as the more traditional continuous process systems. **Shipments of computers for monitoring and control applications, while insignificant just a few years ago, will exceed 5000 units in 1970, growing to an estimated 22,000 in 1975.**

– *The Diebold Group, Inc.*
403 Park Ave.
New York, N.Y. 10022

Recent changes in the attitude of the government toward science and technology have resulted in reduced federal research and development budgets. The response of the scientific community has focussed mostly on the deleterious effects these cutbacks are having on the present health and future growth of America's scientific and engineering programs. Less well debated are the effects these cutbacks will have on the careers and the professional development and attitudes of scientific and engineering personnel. **While government science and fiscal policy can shift in time periods as short as one year, the response time of the educational institution and its students is much longer – on the order of three to six years.** Therefore it is crucial to evaluate the present and future trends in order to be able to plan and advise students and professionals to meet the changing emphases for efficient employment in government, industry, and academia.

– *Dr. Sanborn C. Brown, Associate Dean*
Graduate School
M.I.T.
Cambridge, Mass. 02138

Many users of data processing information don't know how much that information costs their departments. A recent survey indicates that only 18% of firms with their own data processing equipment or using service bureaus charged the costs of using the facilities to the individual departments that use it. The remainder charge data costs to financial or to general and administrative expense, and thus have no means for determining the cost of information obtained through automatic data processing.

– *Clemens Hathaway*
Control-O-Gram, Inc.
201 Haven Rd.
Elmhurst, Ill. 60126

The high rate of turnover of EDP personnel and the increasing need for higher and more sophisticated levels of knowledge and competence are of ever-increasing concern. **If we assume that we have only a given number of people available to an EDP facility, then it should be self-evident that we must increase the level of competence of the people we have.** In order to do this, we must directly use the educational process.

– *Dr. Frank R. Berman*
Senior Consultant
Hazeltine Corp.
Little Neck, N.Y. 11362 □

CALENDAR OF COMING EVENTS

July 15-17, 1970: Primer Congreso Argentino de Instruccion Programada, Pedagogia Universitaria, Buenos Aires, Argentina / contact: Professora Luisa Kohen, Viamonte 430, piso 1°, Buenos Aires, Argentina

Aug. 18-21, 1970: International Conference on Microelectronics, Circuits & Systems Theory, Univ. of New South Wales, Kensington, Sydney, Australia / contact: Jt. Conf. Secretariat, IREE, Australia, Box 3120, GPO, Sydney, 2001 Australia

Aug. 24-28, 1970: IFIP World Conference on Computer Education, Amsterdam, Netherlands / contact: A. A. M. Veenhuis, Secretary-General, IFIP Conference Computer Education 1970, 6, Stadhouderskade Amsterdam 13, Netherlands

Aug. 25-28, 1970: Western Electronic Show & Convention (WESCON), Biltmore Hotel, Sports Arena, Los Angeles, Calif. / contact: WESCON, 3600 Wilshire Blvd., Los Angeles, Calif. 90005

Aug. 31, 1970: Fifth Annual ACM Urban Symposium, New York Hilton Hotel, New York, N.Y. / contact: Paul R. DeCicco, ACM Urban Symposium Chairman, Polytechnic Institute of Brooklyn, 333 Jay St., New York, N.Y. 11201

Aug. 31-Sept. 2, 1970: American Society of Civil Engineers, Fifth Conference on Electronic Computation, Purdue University, Lafayette, Ind. / contact: Robert E. Fulton, Mail Stop 188-C Structures Research Division, NASA Langley Research Center, Hampton, Va. 23365

Sept. 1-3, 1970: 25th National Conference, Association for Computing Machinery, New York Hilton, New York, N.Y. / contact: Sam Matsa, ACM '70 General Chairman, IBM Corp., 410 E. 62nd St., New York, N.Y. 10021

Sept. 2-4, 1970: The Institution of Electrical Engineers (IEE) Conference on Man-Computer Interaction, UK National Physical Laboratory, Teddington, Middlesex, England / contact: Roger Dence, IEE Press Office, Savoy Place, London WC2, England

Sept. 14-24, 1970: 1970 FID (International Federation for Documentation) Conference and International Congress on Scientific Information, Buenos Aires, Argentina / contact: U.S. National Committee for FID, National Academy of Sciences, 2101 Constitution Ave., Washington, D.C. 20418

Sept. 15-16, 1970: 4th Annual Instrumentation Fair, Washington Hilton Hotel, Washington, D.C. / contact: Norm Ward, AD-TECH, P.O. Box 475, McLean, VA 22101

Sept. 17-18, 1970: Computer Science and Statistics Symposium, sponsored by the Los Angeles Chapter of the ACM, University of California, Irvine, Calif. / contact: Dr. Mitchell O. Locks, C-E-I-R Professional Services Div., Control Data Corp., 6060 W. Manchester, Los Angeles, Calif. 90045; or Dr. Michael E. Tarter, Assoc. Prof., Dept. of Mathematics and Dept. of Medicine, University of California, Irvine, Calif. 92664

Sept. 22-24, 1970: The Computers and Communications Conference (IEEE), The Beeches, Rome, N.Y. / contact: Jerold T. McClure, Conference Chairman, P.O. Box 182, Rome, N.Y. 13440

Sept. 22-24, 1970: Univac Users Association Fall Conference, Roosevelt Hotel, New Orleans, La. / contact: User Group Relations, Univac Division, Sperry Rand Corp., P.O. Box 500, Blue Bell, Pa. 19422

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. 11-15, 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. 12-16, 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. 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. 14-17, 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. 19-21, 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. 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. 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: 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

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

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

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

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

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 707

```
    A G E N          W O R D
  X   T L E        + O P E N S
  ---------        -----------
    N I O T N      = G R G P N E
  G N S L T
  P A D G I
  ---------
= W O G A N E N

          D I P = S L W

      74209          41786
```

Solution to Numble 706

In Numble 706 in the June issue, the digits 0 through 9 are represented by letters as follows:

S = 0	W = 5
L = 1	0 = 6
G, K = 2	N, R = 7
D = 3	I, Y = 8
A = 4	E = 9

The full message is: "A good word is a golden key."

Our thanks to the following individuals for submitting their solutions to **Numble 705**: A. Sanford Brown, Dallas, Tex.; T. Paul Finn, Indianapolis, Ind.; Hank Greene, Durham, N.C.; Kenneth S. Johnson, Newark, N.J.; G. P. Petersen, St. Petersburg, Fla.; Lambert J. Simon, Irving, Tex.; and Robert W. Weden, Edina, Minn. □

C.a PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

PROBLEM 707: FINDING THE VALUE OF A SMUDGE

"Have you ever written a program to solve one of those arithmetic problems – the kind with letters instead of numbers?", Joe asked.

"No, I've done a few by hand, but I never thought of using a computer. That would take the fun out of it," Bob replied.

"Yes, but this is part of the homework in our programming class." Joe pointed to the sheet he had been working on.

```
  A □ B C D E
+ B F G E H I
-------------
J F J F H A C
```

"What's that between the A and B?," Bob asked.

"A smudge. My copy of the problem got smeared and I can't make out what letter that is. I don't like the idea of trying each of the letters in turn in that spot, but I don't see anything else to do."

Bob had been making some calculations on a piece of scrap paper. "Maybe you won't have to do that," he said. "I think I can tell you what that letter is."

What is it?

Solution to Problem 706: Restoration Completed

The number was 110,101. When this is converted to binary the leftmost six bits are 110101.

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.

An Example of Planned Development of an Organization for Computer Professionals: THE BRITISH COMPUTER SOCIETY

Maurice C. Ashill
The British Computer Society
29 Portland Place
London W1, England

"Rules of professional conduct . . . are an essential element of organized co-operation and constitute the major characteristics which distinguish a profession from a trade or other calling."

Maurice C. Ashill, F. C. A., is Secretary-General of The British Computer Society. He is a Fellow of The Chartered Accountants (F. C. A.) in England and Wales, and for the past seven years has been an Undersecretary of The Institute of Chartered Accountants. Initially, he was Secretary to the Parliamentary and Law Committee of the Institute, and later Secretary to the committees responsible for the policy and direction of post-graduate training courses, ethics, professional standards, and internal services.

Before joining the Institute, Mr. Ashill was Assistant Chief Accountant, Finance, with the BBC, and was also with the Central Electricity Generating Board for two years.

Origin

The original development of computers took place in the Universities, where scientists became aware of the potentialities. Joseph Lyons and Co., the catering and grocery company, had from as long ago as 1935 been searching for a way to cope with masses of paper work by means of a high-speed calculating machine; after the war they felt the computer provided the answer. Since they could not buy one, they built their own Lyons Electronic Office, L.E.O., which first operated in 1954. Thus in the early nineteen-fifties businessmen also became aware of the computer and saw its possibilities as a management tool.

Both scientists and businessmen alike foresaw the vital importance of the computer to the community and considered that means should be found of initiating lectures on all aspects of computing science and discussions on the problems of its application to industrial and commercial work. From these scientists, engineers, and the London Computer Group, which represented industry and commerce, the British Computer Society was formed in 1957.

Purpose

The objectives of the new Society were:

1. to further the development and use of computational machinery and related techniques,
2. to facilitate the exchange of information and views and to inform public opinion on the subject,
3. to hold conferences and meetings for the reading of papers and delivery of lectures, and
4. to publish information for the benefit of members.

In brief – to promote the science of computing in every way possible.

"Rules of professional conduct are voluntarily assumed as an obligation over and above the requirement of the law."

Professional Status

Over the years it came to be recognised that computing would permeate every aspect of society – scientific, commercial and social. Accordingly, the Society felt it had a duty to ensure that its members were recognised to have not only a high standard of technical competence but also a high standard of professional practice.

The essentials of a professional activity are:

a. a high standard of skill and knowledge,
b. a confidential relationship with clients,
c. public reliance on the standards of its practitioners.

To meet these requirements the Society resolved in 1968 to restrict full Membership to those who pass its examinations, or can claim exemption by having passed the examinations of certain Universities or other recognised bodies; there are, of course, transitional provisions and it is still possible to become an "Affiliated" member without passing the examinations. Affiliates receive the Society's publications and attend its conferences but cannot use designating letters nor vote on the Society's business.

The first examinations were held in April 1969 when there were ninety-four candidates, of whom forty-nine passed; the second series, at which there were two hundred and twenty seven candidates, has just taken place.

To complete the professional status, the Society has drawn up a proposed code of practice, which has been published; meetings have been held in the branches; and it is hoped that the membership will adopt the code at the Annual Meeting in October.

There has been a general acceptance of the code although some considered that it should apply only to consultants. Broadly, rules of professional conduct are voluntarily assumed as an obligation over and above the requirement of the law. They are an essential element of organised co-operation and constitute the major characteristics which distinguish a profession from a trade or other calling. They recognise the acceptance of the social responsibility inherent in an occupation endowed with public interest! There is little doubt that this embraces both the consultant and the employee.

Progress

Today the Society has some 16,000 members and is becoming recognised as the authoritative body on computing matters; after a period of rapid development, it looks forward to consolidation and development.

Structure

To achieve its objective of "promoting the science of computing in every possible way" the Society has a Council with a standing committee – the General Purposes Committee, to run its affairs and handle its finances.

There are four Boards, each responsible for one of the Society's main activities. The **Branches Board** looks after the interest of branches and sets up new ones where needed. There are thirty branches grouped by eleven regions, each of which elects a member to the Council of the Society. The members elected by the branches serve for one year only, which allows each branch to have a member for one year in three.

The **Membership Board** deals with all applications for membership. When the Society took professional status, there was a large influx of members who were all made "Affiliates" until their claims by experience could be examined, and they could be properly graded into the appropriate grade of membership. In the past two years the Membership Board has dealt with more than 14,000 of these cases; this has been a heavy burden for the Board which goes to great lengths to satisfy itself as to the fitness of the candidate for the grade to which they recommend him. Broadly, admission has been based on experience gained in full-time involvement with the design, construction, or use of analogue or digital stored program electronic computers. Admission on the basis of indirect experience is exceptional. To ensure fairness of treatment, two members of the Board normally scrutinise each case before it is considered by the Board and then by the Council.

Working in close co-operation with the Membership Board is the **Education Board.** This Board has about twenty-two committees and subcommittees and is responsible for the syllabi for our examinations (which are in two parts) and for ensuring that there are adequate courses for those who wish to take them. The Board's activities are carried on through two main committees.

"There is a wide and free exchange of information between the Society's Education Activities Committee and all other organizations which have a strong interest in computer education and training."

First is the Examinations Council which is responsible for the Examining Boards (particularly that of the Society's professional qualifying examinations), the Exemptions Committee and an Examinations Planning Committee. The Examinations Council also makes recommendations for the appointment of representatives of Council to other examining bodies and is responsible for maintaining links with various other bodies such as the United Kingdom Co-ordinating Committee for Examinations in Computer Studies, and for advising other organisations on examinations in computing. Through the Systems Analysis Examining Board, the Council administers the examinations for the National Computing Centre Systems Analysis Courses and its terms of reference allow it to conduct other systems analysis examinations for other bodies.

The other committee of the Education Board is the Education Activities Committee, which is responsible for examining the needs of education and training of the different classes of personnel concerned with the development and utilisation of computers. It has a number of working parties whose activities cover career, curricula development, surveys of courses, teachers and qualifications in secondary education, and both the further and higher sections of tertiary education. Through its liaison with the industrial training boards and by means of the Society's Education Consultative Committee, there is a wide and free exchange of information with all organisations which have a strong interest in computer education and training. Indeed over the years four books have been published: one in 1962 on Training Aids; in 1967 and 1968 special issues of the Society's Bulletin were devoted to education; and in 1969 a Yearbook was published which it is anticipated will become a regular publication.

Some indication of the energy and devotion of those associated with the Education Board can be obtained from the recent meeting of the Schools Committee which held a week-end conference at Hedsor Park in Buckinghamshire. That committee is recommending an advisory centre be established for computer education in schools, and the recommendation is being put forward directly to the Secretary of State for Education and Science and to the present Select Committee on Science and Technology. Such a move would bring together three main influences: the BCS Schools Committee, the Computer Education Group (an informal association of teachers and lecturers), and the Journal of Computer Education. The overall aim is to provide a combined focussed effort towards computer education in schools. The cost of the proposed centre, which would co-ordinate this work, is estimated at about £100,000 for a three-year period and it is recommended that the main burden of this cost be borne by the Department of Education and Science.

". . . computing will be more than an economic improvement. It will influence the whole quality of human life."

To supervise the conduct of the Society's affairs in matters involving technical knowledge and judgement, there is the **Technical Board**, whose job is to ensure that the Society's influence is effective in the technical sphere. It sets up sub-committees to deal with particular aspects of computing technology, and has at present a subcommittee on computer privacy (a matter which the Society considers to be of great importance). There is also a Standards Committee, which co-ordinates the Society's representation on British Standards Institutions Committees and seeks to present a representative view on matters raised at these committees, and to promote standards where these are felt to be necessary. Domestically, the Technical Board plays a great part in the exchange of information by administering the discussion groups on various aspects of computing science, and of which there are at present forty-one. These discussion groups cover an extremely wide range of technical subjects and from them emerge ideas for conferences.

Apart from the Boards the Society has two committees, one to deal with conferences, and one with publications. The Society runs, either on its own or jointly with other bodies, some eight to twelve conferences on technical subjects. The biggest function organised by the Society is Datafair, fast gaining an international reputation and which attracted some eight thousand visitors to Manchester in August 1969. At a typical Datafair the Society mounts some eighty presentations, and provides an opportunity for the industry to stage presentations on advanced techniques and to show its latest equipment. The Society's Conference Committee is also prepared to help branches and discussion groups to mount their own conferences.

The Publications Committee is responsible for *The Computer Bulletin* and *The Computer Journal* (both of which are free to members) and for individual works which emerge from the various discussion groups.

"It is vitally important that the Society be an informed body of opinion independent of vested interests, and capable of determining suitable standards and giving advice to the government and other organizations."

The Society feels that something should be done to bridge the gap between the technologists and the lay-public, and has set up a committee which is working on the type of presentation which might be made to members of the public to show what can be done with computers, and to strip these machines of some of their 'mystique.'

The Society expects its growth to be drawn from the middle ranges of computer technologists. Younger and older members alike must feel that the Society properly represents their interests. Further, to enhance the appeal of the examinations to prospective employers, a seminar on the present syllabi will be held at reasonable intervals at which invited employers and educators will be asked to consider the existing syllabi, and to decide how these syllabi should be changed to bring them into line with the advances in the science and the needs of industry.

It is anticipated that the growth in the industry is likely to lie in software and, without detracting from the interests of other groups of computer technologists, special attention must be paid to likely development in this field.

The Society is far from insular and keeps in touch with developments overseas by its membership in the International Federation for Information Processing (IFIP). In addition, it invites speakers from abroad. The Society was honoured to have Mr. J. C. Stokes, the Senior Programmer from N.A.S.A., to address the closing meeting at Datafair in Manchester last year. Mr. R. C. Lawler, an attorney of Los Angeles, came to speak on software protection. Amongst those who attended a conference on multi-access at the Europa Hotel earlier this year were: Mr. A. T. Oram, head of the Unilever Computer Education Unit, and Mr. P. J. Coaten, chief consultant at the NCC, as well as several delegates from France.

The Future

It will be seen then that the Society is extremely active and is planning for the future. It has been suggested that between 1975 and 1980 more than one hundred thousand people in the United Kingdom will be engaged in some aspect of computing as a career. By then their work will be of critical importance to the great majority of companies. Yet computing will be more than an economic improvement. It will influence the whole quality of human life. In these circumstances it is vital that the United Kingdom has an informed body of opinion, independent of vested interests, which is capable of determining suitable standards, and giving advice to the government and other organisations. This is the role the Society plans to fulfill. To do this it will have to widen its technical activities, the range of its conferences, and of its publications. It will have to keep in closer touch with the government; it must review proposed legislation and make suitable representations to government before any Bill becomes law, not only in the interests of members but in the interest of the public in general.

The Society also feels that much should be done to improve the relationship between management and computing professionals, and has instituted conferences on "Business decisions," and "Management's role in effective computer-based systems." It has also shown its interest in the spread of computing into other disciplines by mounting a conference on "Computer audit packages" for accountants. A conference on the development of computers in the City of London is being produced shortly, to show top management just what benefits can be obtained from an effective computer-based system. The Society feels that much should be done to improve training within industry and has set up a committee to examine this subject.

Conclusion

The Council of the Society can well draw satisfaction from what has already been achieved, but it still sees great opportunities for work for the benefit of its members and the computer profession as a whole. □

THE MEDITERRANEAN COMPUTER SCENE

Ottorino Beltrami
General Electric Information Systems Italia
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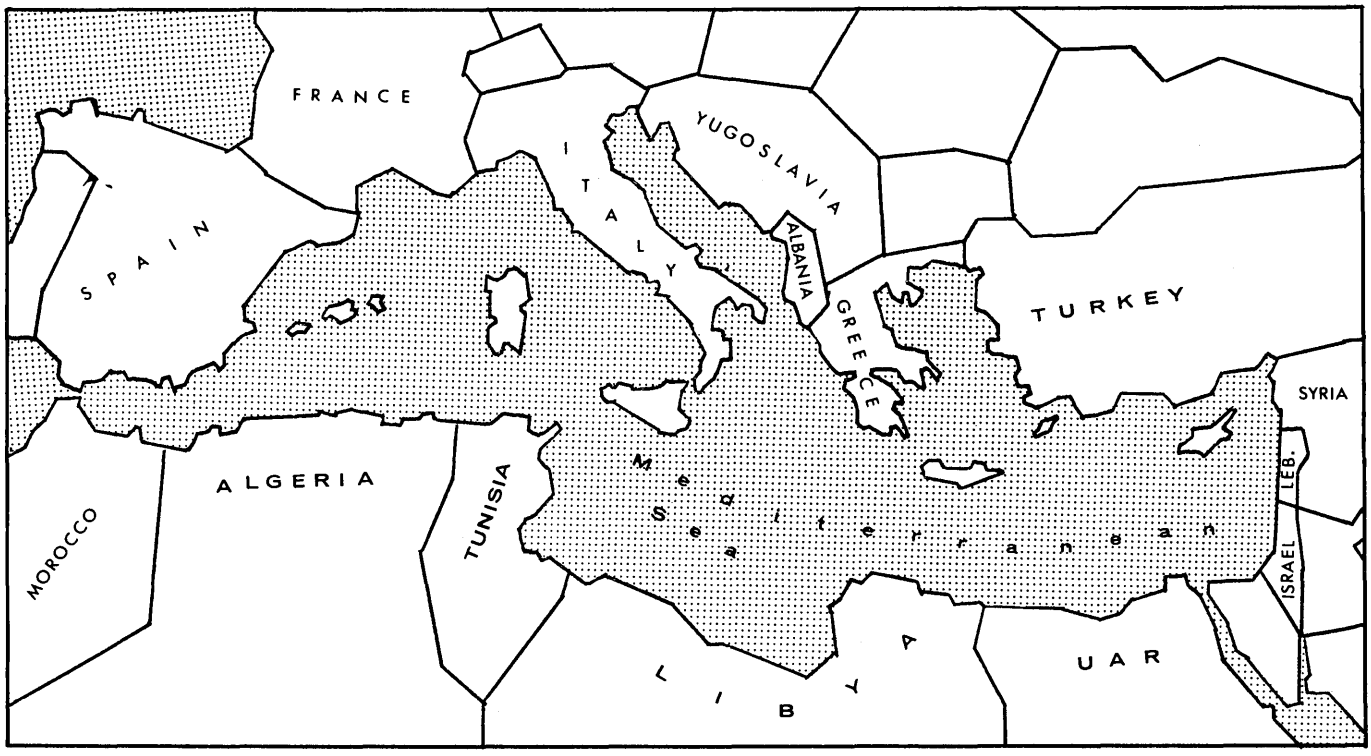
"Computer development in a country (given the investment necessary to undertake such an activity) is strictly correlated with the volume of total market demand."

Before beginning our analysis of the computer market of the countries bordering the Mediterranean Sea, we should first consider their geographical location and territorial features.

The total area of the Mediterranean countries is slightly smaller than that of the U. S. However it is worth noting that total population of the countries under examination (Yugoslavia and Albania excluded) exceeds the U.S. population (around 200 millions against about 180 millions), while the total GNP (Gross National Product) for the same countries represents only about 30% of the GNP of the U.S.

The computer industry should be analysed from two points of view: first with regard to product development and production; and second with reference to the market.



Computer Development

Computer development, given the investment necessary to undertake such an activity, is strictly correlated with the volume of total market demand. As a matter of fact, all of those activities related to computer research and development, besides requiring highly qualified manpower, imply high investments with extremely long recovery times. This is especially true when you consider the prevailing industry practice of renting instead of selling. We have conducted a study in order to determine the typical life cycle of a product as well as the correlation between development and product costs and revenues. The results of this study indicate that more than 10 years elapse from the start of product development (which occurs some years after preliminary research activity and technologies development) until the final stage when revenues exceed costs. Because this is against the total life cycle of a product of no more than 15-20 years, it is essential that the computer industry rely on more than one market. Only the United States is excluded from such a consideration, since its domestic demand alone is sufficient to support the required volume of production. It should be noted that the United States market today represents about 60% of the total worldwide EDP market.

Given the above, of those countries facing the Mediterranean, only France, and to a lesser extent Italy, are in a position to support industries for the research, development and production of computers. However, it is generally required that the distribution of their products be extended to other countries through agreement with foreign companies or as components of international companies.

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Variable Market Situation

The market situation is extremely variable among those countries bordering the Mediterranean Sea. The countries with advanced socio-economic development, such as France, are contrasted with those with pre-industrial economic characteristics, such as exist in most African countries, or with situations where both technological advancements and problems of underdevelopment are present. Only France can boast of a disposable per capita income in line with that of other industrialized countries of the West, as you can see from Table 1.

Table 1
Estimates of Total and Per Capita Gross National Product at Market Prices
(according to Statistical Yearbook 1968 issue)

Country	Year	GNP total (millions $)	GNP per capita ($)
France	1967	115,881	2,324
Italy	1967	66,958	1,279
Spain	1967	26,435	822
Turkey	1967	11,540	353
Greece	1967	7,092	814
U.A.R.	1966	5,690	189
Israel	1967	3,979	1,491
Algeria	1963	2,743	245
Morocco	1967	2,706	191
Libya	1967	1,535	883
Tunisia	1967	948	208
Lebanon	1963	775	339
U.S.	1967	803,914	4,037
Canada	1967	57,329	2,805
United Kingdom	1967	108,843	1,977
Germany	1967	120,975	2,021

The Italian situation, as depicted in Table 1, results from the dualism of its economic system where high individual income zones coexist with zones where the per capita income disposability is extremely modest. Spain, Greece and Libya boast a per capita GNP of around $800, while all other countries, with the exception of Israel, have a much lower per capita GNP. Consequently these countries do not appear today to present an attractive market for computers.

With regards to Israel, even though the individual average income is relatively high, the computer demand in this market is not viewed too favorably due to its small population.

Another element characterizing the group of African countries, as well as Turkey, Lebanon and Greece, to a lesser degree, is the large agricultural sector in the GNP, and the correspondingly smaller industrial sector in general, and manufacturing sector in particular.

Table 2 indicates the comparative situation of the various countries to be considered in relation to the various sectors that comprise the GDP (Gross Domestic Product). Note that the agricultural sector comprises over 20% of the total GDP in Algeria, Greece, Morocco, Turkey and the U.A.R. The industrial sector exceeds 30% only in France, Israel, Italy, Libya, Spain, Canada, the U.S., Great Britain and Germany. These last four are shown in order to emphasize the contrasts existing between the more advanced and the less developed countries.

Table 2
Industrial Origin of Gross Domestic Product
at Factor Cost

Country	Year	Agriculture	Industry (Manufactur.)	Construction	Transportation and Communication	Wholesale and Retail Trade	Others
Algeria	1958	20	15 (11)	6	5	20	34
Canada	1967	6	32 (25)	6	9	14	33
France	1966	7	38 (35)	9	5	14	29
Germany	1967	4	43 (39)	7	6	14	27
Greece	1966	24	19 (16)	7	7	12	31
Israel	1966	8	32 (24)	--	9	19	36
Italy	1966	13	32 (29)	8	7	10	31
Lebanon	1964	13	15 (13)	6	9	27	30
Libya	1966	5	60 (3)	7	4	6	19
Morocco	1965	33	22 (14)	5	--	22	18
Spain	1966	18	30 (26)	5	6	12	29
Tunisia	1966	18	21 (15)	10	10	14	28
Turkey	1966	37	18 (16)	6	8	8	23
U.A.R.	1966	28	23 (22)	4	9	9	27
U.K.	1967	3	39 (34)	7	8	11	32
U.S.	1967	3	32 (28)	5	6	16	38

Potential in Manufacturing Industry

Let us look now to the industrial sector and specifically to the manufacturing industry which is more meaningful for the EDP market. Of the Mediterranean countries, only in France, Italy and Spain, does the manufacturing portion of the GDP exceed 25%. While the overall dimensions of the manufacturing sector represent the key element in judging the potential EDP market, for a more complete evaluation we should examine also its structure, the average dimensions of industrial enterprises and their related rate of concentration. Only those industries above a certain dimensional threshold have the real need and capability to introduce and use a computer profitably in their organization, without experiencing a serious disruption of the normal conduct of the business. In this regard, few comparative statistics are available for the various countries under study, but we can consider the Spanish situation in comparison to the Italian one.

"The overall dimensions of the manufacturing sector of a country represent the key element in judging the potential EDP market."

In 1961 there were approximately 5600 manufacturing establishments with more than 100 employees in Italy, and 2900 in 1958 in Spain. The average number of employees per company was 346 for Italy against 306 for Spain. This comparison indicates one of the present differences in the potential of the Italian market as compared with that of Spain. Bearing in mind that the process of industrial concentration has developed faster in Italy than in Spain, the difference would be even more pronounced with updated information. More detailed information regarding the industrial structure of the various countries is needed for in-depth analysis, but we can stop here, keeping in mind this general outline of the situation in the countries under examination.

Credit, Insurance, and Public Administration

With regard to the last column of Table 2, concerning banking sectors, insurances, real estate, ownership of dwellings, public administration, defense, personal and other services, a meaningful comparative analysis among the various countries is problematic due to the heterogeneity of the factors comprising this column and the impact each has on the overall context.

The sectors of major interest from the computer market point of view, are primarily those of credit, insurance and public administration. However for all sectors the potential EDP market is strictly correlated with the management and organization of the potential computer users. With respect to public administration, it is important to emphasize that the heaviest concentration of computers is registered in universities, scientific institutes and local administration organizations. For the less advanced countries computer demand finds a natural limitation in the low number of scientific institutions, the small amount of scientific activity and in the slower development of peripheral administrative organizations.

Scarcity of Manpower

Furthermore these countries have not yet reached a situation of full employment, whereas one of the factors influencing the expansion of computers is the scarcity of qualified manpower. An additional condition is the scarcity of qualified EDP personnel to support systems. Such a problem, which exists everywhere, is obviously of particular importance to the less economically advanced countries where the level of instruction diffusion is particularly limited.

In addition to the above, it is recognized that the introduction of new methods and procedures in industries is also a significant factor in EDP development and this move is slower in the less advanced countries.

Census Data

Going now to look at the EDP market in the countries under consideration, even for those with a more advanced economic structure, such as France and Italy, no official data exist as to the actual number of computers installed and/or on order. The information that is available is at times contradictory and often unreliable. However, based on the data which to us appear to be the most realistic and in order to have a broad overlook of the computer situation, it appears that the potential EDP market correlates to the absolute dimension of the GNP, not linearly but parabolically. In other words, by representing on a regression diagram the GNP of the countries under study and the number of installed computers, the best interpolation forms a parabolic curve.

Obviously this phenomenon, if considered valid in light of substantial disparities between the two terms of comparison, has value only where applied to the countries under discussion. In fact, above the revenue levels typical of France, the tendency should reverse itself, due to the natural phenomenon of saturation, and therefore the general model of market development of computers should be represented by a logistic curve.

In order to qualify the previous statements, we can consider the comparison between the total revenue of the countries under study, expressed in millions of dollars, and that of the number of computers installed: using 1967 figures we find 36 million per each computer in France, 38 million for Italy, 50 million for Spain, 60 million for Greece and about 100 million for Algeria and Morocco.

In order to properly evaluate these figures it is also necessary to consider that the data related to France and Greece refer only to those computers already installed, while for the other countries they include also computers on order. If the data were more homogeneous the difference between Italy and France, for example, would be more substantial.

Passing on to a more detailed examination of the computer market and with reference to the situations of the individual countries, it is necessary to specify that our information is limited to France, Italy, Spain, Greece, Algeria and Morocco, since we do not have firm information on the EDP situation in the other Mediterranean countries.

The African Countries

Starting our evaluation from the African countries facing the Mediterranean, we note that Morocco's position is substantially in line with Algeria's: 35 installations are estimated for Algeria at the end of 1969 vs. 30 for Morocco. To these let us add the number of tab installations which is estimated at approximately 40 units for both countries. It should be noted in this respect that the heaviest concentration of installations is registered in public administration and, to a lesser extent, in the banking area. The demand in the industrial area is practically at present non-existent with the exception of the crude-oil industry. As to territorial distribution, we find that present installations are exclusively concentrated in Algiers for Algeria and in Casablanca and Rabat for Morocco.

"In the African countries, the demand for computers in the industrial area is practically at present non-existent with the exception of the crude-oil industry."

Greece

Greece's position is not very different from the aforementioned countries, at least in relation to GNP: around 60 computers installed at the end of 1969. For Greece also, the greatest number of systems is used in public administration. To explain the present poor potential of the Greek market it is worthwhile underlining that local establishments, according to the latest available census (1958), amount to only 111,000 units against the estimated 500,000 for Spain and 700,000 for Italy.

Spain

The information available for Spain is more analytical and the number of computers installed or on order at the close of 1969 amounted to 524 units. The territorial distribution of these installations revolves around the area of Madrid (50%) and Barcellona (27%). As to economic sector, we find a sharp concentration in the banking-insurance area, which absorbs about 42% of the total systems, followed by the manufacturing industry (about 20%), distribution (about 17%) and public administration (15%). With reference to prospects for the EDP market in Spain, an average annual expansion not in excess of 20% is estimated for the coming three-year period. This rate of development is rather restrained when compared with the past expansion of other European countries starting with Spain's installation base.

France's position in the computer field is particularly well developed in comparison with the other countries considered here, as shown in Table 3. By our estimate the number of systems installed in France at the end of 1969 is about 5000. From Table 3 you can follow the evolution of

computers in France starting in 1963. The annual development rate for the period examined is quite high, fluctuating from a minimum of 31% to a maximum of 52% (from 1964 to 1965). Such average evolution implies a particularly high development of small computers, the incidence of which has risen from 30% in 1962 to 62% in 1968, against a more restrained growth rate in medium and large computers. For a better understanding of the figures above mentioned, we have defined small computers as those whose if-sold value ranges from 0.25 to 1 million francs; for medium computers the value fluctuates from 1 to 5 million francs, while the value of large computers exceeds 5 million francs. The rapid growth of small computers during the period considered is the result of a constant expansion of mechanization by small-medium sized firms, particularly in the manufacturing industries.

Table 3
Computer Installations in France

Year (as of Dec. 31)	Small	Medium	Large	Total
1963	227	495	46	768
1964	309	661	58	1028
1965	647	836	75	1558
1966	1116	987	80	2183
1967	1802	1326	110	3238
1968	2663	1446	148	4257

Italy

Finally let us examine Italy's position. The most updated survey on the EDP evolution in Italy has been conducted by the "Cassa di Risparmio delle Provincie Lombarde" and published in the October 69 issue of "Congiuntura Economica Lombarda". According to this survey, the number of computers installed and on order totals approximately 2600 as of the end of 1969, a rise of about 22% over the position of December 31, 1968.

Table 4
Computer Installations in Italy

Year (as of Dec. 31)	Number of computers	Ratio: Personnel involved in the secondary and tertiary industries and number of computers
1963	760	19,000
1964	930	16,000
1965	1,170	12,000
1966	1,400	10,000
1967	1,750	8,500
1968	2,120	7,100
1969	2,600	6,000

Table 4 shows the development of computers in Italy starting from 1965, and the correlation existing between the working population (agriculture excluded) and the number of computers. As to territorial distribution, Lombardy is the Italian area with the heaviest concentration (32% of the national total) followed by the areas around Rome, Turin and Genoa.

To confirm the development scheme stated above, it should be noted that the computer concentration in Lombardy has been decreasing slightly during the past 5 years, falling from 35% in 1965 to 32% in 1969, which implies a faster expansion of computers in the rest of Italy as compared with Lombardy alone.

As to the installation distribution per industry, manufacturing has 46.5% followed by credit-insurance (20.2%), public administration (17%) and other commercial areas (about 5.7%).

In the manufacturing industries, the strongest concentration of computer systems is to be found in the automobile, rubber, iron and steel, and petrochemical industries. Less satisfactory results have been achieved in the textile and food industries. These manufacturing areas, moreover, are likely to increase their position still further as the biggest users of electronic data processing systems. This will result from the mechanization of a number of larger concerns that do not yet make full use of data processing, as well as many smaller firms which have become capable of utilizing profitably small-medium scale systems.

Public administration should also see particularly outstanding developments, since the volume of installations in this field in Italy is proportionately smaller than in the rest of Europe, particularly with reference to local administrations which are also now under development from a political point of view. There should also be a distinct growth in the demand for computers in the distribution area, in which large-scale advances may be expected in the future.

In Summary

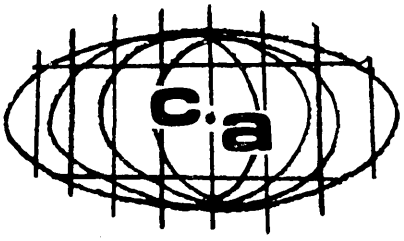
Let us summarize the future opportunities of the computer market in the countries under study: it seems reasonable to forecast with regard to African countries and Greece that the extension of the EDP market will remain modest for a considerable length of time. In fact, as previously outlined, the basic problem in these countries involves both a low GNP and a still unsatisfactory evolution of industrial activities. As a consequence, it is evident that for about another 5 years, they will not represent large potential markets for computers.

"The increase in the computer demand in Spain and Italy may be regarded as basically positive."

With reference to Spain and Italy, the increase in the computer demand may be regarded as basically positive, but will likely be lower than those registered in France in the course of the last 5 years.

Italy's main handicap involves the economic-industrial development of its under-developed areas (South-Central), which will require some years, while for Spain the biggest obstacle is represented by the evolution and growth of the present industrial structure. Consequently it is very likely that the annual growth rate of the computer market in these two countries, though not as high as that of France, will continue to increase for a longer period of time than in France, where the EDP market is maturing more rapidly.

Lastly, evaluating France's potential market, we can expect that it will be characterized by a high development rate for some years to come, probably until reaching Germany and the U.S.'s diffusion level. Afterwards such a development rate should decrease slightly as is happening in other mature EDP markets. □



WORLDWIDE

REPORT FROM GREAT BRITAIN

By the time this report is printed, the British election will have been decided and with it the pattern of EDP in the United Kingdom and Europe for many years to come.

I am not attempting to say now what it will be. Pollsters have been confounded before and while Harold Wilson is the favourite .....

A Conservative Government

Abandoning this unprofitable line let us look at the future for the $300m ICL under a Conservative Government. In office, it may well apply the principle of non-involvement in industry which it has clearly stated in opposition. This means ICL will have to refund the Government's $24m stake.

Indeed the ICL chairman has been told as much by Edward Heath, the Tory boss. The next move could be much closer ties than now prevail with CDC.

The "Buy American" Act

No reasonable person thinks anything like the Buy American Act should apply – Honeywell, Burroughs, NCR and IBM in that order have major EDP factories in Britain. Yet I have heard it maintained and by an influential politician that the only reason the four American companies set up plants in the UK was because it suited their economic book so to do. This is because the areas in which most of their plants have been established are underprivileged as a result of such economic changes as the run-down of the coal industry. The Government has provided many incentives to foreign manufacturers such as extremely low-cost premises and tax inducements which, added to a labour pool greater than in most areas of busy Europe, swing the balance in Britain's favour.

So they are here because it suits them, and now that they are here there is no other place in Europe to go, the politician concluded.

Just how much influence this kind of thinking will have on policy is hard to say.

The Honeywell-GE Tie-up

Great excitement over the Honeywell-GE tie-up. It makes much more sense in Europe than anything that has been done so far. It also creates a new force to challenge IBM, one which has a much larger share of the European market than ICL in spite of the latter's success in France and Scandinavia.

Whether this happening will induce Siemens finally to move closer to ICL and the French CII, as well as to Olivetti and Philips, will not be known for some time.

The Big European Machine

As matters stand, the failure of Eurodata (ICI-Telefunken-CII-Olivetti) to oust IBM from its contracts with the European Space Research Organisation, after objections from Siemens, has not improved the outlook for European co-operation. Meanwhile, the Soris market research organisation in Turin has completed its groundwork on the survey of the chances a giant European machine has of succeeding.

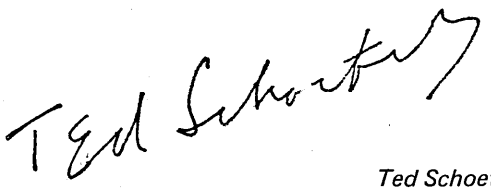
This latter job is being undertaken on behalf of the European Commission which wants to associate Britain with the giant machine project.

Time-scale for the big machine – about five times the power of a CDC 7600 – is to be operational by 1980. That is a new generation away still.

As Britain becomes integrated with Europe – that is if this year's negotiations between it and the Common Market countries are successful – there is bound to be a change of attitude by any EEC Government to any big computer company operating in Europe under European control.

It is interesting to speculate whether Siemens, ICL, CII and Philips will, in a few years, rank equally for official business in Europe, with IBM, "Honeygee", Burroughs and various others then becoming "second-class citizens".

Perhaps by then, however, the growth of the European operation may have induced the wiser Americans to start controlling their operations in Europe.



Ted Schoeters
Stanmore, Middlesex
England

A LANDMARK YEAR FOR COMPUTERS IN HIGH SCHOOLS

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"In the coming decade, schools will stop groping their way along the path of computer application, and will develop many more uses — more sophisticated uses — of the computer's power."

If the world of computers is a fast-moving one, the world of computers in the hands of innovative high school instructors and students is dazzling. Recently, a number of developments have altered not only the way secondary schools use computers, but also the way they buy them.

One area of significant recent growth has been the increasing number of schools that are banding together to help one another finance computers and explore ways to use them.

Time Sharing

For example, four communities in Rhode Island have established a project to offer low-cost computer training in their high schools. The Northeast Rhode Island Computer Project (NERICOMP) will give every high school student in the towns of Cumberland, Lincoln, North Smithfield, and Woonsocket exposure to a computer.

The project purchased a small time-sharing system that enables up to seven users to have access to the computer simultaneously. The cost of the system was carefully analyzed – by sharing the purchase price of the computer, the per terminal cost was less than $5,000. The ultimate location of the computer was planned to make the most economical use of the telephone lines required to connect the terminals and the computer. Now, each school has a computer terminal of its own, and the educational consultant who established the project feels that every school in Rhode Island should have access to a system like this within two years.

A regional educational service agency in Iowa, the Schools Information Center, offers time-sharing services to nine schools in Muscatine, Scott, and Clinton Counties and to a high school across the Mississippi River in Moline, Illinois. The center, located in Bettendorf, Iowa, gives each school immediate access to the computer just by dialing a telephone number. Portable teletypewriters permit the computer terminals to be moved to the classroom or laboratory where they are needed.

The Advantages of Pooling Resources

The reasons for pooling resources are best explained by Robert Haven, director of Project LOCAL, an organization

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made up of five Boston area high schools, and one of the first groups formed to explore the cooperative use of computers.

"There are some functions that it was felt could be done centrally and distributed to five places as easily as one," according to Haven. "For instance, overall planning and direction could be done centrally, eliminating duplication. A central organization could create and distribute teacher resources and text materials, and provide in-service training of the instructional staff. Project LOCAL's administration also provides for the maintenance of computers and teletypewriters, and carries out the project's time-sharing programs, as well as selling time on its machines," Haven said. "We also have written software – mainly small drill-and-practice routines – and we have conducted evaluations of computers in improving mathematics and science programs. Finally, there is only one approval needed when applying for federal and state funds.

"Mainly, these are things the individual schools felt they could not do more effectively by themselves, or things they would need extra money to do."

Simulation in Science

Science instructors, particularly, have begun to assign a larger role to computer simulation in the classroom and laboratory. Most commonly, the computers are used in two ways:

a. The computer is programmed to simulate a certain problem, such as a chemical reaction, a physical phenomenon, or a social or historical situation, and the student enters his own parameters into the program. The computer calculates the results.
b. The computer is programmed to simulate a certain experiment. The student conducts his own experiment, takes data from it, and compares his measured data against the computer's simulated experimental results.

"The computer gives the students an operating example of what Mendel's Law is and how it operates."

An example of the first category of classroom simulations is a program used by the Huntington Project in New York that demonstrates Mendel's Law of heredity in plants. Mendel crossbred plants with different characteristics such as height and color, and calculated the mathematical probabilities for each of the resulting generations of hybrid plants. In the computer program, a student enters the variables – height, color, and other characteristics being considered. The computer analyzes the input and types out the characteristics of each succeeding generation, based on Mendel's probabilities. Such an experiment obviously would be impractical to perform in a laboratory simply because of the time involved; a large number of generations could take years to develop. Yet, the computer gives the students an operating example of what Mendel's Law is and how it operates.

Apollo Moon Landing

Another example is an interactive program written by high school students in Lexington, Mass. It simulates an Apollo moon landing – the entire burden of landing the spacecraft is on the person using the program. The simulation starts with the spacecraft at zero seconds, 120 miles above the lunar surface, at a velocity of 3,600 miles per hour. A "radar" check is made every 10 seconds, along with a check of the velocity and remaining fuel. At each radar check, the user must tell the computer the amount of fuel he wants to fire during each of the remaining 10 seconds. The object is to land safely – a safe landing requires a speed of less than a tenth-of-a-mile per hour, with no fuel left.

"This simulation [of a lunar landing] allows a physics student, who has studied the effects of gravity and Newton's Laws of motion, to put the theories he has learned to work."

This simulation allows a physics student, who has studied the effects of gravity and Newton's Laws of motion, to put the theories he has learned to work. The likelihood of a perfect landing on the first attempt is rare; a student will probably have to make calculations, which will reinforce the concepts he learned, to determine the decisions he will make. And the student who wrote the computer program had to do extensive research into lunar landing principles and physical laws, which helped him learn to apply the scientific principles he was taught.

Civil War Battles

Another program in this category simulates 14 Civil War battles. Two students, one representing the North, the other the South, manipulate men, money, and strategy, which in turn affect the morale, casualties, and desertion rates of each army, as they try to "win" each battle. The program, although technically a game, is also an outline of the major battles of the Civil War, with much of the information based on actual facts and figures. The history student learns about the battles by actually simulating the fighting of them.

Simulating Experiments

An example of the second class of simulations, where the computer simulates the experiment and the student compares his data against the computer's, is a chemistry experiment where students combine magnesium and hydrochloric acid to produce hydrogen gas. Students type laboratory data from their experiments into the computer (several experiments are done independently during the same laboratory period). The computer calculates the average readings of the experiments, which enable the class to calculate results and make a laboratory report.

Each group doing an experiment must make two sets of calculations: a set based on the data the group obtained from the experiment, and a set based on the average readings of the entire class, which are provided by the computer.

Another part of the program, however, known only to the teacher, makes the calculations necessary for the laboratory reports. The computer makes the calculations; and the instructor uses the printout to correct student papers or as a basis for post-lab discussion. It can be given to a student who was absent from the laboratory or to a student who was having trouble with the calculations and needed extra help.

Apart from the area of simulation, an interesting development from the computer industry's point of view is the increasing number of formal computer science courses being offered to high school students for academic credit. The best of these courses teach the student assembly language programming, and they may have a noticeable effect on the industry. Courses such as those offered at Amity Regional High School in Woodbridge, Conn., and Deerfield High School, Deerfield, Ill., for the first time make an important point – that vocational training in computer science can be given at the secondary school level.

"An interesting development from the computer industry's point of view is the increasing number of formal computer science courses being offered to high school students for academic credit."

Career Training

The computer science course at Deerfield High School, for instance, gives students going on to college a knowledge of computers and the ability to use them in college work. But it also prepares students not going to college for jobs as programmers and maintenance technicians. The first eight weeks of the 15-week program give the student a "nuts-and-bolts" background in computers and logic design. The course covers such basics as binary and octal numbering systems, Boolean algebra, truth tables, problem solving, and an introduction to electronic components. The actual computer science begins in the ninth week with a study of input and output media. In the tenth week, the students get into flowcharting and programming.

Combined with work done on the computer in other classes, the computer science courses give high school students an in-depth knowledge of assembly language, enabling them to get into a program to modify it or give it extended capabilities. This could lead to challenging, well-paid positions in the computer industry for high school graduates who have neither the resources nor the desire to attend college. The computer industry relies on colleges teaching computer science for its supply of programmers, but there are not nearly enough graduates to meet the demand. Many college graduates with backgrounds in subject matter principles – mathematics or science – can write programs in a high-level language such as FORTRAN or BASIC; but they have no experience with lower level languages.

"The area of technical and trade schools is one that offers room for innovation and creativity for computer use."

The Software Technician

This will possibly create an area for a new breed of person – the software technician – who does not have a background in higher mathematics or science and could not, for instance, write a Fourier transformation program. But he could write something like an input/output routine with interrupts for multiple terminals that would be incorporated into the Fourier transformation program.

The computer science courses and computer clubs in secondary schools have turned out their share of proficient students: at the Taft School in Watertown, Conn., two students adapted SNOBOL-3 (String Oriented Symbolic Language), which was designed to run on larger machines, to a small computer with only 4,096 words of memory.

Recently, one student in Massachusetts was solicited by a computer company to take a job with them; unfortunately, he had to turn it down – he was only 14 years old.

Technical and Trade Schools

Technical and trade schools have found new uses for computers during the past year. Don Bosco Technical School in Paterson, N.J., is using its small computer in its machine shop to generate numerical control information, such as plotting x and y coordinates. The school does not have numerical control equipment; so students cut an NC tape and read it to a machine operator, who makes a part using the information. The computer allows students to machine corrected parabolas and ellipses by giving the students the capability to calculate a coordinate to a non-integer power, such as $X^{3.14159}$. Using the computer gives the students experience with NC directions and formats when they begin working in industry.

The area of technical and trade schools is one that offers room for innovation and creativity for computer use. Today, students taking electronics courses in technical schools end up qualified to maintain hardware. If there is a software problem in a computer system, the user has to send for another person, the software specialist, who can work in assembly language.

Technical schools that offer students courses in assembly language programming along with electronic principles, could begin to phase out the hardware maintenance specialist and software specialist designations, replacing them with a computer maintenance specialist capable of trouble-shooting and repairing all aspects of a computer system. This ability would give technical school students a more marketable skill in the job market.

The innovations started in the last year make it a landmark year in computer education. In the coming decade, schools will stop groping their way along the path of computer application, and will develop many more uses – more sophisticated uses – of the computer's power. Instructional methods using that power will bring more and more meaning and depth to secondary education. □

THE MAY ARTICLE, "THE ASSASSINATION OF PRESIDENT JOHN F. KENNEDY: THE APPLICATION OF COMPUTERS TO THE PHOTOGRAPHIC EVIDENCE" —REPORT NO. 2

A new field for the application of computers is the analysis of information about assassinations. To analyze evidence is difficult at best; analysis can be made easier with assistance from a computer.

Computers and Automation is accordingly going to devote some space to this subject from time to time. The article which launched this subject in the pages of Computers and Automation is one entitled "The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence" by R. E. Sprague published in the May 1970 issue. Report No. 1 on this article was published on page 7 of the June 1970 issue; Report No. 2 is published below.

Interested readers who did not see the May issue are invited to send for it; it can be purchased on approval; see the notice on page 2 (inside front cover).

Some readers may not be interested in this subject; they are requested to skip this section. A magazine is like a smorgasbord: almost nobody likes every dish offered!

IMPACT

Edmund C. Berkeley
Editor, Computers and Automation

A total of 36 newspapers and periodicals, so far as we know at time of writing (June 9), have to date published reports on our May feature article, "The Assassination of President Kennedy: The Application of Computers to the Photographic Evidence". This article was written by Richard E. Sprague and covered pages 29 to 60. This article presented substantial evidence that Lee Harvey Oswald was not the sole assassin of President Kennedy, that there was a conspiracy, and that the Warren Commission conclusions are false. The cumulative list of newspapers and periodicals appears in Table 1.

Can we draw any conclusions from this information? Yes.

1. The first conclusion is this:

The story was certainly newsworthy.

Both Associated Press and United Press International sent out wire dispatches. The publication of these dispatches occurred here and there all over the United States. This proves that a large number of U. S. newspapers independently decided that the story was newsworthy, and so published information about it. This group included the Washington Post, the Boston Globe, the Philadelphia Inquirer, the San Francisco Examiner, the Detroit Free Press, and other well-known newspapers. The news was published in at least the following 18 states:

Alabama	Ohio
California	Pennsylvania
Georgia	South Dakota
Massachusetts	Tennessee
Michigan	Texas
Minnesota	Utah
Nebraska	Virginia
Nevada	Washington, D.C.
New York	Wisconsin

2. Yet apparently no newspapers in the following large cities of the United States published any reports about the May article:

Atlanta	Los Angeles
Buffalo	Louisville
Chicago	Miami
Cincinnati	Newark (N.J.)
Cleveland	Pittsburgh
Denver	Portland (Ore.)
Des Moines	St. Louis
Indianapolis	Seattle
Kansas City	

Why not?

Considering the news which newspapers do publish, undoubtedly much less important news was published in all those cities, than the news presented in the article.

3. Therefore, it seems reasonable to conclude that there exists either an organized understanding, or else an unorganized "concert of ideas and attitudes", by a large portion of the press of the United States. The effect of this condition is to suppress (i.e. not publish) certain kinds of news. The suppression applies in particular to questions, challenges, and attacks on the Warren Commission report. This report is treated as if it were sanctified, revealed truth.

What should be done about this suppression?

There is probably no prospect of reasonably altering this condition. Accordingly it would probably be worthwhile to establish an auxiliary means of communication, so that people everywhere in the United States could obtain information about political assassinations in the United States independent of suppression by the press.

A particularly interesting example of what we may call "leaky suppression" occurred in the case of The New York Times, which is of course one of the most distinguished and renowned newspapers in the United States.

The New York Times and The New York Post have a news service. This news service sent out a story about the May Sprague article. (See Exhibit 1.) The story is sensible, tells much that is important, and is a not unreasonable report on the article. The evidence of sending out the story is that it was published in the Virginian-Pilot of Norfolk, Va. on May 13.

Table 1

REPORTS PUBLISHED OF THE MAY ARTICLE BY SPRAGUE

Place	Name of Paper	Date	Source of Dispatch	Headline * = *Headline is incorrect*	No. of Column Inches
Athens, Ga.	Athens News	5/3	AP	Computer Analyst Has Proof Kennedy Killed by Four Men	8
Binghamton, N.Y.	Binghamton Press	5/2	AP	Four in JFK Plot, Computer 'Proves'*	11
Birmingham, Ala.	Birmingham News	5/2	-	Computer Says 4 Gunmen Shot JFK*	12
Boston, Mass.	Boston Globe	5/1	-	Computer Expert Charges Conspiracy in JFK Assassination	24
Chattanooga, Tenn.	News-Free Press	5/2	UP	Computer Expert Says 4 Killed JFK	4
Corning, N.Y.	Corning Leader	5/2	AP	Computer Specialist Says Four Gunmen Shot at JFK	9
Dayton, Ohio	Journal Herald	5/2	UPI	4 Men Fired at JFK, Computer Says*	5
Detroit, Mich.	Detroit Free Press	5/2	UPI	Computer Cites JFK Death Plot*	3
Fort Worth, Tex.	Star-Telegram	5/2	-	Assassination	4
Fresno, Calif.	Fresno Bee	5/2	UPI	Computer Analysis Says JFK Was Shot By 4 Men*	5
Houston, Tex.	Houston Post	5/3	UPI	Computer Analysis Shows JFK Killed By Conspiracy*	4
Las Vegas, Nev.	Review Journal	5/3	UPI	Computer Says 4 Assassins Involved in JFK Murder*	5
Middletown, N.Y.	Middletown Record	5/2	-	Computer Expert: Four Killed JFK	4
Milwaukee, Wisc.	Milwaukee Journal	5/1	UPI	Computer Data Said to Prove 4 Shot Kennedy*	3
Minneapolis, Minn.	Minn. Star	5/1	AP	Computer Analyst Claims 4 Fired at JFK	4
Nashville, Tenn.	Nashville Banner	5/1	UPI	Oswald Not Only Gunman: Study	4
Nashville, Tenn.	Nashville Tennessean	5/3	UPI	JFK Killing Blamed On Conspiracy	4
Newton, Mass.	Computer-world	6/3	-	JFK Death Photos Computer-Analyzed for Conspiracy	13
New York, N.Y.	New York Times	5/25	-	(none)	6
Norfolk, Va.	Ledger-Star	5/2	AP	Kennedy Assassination: Computer Findings Show Oswald Innocent*	10
Norfolk, Va.	Virginian Pilot	5/13	Times/ Post	Computer To Look For JFK Gunmen	7
Ogdensburg, N.Y.	Advance News	5/3	AP	Computer Expert Says Evidence of Four Gunmen in JFK Slaying	12
Omaha, Nebr.	Sunday World-Herald	5/3	AP	'At Least 4 Fired Shots at Kennedy'	11
Paris, France	Paris Match	5/23	-	Le Meutre de John Kennedy: Les Ordinateurs Affirment: a Dallas il y avait au moins 3 Assassins	7 pages
Translation: The Death of John Kennedy: The Computers Affirm:* In Dallas, There Were At Least 3 Assassins — Paris Match published a seven-page feature article based on interviewing Sprague, and reprinting three pictures and one map from the May article.					
Philadelphia, Pa.	Philadelphia Inquirer	5/3	-	Lee Harvey Oswald ...	2
Salt Lake City, Utah	Tribune	5/26	NYT	(none)	5
San Francisco, Calif.	San Francisco Examiner	5/2	UPI	Computer Finds a JFK 'Plot'*	2
San Jose, Calif.	San Jose News	5/2	UPI	'Expert' Says Many in JFK Death Plot	3
Staten Island, N.Y.	Staten Island Advance	5/2	AP	Computer Decides JFK Death A Plot*	11
Victoria, B.C.	Victoria Daily Times	5/5	WP	Computer Specialist Studies Death Photos	5
Washington, D.C.	Washington Post	5/3	-	Computer Will Study JFK Murder Photos	8
Washington, D.C.	EDP Weekly	5/11	-	A Computer Analysis of Photos of President Kennedy's Assassination	7
Watertown, N.Y.	Watertown Times	5/2	AP	50 Helped Kill JFK: Oswald Not Slayer, Says Computer*	11
White Plains, N.Y.	Reporter Dispatch	5/2	AP	Computer Specialist Sees Oswald 'Cleared': Analysis of Photographs	11
Yankton, S.D.	Yankton Press and Dakotan	5/21	-	Protect Us From Computers	7
York, Pa.	The Gazette and Daily	5/6	-	Warren Commission Findings on Kennedy Death Said False	15

But The New York Times did not print this same story in its own newspaper. Why not?

Instead, 24 days after the original release date May 1, The New York Times published a different version of the story (on May 25). It was headlined OSWALD'S HATRED LINKED TO CASTRO. (See Exhibit 1.) Nine paragraphs of this story are devoted to a report on a book by Albert Newman which was published in March and is entitled The Assassination of President Kennedy: The Reasons Why.

Then with no headline (simply a second centered heading "Warren Panel Scored"), the last six paragraphs of the story (about six inches of newspaper column) are devoted to the May Sprague article.

These paragraphs concentrate on two incidents described in such a way as to seem to the uninformed reader somewhat unbelievable, even whimsical. Hardly any of the sensible reporting of the dispatch sent out by the New York Times/New York Post news service is retained. Why not?

Why no headline?

Why depart so far from the first story that The New York Times produced?

Why 24 days late?

Why publish a report of this low caliber in a newspaper of the stature of The New York Times?

Can it be true that there is a deliberate policy at The New York Times to distort or suppress serious

Exhibit 1

From the Virginian-Pilot, Norfolk, Va., May 13, 1970

Computer to Look For JFK Gunmen

By THOMAS O'TOOLE
Times/Post News Service

WASHINGTON—A computer specialist named Richard Sprague says that he is confident a computer analysis of photographs of President Kennedy's assassination will prove that Kennedy was shot by more than one assassin.

Sprague, the owner of his own consulting firm in Hartsdale, N.Y., said he will be assisted in such an analysis by a trade magazine called "Computers and Automation" and by the Committee to Investigate Assassinations, which has headquarters in Washington.

Sprague said an estimated 75 people took more than 510 photographs in Dallas on Nov. 22, 1963 of President Kennedy's motorcade as it passed through Dealey Plaza, where he was shot. Some of these 510 photographs are movies, Sprague said, so that the total number of picture frames runs over 25,000.

"I personally interviewed every one of the photographers I could find," Sprague said. "Most of the photographs they took were never even asked for by the Warren Commission."

In examining all the available photographs, Sprague said, he found evidence to support the charge that President Kennedy was killed by at least three gunmen, who fired a total of six shots at the President.

What he has set up to prove with computers, Sprague said, is that the physics of the shooting, the timing of critical events, and evidence hidden in photographs of the crime will all show that the assassination was brought off by as many as 50 men at the scene of the crime.

Through a technique known as "image enhancement," Sprague said, a computer will be able to identify a puff of smoke as the discharge of a weapon. It will also be able to locate the whereabouts of the weapon and pinpoint the time of its firing.

From The New York Times, May 25, 1970

OSWALD'S HATRED LINKED TO CASTRO

Book Says Critics of Cuba Aroused Him to Anger

A new study of Lee Harvey Oswald contends he shot President Kennedy because of the President's opposition to Fidel Castro's regime in Cuba and that Oswald had the same motive in his hatred of Richard M. Nixon, then a private citizen, and former Maj. Gen. Edwin A. Walker.

The latest study, setting the alleged actions by Oswald against a context of the three men's anti-Castro statements, was published Thursday by Clarkson N. Potter, Inc., as a 622-page book, "The Assassination of John F. Kennedy: The Reasons Why." The author, Albert H. Newman, was formerly managing editor of The Reporter magazine.

. . . . . .

(6 paragraphs)

Warren Panel Scored

A 32-page new attack on the Warren findings appears in the current issue of Computers and Automation, a monthly published in Newtonville, Mass. This was written by Richard E. Sprague, an engineer and computer expert, who is president of Personal Data Services, Hartsdale, N. Y.

Mr. Sprague says he has collected more than 200 photographs and looked at 200 more, out of 510 taken before, during or just after the assassination (counting any movie sequence as only a single photograph). He urges computer analyses.

He holds that at least three gunmen and probably four fired six shots at President Kennedy. He contends that Oswald took part in a conspiracy but did no shooting.

His article includes a picture that he interprets as showing a man just after the assassination "with radio in pocket and 'S'-shaped antenna hanging down."

Mr. Sprague says this man told District Attorney Jim Garrison of New Orleans he was "the radio communicator among the rifle teams."

Mr. Sprague also says that pictures show a "man with the umbrella," first holding it closed as the Kennedy car neared and then holding it "open and low over his head" shortly before the first shot, despite the sunny day.

Next, he says the umbrella is seen raised about two feet higher shortly before the last shot, and then it is folded a few seconds after the last shot. Mr. Sprague suggests the man hay have been signaling as "on-the-scene commander."

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questions, challenges, attacks, on the Warren Commission report?

Suppose we sample some other stories published in The New York Times of May 25, all of them bearing headlines.

On page 1, there begins a story: Drive to Clean Up Litter Intensifies in Many Areas; by Gladwin Hill, no date line — Public zeal against littering is on the upswing across the country, but not yet enough so to offset a costly worsening in the scourge of trash. ...., 9 inches on page 1, plus 73 inches on page 38.

On page 2: Swiss Authors' Group Backs Protest Against its Leader, Geneva, May 24 — The Swiss Society of Authors gave its backing today to Friedrich Durrenmatt, the Playwright ...., 4 inches.

On page 10, at the top of the page: Hungary Reforming Economy to Attract Tourists, Budapest, May 23 — Hungary is experimenting with competitive Western-style business methods in an intensive campaign to attract more foreign tourists ...., 11 inches.

On page 11: U.S. to Build Center for Drug Analysis, St. Louis, May 23 — A national center for drug analysis will be built in St. Louis County by the Federal Government, representative Leonor K. Sullivan, St. Louis Democrat, said on Tuesday ...., 4 inches.

On page 17: Brief Strike Ended by Rochester Police Asking Pay Change, Rochester, May 23 — Policemen in this city went on strike for nearly eight hours before reaching a temporary back-to-work agreement ...., 8 inches.

On page 18: Police Hold Suspect in Subway Holdups, no dateline — A man who told police that he was a drug addict with a $24-a-day habit, was arrested yesterday morning by five Queens policemen, in the Richmond Hill section ...., 7 inches.

On page 22: Pensioner Asks for Consent to Restore Castle in Wales, London, (no date) — When a 71-year old pensioner was told that only the ministry of Public Building and Works could give him permission to start restoring the 12th Century Dinas Bran Castle in Llangollen, Denbigh, he wrote to the Prince of Wales ...., 4 inches.

On page 25: O'Brien Clarifies Role of Two Panels, by Warren Weaver, Jr., Washington, May 24 — Lawrence F. O'Brien, the Democratic national chairman, said today that two new committees named last week were "solely for the purpose of speeding implementation" of the reform proposals of party commissions working towards the 1972 Democratic National Convention ...., 12 inches.

On page 25: College Researchers Find Pig is a Bright Test Animal, Lexington, Ky. — Pigs at The University of Kentucky College of Agriculture have revealed a high level of intelligence during testing ...., 3 inches.

Should all these stories bear headlines — about Swiss authors, pig intelligence, Hungarian Tourism, etc. — and the story charging falsity of the conclusions of the Warren Commission Report bear none?

The conclusion that we can draw from this analysis is plain and obvious:

> Something is haywire at The New York Times — and at many other newspapers.

In the June issue of Computers and Automation, we said:

> Computers and Automation has been informed that agents of the Central Intelligence Agency of the United States have been installed in New York, Los Angeles, and Chicago (and in other places) to prevent many kinds of news about political assassinations from being published in these cities and elsewhere. It is certainly interesting to see the confirmation of this quite unproved hypothesis by the failure to publish any information about the article in almost all major newspapers of New York, Los Angeles, and Chicago.

Quite possibly, this is a foolish and alarmist hypothesis. Nevertheless it is curious to see the power of this hypothesis to make predictions.

MORE ABOUT JIM HICKS

Question (composite — from several inquirers): I am very curious about the Jim Hicks' story and photo, appearing in Figure 11 on page 33 of the May issue. He is said to be "the radio communicator among the firing teams." I can see the outline of a large square box in his left hip pocket, but I cannot see in that picture the "antenna" the author refers to.

Also, what were the circumstances under which Jim Hicks admitted his role as radio communicator among the firing teams? How does the author know he is in an Air Force hospital for the insane in Oklahoma?

Answer, by Richard E. Sprague: The picture Figure 11 (7th copying) published on page 33 was produced from the printer's photooffset plate positive (6th copying), which was produced from the printer's negative film (5th copying), which was produced from a positive print (4th copying), which was produced from a negative (3rd copying), which was produced from a color slide (2nd copying), which was made from the original color negative (1st copy of the scene, or original picture). So Figure 11 as printed is a seventh copying of the scene.

The picture is identified as Willis 7, Main List No. 87.

Phil Willis was selling slide copies of the color slide (i.e., 2nd copying) along with eleven other slides in sets, for several years after President Kennedy's assassination. The Warren Commission published a very fuzzy black and white copy of this picture in the 26 volumes of Hearings and Evidence.

The slender S-shaped antenna mentioned is definitely visible in the slide (2nd copying), and in the print (4th copying), both of which are in my possession and from which the published picture (7th copying) was produced. I will be glad to show anyone who is seriously interested the print (4th copying) and the slide (2nd copying) at a convenient prearranged time.

Jim Hicks arrived with his wife in the office of District Attorney Jim Garrison in New Orleans one day in 1967. He had driven to New Orleans from Dallas and showed up unannounced, to "give Garrison some information about the assassination".

At first, he said nothing about his having been in Dealey Plaza. Jones Harris, one of the researchers, happened to be in Garrison's office. Harris noticed him — his broad shoulders and back, his gray jacket, and his style of haircut. Harris said to himself, "Where have I seen that man before?" and suddenly he remembered this picture (Willis 7) and spoke to Garrison. Garrison brought out the picture and showed it to Jim Hicks and his wife. When Hicks was asked if he had been in Dealey Plaza that day, Hicks at first denied it, but his wife spoke up and said, "Yes, you were, Jim, don't you remember? There you are in the photo wearing the same jacket."

Hicks admitted being the radio communicator among the firing teams. He admitted he had set up a communications center in the Adolphus Hotel, a few blocks from Dealey Plaza on Main St., prior to the assassination.

In the later part of 1967, an article published in the New Orleans States-Item reported that Hicks had been put into an Air Force hospital for the insane in Oklahoma.

Garrison considered subpoenaing Hicks as a witness for the Clay Shaw trial in New Orleans in February 1969. He did not do so because Hicks was understood to be still confined in the hospital.

VISUAL RE-CREATION OF A SCENE BY COMPUTER GRAPHICS

Leslie Mezei
Computer Systems Research Group
University of Toronto
Toronto 181, Canada

Richard E. Sprague's article and the data he reports make possible an interesting application of computers towards the visual re-creation of a scene. Since the events took place over a period of time, and the photographs are merely snapshots of the action at different points of time, the possibility of dynamic simulation should be considered. Assuming that the contents of each picture have been coded into the computer, so that for each person and moving object space-time coordinates are available at a number of points, it would be possible to create a motion picture (by means of a microfilm plotter) simulating their movements.

There would be gaps in the data. Many of these could be filled in to provide reasonable continuity while viewing the simulation (perhaps at an interactive graphic terminal). Various hypotheses could be programmed about particular individuals and objects and their reasonableness ascertained visually. Scaling is possible in not only the space dimensions but also in the time dimension, so that — for example, ultra slow motion could be achieved.

All of this could be accomplished with currently used techniques of computer graphics.

CONFIRMATION OF FBI KNOWLEDGE 12 DAYS BEFORE DALLAS OF A PLOT TO KILL PRESIDENT KENNEDY

Edmund C. Berkeley, Editor
Computers and Automation

The May Sprague article on page 31 refers to the Miami Tape, and the information that there was a plot to kill President Kennedy, which J. A. Milteer knew about.

Part of a Warren Commission Document 1347 (noticed by one of the researchers in the Archives) confirms that the Federal Bureau of Investigation knew of this plot, and knew of it before the assassination occurred.

Following is a verbatim copy of the information contained in pages 119 to 124 (except that one page, 121, was classified secret by the FBI) of Warren Commission Document 1347 in the U. S. Archives. This part of Commission Document 1347 has been reproduced photographically on the following pages.

The FBI obviously knew about Mr. Milteer two weeks before the assassination.

Why did they do nothing about it?

Why did the Secret Service do nothing about it?

Why were these important records excluded from the 26 volumes of Hearings and Evidence published by the Warren Commission?

What information was on page 121 which was withheld from release by request of the FBI in August 1965 (almost 2 years later)?

Why was it requested then?

VERBATIM COPY OF CERTAIN PAGES IN WARREN COMMISSION DOCUMENT 1347

MM 89-35
FPG:ggr/ds
1

Re: Threat to Kill President
KENNEDY by J. A. MILTEER
Miami, Florida
November 9, 1963

On November 10, 1963, a source who has furnished reliable information in the past and in addition has furnished some information that could not be verified or corroborated, advised SA LEONARD C. PETERSON that J. A. MILTEER on November 9, 1963, at Miami, Florida, made a statement that plans were in the making to kill President JOHN F. KENNEDY at some future date; that MILTEER suggested one JACK BROWN of Chattanooga, Tennessee, as the man who could do the job and that he (MILTEER) would be willing to help. MILTEER reportedly said that he was familiar with Washington and that the job could be done from an office or hotel in the vicinity of the White House using a high-powered rifle.

U.S. Secret Service was advised of the foregoing information.

119

MM 89-35
FPG:ggr/ds
2

Re: [redacted]

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CD 1347

MM 89-35
1.

Re: THREAT TO KILL PRESIDENT KENNEDY
BY J. A. MILTEER, MIAMI, FLORIDA
NOVEMBER 9, 1963

On November 26, 1963, a source who has furnished reliable information in the past and in addition has furnished some information that could not be verified or corroborated, advised SA PETERSON as follows:

On November 23, 1963, J. A. MILTEER was in the Union Train Station, Jacksonville, Florida, and at about 4:25 p.m. on that date stated he was very jubilant over the death of President KENNEDY. MILTEER stated, "Everything ran true to form. I guess you thought I was kidding you when I said he would be killed from a window with a high-powered rifle." When questioned as to whether he was guessing when he originally made the threat regarding President KENNEDY, MILTEER is quoted as saying, "I don't do any guessing."

On the evening of November 23, 1963, MILTEER departed Jacksonville, Florida, by automobile en route to Columbia, South Carolina. During this trip, MILTEER stated that he had been in Houston, Ft. Worth, and Dallas, Texas, as well as New Orleans, Louisiana, Biloxi and Jackson, Mississippi, and Tuscaloosa, Alabama. MILTEER said he was acquainted with one R. E. DAVIS of Dallas, Texas, whom he described as a "good man," but did not indicate he was personally acquainted with DAVIS. MILTEER did not indicate on what dates he was in the above cities, except for Tuscaloosa, Alabama.

MILTEER related that he was in Tuscaloosa, Alabama, and contacted ROBERT SHELTON of the United Klans of America, Inc., Knights of the Ku Klux Klan (United Klans), on the evening prior to the bombing of the

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MM 89-35
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BY J. A. MILTEER, MIAMI, FLORIDA,
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The Federal Bureau of Investigation has requested that certain pages of this document not be disclosed. This request was incorporated in a letter of August 13, 1965, to Dr. Wayne C. Grover, Archivist of the United States from Norbert A. Schlei, Assistant Attorney General, Office of Legal Counsel, Department of Justice

Commission Document Number: 1347

Pages Withheld: 121

MM 89-35
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A characterization of the Association of South Carolina Klans follows. Sources therein have furnished reliable information in the past.

After their arrival, MILTEER stated that there was no point in discussing President KENNEDY, and again stated, "We must now concentrate on the Jews." MILTEER advised that he was preparing a pamphlet which he wanted to disseminate throughout the country. Prior to concluding their discussion, information was received that JACK RUBY had killed LEE HARVEY OSWALD. In view of this, MILTEER said he would have to alter the information he was setting out in his pamphlet.

The source advised that based on his contact with MILTEER, he could not definitely state whether MILTEER was acquainted with either RUBY or OSWALD.

122

MM 89-35
FPG:ggr
1

Re: Threat to Kill President KENNEDY
by J. A. MILTEER, Miami, Florida,
November 9, 1963

J. A. MILTEER is also known as JOSEPH ADAMS MILTEER. He was born February 26, 1902, at Quitman, Georgia, and lives at Quitman and Valdosta, Georgia. He reportedly is a wealthy bachelor who inherited an estimated $200,000 from his father. He is reported to have no family, no employment and to spend a great deal of time traveling throughout the Southeastern United States. He has been unsuccessful in city politics in Quitman and publishes a weekly pamphlet criticizing the operation of the Quitman City Government. MILTEER has associated himself with the Constitution Party of the United States and attended a convention of this party held at Indianapolis, Indiana, during October, 1963. He was reprimanded by this party for describing himself as being the party regional chairman for the Southeastern states. MILTEER reportedly became disillusioned with the Constitution Party of the United States and has attempted to form a party known as the Constitutional American Parties of the United States. MILTEER allegedly intends to use the Constitutional American Parties of the United States as a front to form a hard core underground for possible violence in combatting integration.

123

1
DL 89-43
PEW/ds

The interview of JOSEPH ADAMS MILTEER, as well as additional information regarding him, is contained on pages 24-26 of the report of Special Agent CHARLES S. HARDING, Atlanta, Georgia, dated December 1, 1963, in the case entitled "LEE HARVEY OSWALD; INTERNAL SECURITY - RUSSIA".

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124

THE SECOND CONSPIRACY

Richard E. Sprague
Hartsdale, N.Y.

Question: (composite — from several inquirers)
I think you assert that there were two conspiracies: a first conspiracy, i.e., one before President Kennedy's assassination, "involving over 50 people", and a second conspiracy later, when a much larger number of persons realized that President Kennedy had been assassinated as a result of a conspiracy, and yet these persons proceeded to cover it up in the interests of what they called "national security".

Could you please describe the essential elements of the second conspiracy?

What is the main evidence for it?

Answer: by Richard E. Sprague

There was a second conspiracy, and it continues today.

The second conspiracy began when a large number of important and highly-placed persons in the United States government (and outside of it) realized (on Nov. 22, 1963, and in the next few days) that there had been a conspiracy to assassinate President Kennedy. They decided — one by one, or in groups, or as a result of threats, or choice, or being told in confidence, etc. — we do not know with what hesitation or pangs of conscience — but they decided to cover up the first conspiracy. The phrase which they used and still use to absolve themselves is "on grounds of national security". There is evidence that people are still joining the second conspiracy, having concluded that it is to the advantage of the United States or to their own advantage not to admit the existence of the first conspiracy.

The evidence for this second conspiracy is very different from the evidence for the first conspiracy. The evidence for the first conspiracy includes such things as photographs, confessions, court testimony, the physics of bullets and guns, and other very solid evidence.

The evidence for the second conspiracy consists essentially of a large number of "strange events". Separately, each one can be "explained reasonably". Together these events make a mass of evidence that cannot possibly be "explained reasonably" in the same way as a person who steals funds from his employer can "explain reasonably" once, and a person who steals funds from his employer twenty times can no longer "explain reasonably".

A very recent example of an act covering up the first conspiracy occurred when former President Lyndon B. Johnson was interviewed by Walter Cronkite on a Columbia Broadcasting System television news special on May 2, 1970. On April 29, 1970, the New York Times printed a story entitled "Johnson TV Interview Abridged at His Request". (The Times story had actually been leaked to the press three days before the scheduled broadcast by someone at CBS who

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Exhibit 2

Original facsimile record of bills charged to the Warren Commission, to pay for the stenographic reporting of sessions of the Commission.

PRESIDENT'S COMMISSION ON THE ASSASSINATION OF PRESIDENT KENNEDY [TOP SECRET] PC-2

Vol. No.	DATE 1964	PLACE	REPORTER	PAGE COUNT From	To	Actual	Extra	Skipped	Vou No.
4	1/21	D.C.	TOP SECRET Fisher	1	126	124			G-7883
5	1/22	D.C.	TOP SECRET Condon	127	no write up - reporter's steno notes confiscated by Commission				
5	1/27	D.C.	TOP SECRET Fisher	127	212	84			
6	2/3	D.C.	TOP SECRET Fisher	213	247	48			
6	2/3	D.C.	TOP SECRET Mills	248	294	35			
7	2/4	D.C.	TOP SECRET Mills	295	334	40			
7	2/4	D.C.	TOP SECRET Mills	335	379	45			
8	2/5	D.C.	TOP SECRET Mills	380	429	49			
8	2/5	D.C.	TOP SECRET Mills	430	481	52			
9	2/6	D.C.	TOP SECRET Mills	482	509	28			
9	2/6	D.C.	TOP SECRET Mills	510	586	79	3 Cont.		
10	2/	D.C.	TOP SECRET Mills	587	765	176	1 Cont.		
1	2/11	D.C.	TOP SECRET Mills	766	854	89			
2	2/12	D.C.	TOP SECRET Mills & Fisher	855	997	141	995-a cont.		
3	2/20	D.C.	TOP SECRET Mills, Fisher	998	1186	187	1 Cont.		
4	2/21	D.C.	TOP SECRET Mills, Fisher, Condon	1187	1473	281	1 Cont.		
5	2/27	D.C.	TOP SECRET Mills	1474	1595	121			
11	2/24	D.C.	TOP SECRET Mills	1596	1601	6			
11	2/27	D.C.	TOP SECRET Fisher	1602	1754	152			
7	3/27	D.C.	TOP SECRET Condon	1755	1786	31	1 Cont.		
18	3/1	D.C.	TOP SECRET Mills	1787	1794	7			G-7929
19	3/6	D.C.	TOP SECRET Fisher Mills	1795	2063	270	188A-E, 200-7-H 1 Cont.		

knew what LBJ had said to Cronkite.) The story said, "Mr. Johnson was understood to have told Mr. Cronkite that he was not absolutely convinced that Oswald acted alone". "Johnson had expressed fundamental doubts about the Warren Commission's conclusion that Lee Harvey Oswald was the 'single assassin', acting alone, in the death of President Kennedy." "About three weeks ago, sources said, Mr. Johnson thought better of the remarks and asked that they be cut out". "President Johnson had the material cut out, 'on the ground of national security'."

There is the phrase again, repeated by LBJ and CBS as recently as two months ago. In the current situation both CBS management and Mr. Johnson are continuing the second conspiracy, whether intentionally or not.

Here is a list of "strange events". There were 10 items listed in the section "strange events" in the May article (pp 32, 34). These referred to:

1. Crucial Records Were Burned or Destroyed
2,3. Crucial Physical Evidence Was Destroyed (two items cited)
4. The Warren Commission Did Not Examine the Autopsy Materials
5. The Commission Accepted a Bullet (C.E. 399) Which Could Not Have Done What it was Claimed to Have Done)
6. The Commission Printed Two Frames of the Zapruder Film Reversed Which Reversed Kennedy's Head Motion (later they admitted this error)
7. The Commission Ignored the Violent Backward Motion of Kennedy's Head at the Time of the Fatal Shot
8. The Commission Failed to Fully Investigate Motives for Kennedy's Murder
9. President Johnson Locked Up Over 300 Relevant Documents in the National Archives for 75 Years
10. Former Chief Justice Earl Warren Has Refused for over 6 years to Look at Any New Evidence

In addition to these previously listed "strange events", here are more:

11. Johnson Received Word of "No Conspiracy" Before This Possibly Could Have Been Determined

On the afternoon of November 22, 1963, while LBJ was returning from Dallas to Andrews Air Force Base outside Washington, aboard the plane Air Force One (the Presidential plane also carrying President Kennedy's body), he received word that "there was no conspiracy" in Kennedy's assassination and that Lee Harvey Oswald was the "sole assassin".

The message was received via Air Force radio from a midwestern Air Force station, relaying information from the Pentagon. A tape recording of this broadcast was discovered in the National Archives in 1964. The airplane landed about 4:30 p.m., Nov. 22, 1963, at a time prior to Oswald's being accused of the crime, and at a time before anyone could have known whether or not a conspiracy existed.

12, 13. Nineteen Executive Sessions of the Warren Commission Were Classified Top Secret, and One Was Made "Nonexistent"

Exhibit 2 shows the dates and some other information about these sessions.

One of these sessions, held on Jan. 22, 1964, was recorded, but the Commission took the extraordinary step of confiscating the reporter's stenographic notes and deleting the number of the meeting, as if to pretend the meeting had never happened. Seven of the nineteen sessions were declassified in 1968. The other twelve sessions are still classified Top Secret.

14. A Pentagon Officer Controlled President Kennedy's Autopsy at Bethesda Hospital

Col. Pierre Finck, one of the autopsy doctors, testified at the trial of Clay Shaw in New Orleans in March, 1969, that a high-level officer from the Pentagon gave all the orders at the autopsy of President Kennedy in Bethesda Hospital. Among other instructions, this officer ordered the doctors not to probe President Kennedy's neck wound.

(To be continued)

CORRECTIONS IN THE ARTICLE

Richard E. Sprague
Hartsdale, N.Y.

Page 5, item 5: Replace page number "30" with "29".
Page 31, col. 2, line 36: Replace "Flammande" with "Flammonde".
Page 31, col. 2, line 8 from bottom: Replace "September" by "November".
Page 32, paragraph 6, beginning with "The FBI and the Secret Service ...": Insert reference to Note 1.
Page 33, last line: Insert reference to Note 2.
Page 35, col. 1, lines 10 and 11 from bottom: Replace "from President Kennedy rounding the curve" with "from the time that President Kennedy had just rounded the curve".
Page 35, right hand column, line 4 from bottom, next to "neck brace": Insert reference to Note 3.
Page 39, line 2: Replace "197" with "196", and insert reference to Note 4.
Page 39, caption, line 2 from bottom, next to "pistol handle": Insert reference to Note 5.
Page 42, caption for Fig. 7: Replace "3 seconds" with "3.5 seconds".
Page 43, caption for Fig. 9: Replace the first sentence by "John F. Kennedy, after the first shot; taken at Z 202. The arrow points to President Kennedy."
Page 47, col. 1, line 23: Replace "Z2313" by "Z313".
Page 50, Table 2, name of photographer of the last two pictures: Replace "Similis" by "Similas" in two places.
Page 51, Chart 2, 5th horizontal line: Replace "3 sec." with "3.5 sec.".
Page 56, text, next to headline "Part 3. ....Evidence": Insert reference to Note 6.
Page 57, col. 2, line 6: Replace "Table 1" with "Chart 2".
Page 57, col. 2, line 11: Replace "Table 1" with "Table 3".
Page 60, col. 2, line 5: Replace "Flammande" with "Flammonde".

Notes

Note 1: One of the researchers has found evidence in Warren Commission Document 1347 that the Warren Commission -- as well as the FBI -- did know about the Milteer plot reported in the Miami Police tape. The relevant portion of this document is reproduced in the July 1970 issue of Computers and Automation.

Note 2: This picture is Willis 7.

Note 3: President Kennedy was not wearing a neck brace. He was wearing a back brace, well down his back, in the lower torso.

Note 4: Figures 2, 3, 4, and 5 are respectively Main List numbers 251, 252, 195, and 196 (G. Smith 1 and 2, and Wm. Allen 3-14, and 3-15, respectively).

Note 5: This pistol may be a Smith and Wesson Model 15, 38 Special.

Note 6: The application of computers to the photographic evidence has been started, but is in its early stages. The conclusions stated in the article were arrived at by the author, before the computer applications to the photographic evidence were begun.

EFFECTIVE PROGRAM DESIGN

David W. Packer
Digital Equipment Corp.
146 Main St.
Maynard, Mass. 01754

"The tendency of many programmers is to just start drawing a detailed flowchart, solving each problem as it occurs. This is analogous to building a house without a plan – one brick at a time. The result in either case is likely to be the creation of a monster."

This discussion of computer program design promotes the idea that the success and ultimately the cost of any computer program is critically related to its design; that is, that the design, is, by far, the most critical aspect of program development. The EDP community often talks of design and the concepts of modularity, generality, flexibility, and maintainability; yet many programs are not well designed, and others are not designed at all, but simply written. It is my belief that the design of a program is much different from its coding, and is a creative task involving many – if not all – of the same elements as systems design.

David W. Packer is Manager of Information Systems and Data Processing at Digital Equipment Corporation. He joined DEC in 1964 and has most recently been responsible for developing and building its systems and data processing function. Prior to this, he was a Research Associate at M.I.T.'s Sloan School, working on simulation of industrial enterprises. He has authored material on management of the EDP function, corporate growth dynamics, and management science techniques. He received a B.S. in both electrical engineering and humanities in 1960 and an M.S. in industrial management in 1963, all from M.I.T.

Good Program Design Results in Good Systems Design

A further extension of this view is that one who learns to design programs well gains valuable training in systems designing as well. The only basic difference between the program and the system is that the program is a smaller unit, and consequently there is less risk from bad design of it. A system is nothing more or less than a set of programs with logical and physical inter-connections, in much the same way as a program is a set of routines with the same sort of connections. I believe that program design is, over the long run, a most essential ingredient of an effective systems job, for well-designed programs are fairly insensitive to the inadequacies of the particular coding techniques used and tend to make the system flexible and easy to modify.

The lip-service paid to program design manifests itself in a number of misconceptions about what constitutes good design. This, coupled with the fact that the computer can do "anything" (i.e., that even the most poorly designed program can be made to work), detracts from the importance of program design today. Why should programs be designed well – or maybe more practically, why should programs be designed at all and not just coded?

I think it is clear to anybody who has worked with large numbers of programs that have existed for a long time that well-designed programs are easier to write, to document, to review, to control, to understand, to debug, to test, and to maintain.

Today, many programmers are being thrust into their jobs with only a brief indoctrination into programming techniques (a course that more often than not has nothing or little to do with design), with a manual that answers only the technical questions of the specific language being used. Very little education or emphasis has been or is being given to effective design of computer programs. Thus, the development of programmers' creative skills (which in turn would provide a solid base for future systems work) is being minimized.

Another important consideration is that EDP installations are operating at an unnecessarily high cost level, and

they are often unresponsive to users' needs because of the time required to change, revise, and write new programs. The EDP business today is characterized by a tremendous shortage of programming and technical talent so it is highly desirable to educate the available talent in an organized way and to develop at the earliest time the creative and technical requisites for high productivity, fast response, and advancement in the organization for people currently in programming jobs.

It is my intention in this article to discuss program design, to show concrete examples of what constitutes good – and poor – design, and to show how fundamental the design process is to the whole programming job, and in effect to the whole systems job. My comments derive from COBOL-oriented business-data-processing operations; but I do not believe they are restricted to COBOL users nor to business applications programmers. The following sections focus on concepts of modularity and program structure. From these elements, I will seek to outline the straightforward approach to program design that results.

Modularity

The concept of modularity is at the heart of effective program design. It is also the concept most often not carried through to a meaningful end, although the programmer thinks that it is.

A rather theoretical definition of a program module is that it is a set of instructions that perform a clear-cut function that can be described largely independent of other program steps. Essentially, a module is a set of instructions that is meaningful within itself.

The degree of modularity that a program achieves relates to how close it comes to consisting of a number of independent modules, each with a meaningful function and with no interactions with other modules. In other words, the output of one module is in no way dependent upon what is happening or has happened in other modules. It depends only on the input to the module and the function of that module. As a result of logical independence, any program error can be traced to a malfunction in a single module, and by correcting the module the program malfunction will be completely corrected.

"Today many programmers are being thrust into their jobs with only a brief indoctrination into programming techniques."

"A good test of modularity is independence among modules."

Using Subroutines

Modularity implies the use of common routines (or subroutines). However, heavy use of subroutines by itself does not mean that one has a modular program. To be truly modular, two key points are required:

1. Each module of the program has a *small* number of interactions with other modules.
2. Each module has clearly defined functions, which are related specifically to the *logical* function of the program.

For example, consider a program that is updating a master file with transactions from three transaction files. When the program was first laid out, it looked very complex, because the updating functions were different for each transaction type and because the process of reading the transaction files to determine which transaction type should be updated next was inherently complicated.

The program was redesigned with the following key modules:

1. A section that processed the transaction files to find the next transaction to be processed and delivered it to a common working storage location.
2. A section that received each transaction and updated the master file accordingly.

Now each module could be written independently – when working on the transaction matching one did not need to think *at all* about the updating functions; when working on the updating, problems of matching multiple transaction inputs could be completely forgotten – the problem was simply to post one transaction at a time. Thus overall complexity was considerably reduced.

Maintenance was also easier. If, for example, a new transaction file was added, it was clear where to make changes and what changes to make, The chance of "subtle" problems emerging was reduced; we knew that a new type of transaction would appear as input to the update, and it was clear how to accommodate it. For the update module itself was modular, i.e. it contained a set of simple sections that provided for the processing differences between transaction types.

A good test of modularity is independence among modules. The test involves the following questions:

1. Can each module be reviewed and specified in detail without regard to other modules?
2. Can each module be coded by a different person (this is not desirable but may be necessary) based on a simple set of specs, and that very little (ideally, no) communication need take place between the programmers?

Program Structure

Conceptually, a well designed program consists of two types of routines. They are:

1. "Mainstream" or control modules.
2. Subroutines, each a module with a function that is only a part of what the entire program does.

Mainstreams

The "mainstream" modules direct the program's operation. They are the basic control sections, calling various subroutines to do detailed jobs. By reading the mainstream code, one can get an overview of the entire logical function of the program.

For example, consider a typical sequential update. Below is the COBOL Mainstream section. The update is sequentially matching a transaction file to a master file, updating the master when a match occurs (by adding to totals in the master), and rejecting transactions (printing an error message) when a transaction has no matching master. The matching is done on fields within the records called TRANS-KEY and MAST-KEY.

```
MAINSTREAM SECTION.
COMPARE-TRANS-TO-MAST.
   IF TRANS-KEY EQUALS MAST-KEY GO TO UP-
   DATE.
   IF TRANS-KEY GREATER THAN MAST-KEY
      PERFORM WRITE-NEW-MASTER THRU
      WNM-EXIT
      PERFORM READ-OLD-MASTER THRU ROM-
      EXIT
      GO TO COMPARE-TRANS-TO-MAST.
TRANS-LESS-THAN-MAST.
   PERFORM ERRONEOUS-TRANS THRU ET-EXIT.
READ-TRANS.
   PERFORM READ-NEXT-TRANS THRU RNT-EXIT.
   GO TO COMPARE-TRANS-TO-MASTER.
UPDATE.
   IF TRANS-KEY EQUALS HI-VALUE GO TO END-
   ING.
   PERFORM ADD-TO-MASTER THRU ATM-EXIT.
   GO TO READ-TRANS.
```

As exemplified above, the mainstream section consists mainly of decision logic (IF's, GO TO's) and calls of subroutines (PERFORM's). This section, surprisingly enough, is often quite short; yet it provides a clear description of the entire logical function of the program.

Subroutines

Each subroutine is a program module with a smaller function than the entire program. Each is essentially a small program, and will itself consist of a mainstream and may use other, lower level subroutines.

Referring to the example, note that every routine that is PERFORMed is a closed subroutine. For example, the ERRONEOUS TRANSACTION routine is a program whose input is a transaction in an input area and whose output is, in this case, an error printout. The routine might look like this:

```
ERRONEOUS-TRANS
   MOVES SPACES TO PRINT-LINE.
   MOVE "NO MASTER FOR THIS TRANSACTION"
   TO PRINT-LINE.
   PERFORM WRITE-PRINT-LINE.
   PERFORM MOVE-TRANS-TO-PRINT-LINE.
   PERFORM WRITE-PRINT-LINE.
ERRONEOUS-TRANSACTION-EXIT. EXIT.
```

The statements above are the "mainstream" of the subroutine. It, in turn, calls other simple routines for output and for formatting. But its operational functions are clear from the mainstream section alone.

Subroutines can be overused – often to the point where documentation and clarity degrade. This happens when key logical functions appear in a subroutine rather than in the mainstream, where they logically belong, or when subroutines are written for tasks that are short enough to be included in the mainstream.

For example, in the update program, if certain transactions are being selected or deleted from the input file, this logic (or at minimum a PERFORM of the logic) belongs in the mainstream, not in the READ-NEXT-TRANS subroutine, because it is an important function of the program.

"Subroutines can be overused – often to the point where documentation and clarity degrade."

Thus, it is critical that the designer not be carried away by subroutine usage. A common misconception is that *any* use of subroutines is good because it means modularity. A program that overuses subroutines – reducing mainstreams to meaningless levels – is as bad as an undesigned program where everything is included in a long, complex mainstream section.

Subroutines are a tool to break a program into a set of meaningful building blocks with a minimum of interactions among them. Like a program itself, each should do a job that is related to the logical breakdown of tasks of the entire programming system.

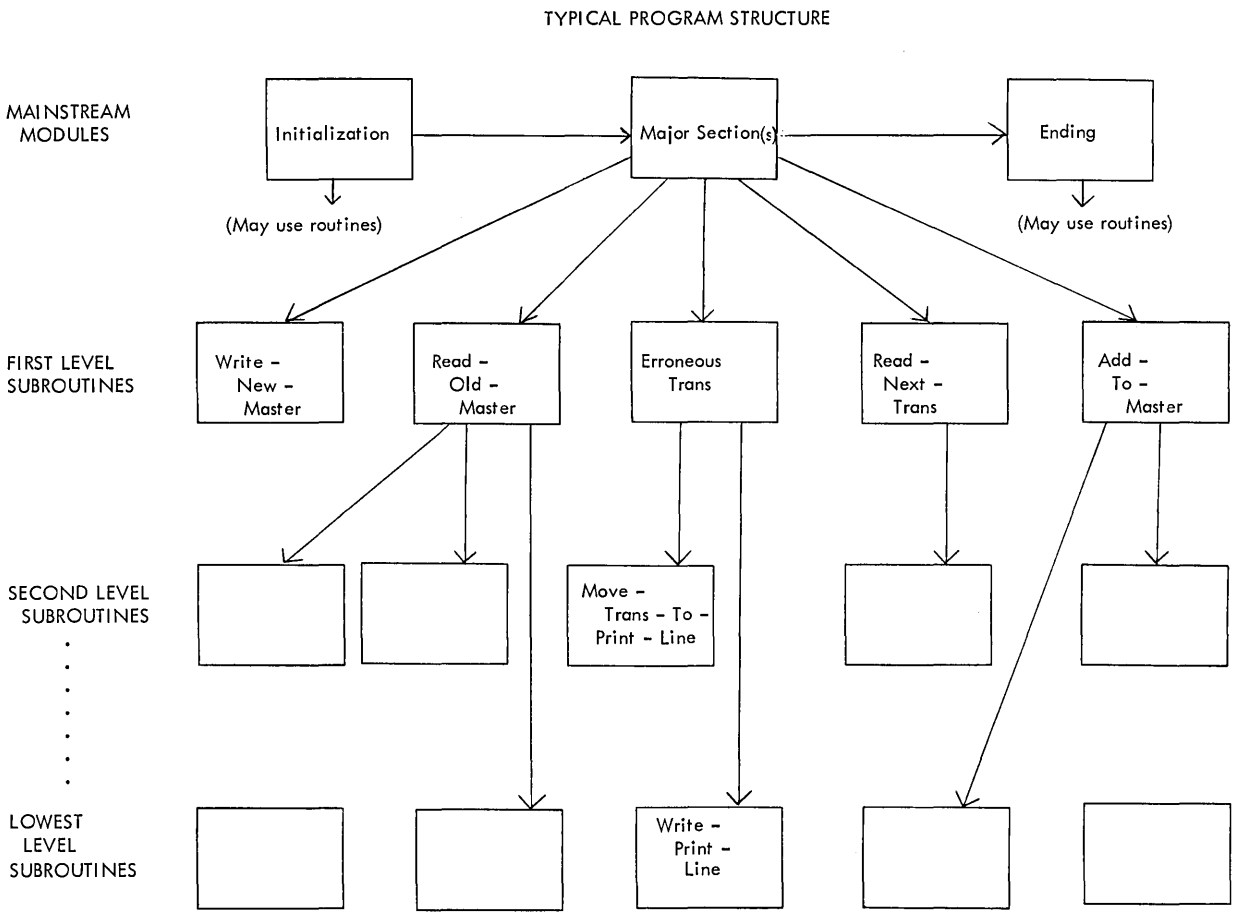

FIGURE 1

Conceptually, both mainstream and subroutine modules are a set of "building block" programs that can be written, tested, and maintained by themselves – they are highly independent.

Overall Program Structure

The block diagram shown in Figure 1 is a convenient way to represent the heirarchical structure of a program. Each box indicates a program module. Along the top are mainstream modules, which are always in control of the program's operations. Note that there may be several mainstreams; typically there is an initial section (initialization, setup, etc.), followed by the main processing section or sections (if the program is doing a series of sequential jobs), and an ending section (wrap up, final totals, closes of files, etc.).

At the next level are what I call first level routines, the major subroutines referred to in the mainstream. Since these are in fact programs, they may use more detailed routines, creating a structure several levels deep. As one goes deeper into the structure, one normally finds that routines have functions of increasingly limited scope. For example, at the lowest level are subroutines that do such things as write print lines, read tape, read disk files, etc.

The block diagram representation of a program is a useful tool for teaching and for stimulating good design concepts. It shows every module of the program and will quickly bring to light fallacious design concepts (for example, an undesigned program will show up as one monstrous block), excessive use of subroutines, etc.

Design Considerations – An Example

Here, let me discuss a representative example of program design consideration. It is typical of a wide variety of rather general design questions that come up in a broad range of programs.

The design consideration is how to handle the several possible outcomes of a modular subroutine. For example, the mainstream may say, "PERFORM READ-CUSTOMER-RECORD." Then the question is, how can we account for the possibility that the customer record will not be found by the subroutine that is "performed"?

There are two approaches: First, to have the subroutine handle the error condition, i.e., go to an error routine that returns to the mainstream section. Second, to have an indicator set at the end of the subroutine that will *tell* the mainstream logic whether the record has or has not been found. If the error indicator is set or "on," then the mainstream logic can handle the error condition. I believe that the indicator is usually the better method, because it puts back into the mainstream logic for a condition that is in fact a part of the broad function of the program – what to do when an error is found. Thus the mainstream may read:

```
PERFORM FIND-CUSTOMER-RECORD
    IF ERROR INDICATOR IS ON, PERFORM CANT-
        FIND CUSTOMER.
```

"CANT-FIND-CUSTOMER" is another program module that would print the program messages and take appropriate action. Thus again the reader of the program knows, from the mainstream alone, that errors can occur and how they are handled.

In most programs, there are many such design considerations. The good programmer will find the opportunity for creativity, innovation, and personal satisfaction if he recognizes such opportunities and exploits them.

Generality and Flexibility

An important design consideration that does not relate directly to program structure is that of generality. Essentially, this means setting up a program to do a general task, rather than a series of highly specific jobs. Generality buys flexibility, for it creates programs that are adaptive, without modification, to the normally changing business environment.

Almost every program of any substance contains opportunities for generality. For example:

Don't include today's specific numbers in programs (like stockrooms, parts, orders). They may (and usually will) change. Include them as parameters, or data, that is an input to the program and can be changed at run time.

Make dates printed by programs in the format "N week period ending MM-DD-YY" so that the same program can be used for weekly, monthly, quarterly, or yearly reports as a function of the input data. Allow for full dates (decades do change, about once every 10 years).

Format reports in a way that allows expansion. Normally a vertical arrangement is best; printing summary items across the page limits expandability and means program changes whenever a new item is added or changed.

"A program should be designed to do a general task, rather than a series of highly specific jobs."

Don't cut corners based on *current* requirements. *Always* design for the general case. For example, if there is a four-digit account number, where the first two digits are constants (today), don't set up records and programs to use only two digits ("But, the other two don't matter!" – today). Use the whole number. Avoid the crises of "But, that means revising 30 programs!" by designing it for the general case the first time. Also, in fixed records, allow extra spaces – you will need them sometime. Don't lump items together unnecessarily ("They say they only need the total, so why keep an extra field in the master file?"). The keynote is:

Think Ahead
Understand Why
Design Systems that Live in a World of Change (Remember Heraclitus)
Avoid Future Crises

Of course, there are tradeoffs. A *highly* generalized system is expensive to build and operate. In many cases, however, a general approach is as easy to implement as a specific one. It just requires more thought in the design stage. Sometimes (often) it's even easier, because the extra thought results in generality that avoids programming specifically all the oddities of the way things work now.

"Think in terms of alternatives and draw flow diagrams at a general enough level so that it is possible to re-think and re-draw until one finds a design that is satisfactory."

The Design Process

How does one really set to work to design a program? I think the answer to this question is relatively simple, and it takes the form of evaluating various alternatives to good program design. The first step normally is to start drawing flowcharts. These should not be detailed flowcharts; and in fact, even in the case of relatively complex programs it should not take more than ten to twenty blocks to show what is really being done. In other words, the flowchart blocks should all fit on a single piece of 8½ x 11″ paper, if the designer is thinking broadly about the function of the program and is really starting at the highest level before becoming enmeshed in detailed design of individual portions of the program.

The basic approach here is to think in terms of alternatives and to draw flow diagrams at a general enough level so that it is possible to re-think and re-draw until one finds a design that is satisfactory. The process one goes through here is like many other creative processes. One starts with some assumption of how the total program should be structured and starts to diagram it. In the process, one will often see difficulties and objections with that particular method. From these objections one will get ideas for another way that will make the logic look simpler and more easily implemented.

Because of this process, it is important to start at a fairly general level. By "general" I do not mean vague. It is important to be precise but not to worry about too many of the details. If one starts drawing a detailed flowchart, one thing that often happens is that the effort to revise it evokes a normal emotional bias against really examining alternatives.

The flow diagram at this stage will normally be a detailed diagram of the key mainstream section, showing all of its decision logic and showing all first level subroutine modules, each with a brief description.

Many programmers do not begin design at this level, an indication of a nonmodular approach to the problem. Instead, the tendency is to just start drawing a detailed flowchart, solving each problem as it occurs. This is analogous to building a house without a plan – one brick at a time. The result in either case is likely to be the creation of a monster.

If we are to have well designed programs, the concept of design as a discipline must be accepted, taught, and developed. The concept of design is essentially unrelated to the material in the programming manuals; the information there provides only the raw materials that design converts to reality. □

LORD HALSBURY SPEAKS ON COMPUTER PRIVACY

The Earl of Halsbury
President and Chairman of Council
The British Computer Society
29 Portland Place
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"One of the basic human rights should be: 'No secret information on a computer, and right of print-out for the person to whom the computer records relate.' "

The British Computer Society, as often happens in modern technological societies, combines the functions of a learned society, publishing a scientific journal, with the functions of a professional institution concerned with education and ethical standards. We are particularly concerned with ethical standards and we have set up our own working party to consider this matter. I feel sure that the whole sympathy of the computer scientists is with the potential victims of any misuse of their science. The potential victims and the scientists are on the one side, and the impersonal, hard-hearted administrative machine, which neither understands the techniques of the one nor sympathises with the needs of the other, is the common enemy.

I am not going to take up time with reciting a panegyric upon the use of computers, although computers have been, perhaps, the centre of my emotional life for the last 20 years. Some 20 years ago I found myself, as managing director of the National Research Development Corporation, virtually the sole means of channelling public money from the public purse to the computing industry, then in its period of gestation.

Multi-Access Computation

After 10 years of that work I thought that I was out of it, and lay fallow for a couple of years. But some six or seven years ago I found myself chairman of the Software Committee which was set up by the Science Research Council, and this particular subject has been my personal subject for the last seven years. The subject has attained a new level of achievement, on the one hand, or approached a new level of difficulty or even embarrassment, on the other.

"The kind of proposition which runs 'the system cannot be beaten', has the same logical status as the proposition which says: 'I have forgotten nothing' – because it is obvious that if I had, I would not know that I had forgotten it."

For we have the accomplishment of what is called multi-access computation – that is to say, that you have one computer with a large number of people working into it, and not one of them knows that the others exist.

The Need for File Security

Arising out of this has come the need for file security. It would be disastrous if one person wrote something into another person's file. In the case of a written document, if anybody alters it an expert can tell that the document has been altered. The document may be merely expunged, as they did in the Middle Ages, or have a line drawn through it, as later, or the ink may be scratched out with a knife and something overwritten; but there is always a trace left. In the case of a magnetic mark on a tape no trace is left. A particular dot, or bit, as it is sometimes called, can be written and overwritten many times without leaving a trace. So it is impossible to find out whether something has been overwritten or not, and it is necessary to have a security system to make sure that it is not.

Warning: Security Systems *Can* Be Beaten

It is extremely important not to get starry-eyed about the security provided by the security system. These systems can be beaten, but the kind of proposition which runs 'the system cannot be beaten', has the same logical status as the proposition which says: 'I have forgotten nothing' – because it is obvious that if I had, I would not know that I had forgotten it. The great overload facility for the British universities at Chilton, known as the Atlas Laboratory, where one of the six Atlas computing machines – which were of most enormous credit to this country in the days when they were young – is installed, recently acquired a very large disc file, and then a satellite computer, together with 16 on-line consoles, some of which are in Oxford and some at the Chilton Laboratory. These enable people to communicate direct on-line, simultaneously, apparently, with the Atlas computer.

I was chairman of the Atlas Computer Laboratory management committee during the six months when we set up the file security and were trying to break it. There was, of course, nothing improper in doing this; the people who had designed the security system had an open invitation to break it if they could. They broke it over and over again, but with decreasing frequency. There was an occasion when I was at the laboratory playing with the thing myself, and somebody actually broke it and interfered with what I was doing while I was doing it. That was a personal reminder to me that one ought not to get starry-eyed about the efficacy of these security systems.

I should like to quote a remarkable person on this subject who would, I think, highly commend herself to noble Ladies in this House, because it can be but rarely that a member of their sex achieves the distinction of being both a professor in an American university and a Commander in the United States Navy. I refer to Doctor, as I first knew her, then Professor and now Commander Grace Hopper, the doyenne of software in computer use, who has been writing difficult higher-order software from a time to which the memory of computers runs not to the contrary. We were discussing this very problem in connection with her status as consultant-in-chief to the United States Navy. She made two statements to me that I have her permission to quote.

The first is that these systems are proliferating throughout the United States everywhere, and not one of them has not been beaten within six months by somebody clever enough to do it. Of course, an amateur could not, but the man who designs the system, or his assistant, can usually break it if he tries hard enough.

Automatic Right of Print-Out

The second is that she has persuaded the United States Departments which rely on her advice to grant every member of every public department who has records on a computer an automatic right of print-out. Anybody whose records are kept on a computer has an unqualified right at any time to say: 'I want to see what the computer says about me.' So if anything happens to change his status he knows that the computer has a record of it and can demand a print-out in intelligible form while there is time for human memory to be still available to correct the thing if it is wrong.

In all matters where the computer is going to be the interface between man and the machine – and I do not care whether it is a physical engineering machine in a workshop, or an administrative machine, or a social machine – we must be prepared to invest a little extra money in a soft-sell. You cannot send people to prison because the computer says so; there has to be a better reason than that. This soft-sell has got to come from running the conventional system and the computerised system in parallel, at some extra cost, long enough for people to gain confidence in the system. This, with the right of print-out, will, I think, gradually make people accept the new way of going about things. In other words, we are not entering a phase of the computerisation of everything; we are entering an intermediate phase in which the two systems must be run in parallel for long enough for everybody to gain confidence in both.

"You cannot send people to prison because the computer says so; there has to be a better reason than that."

Some Records Should Not Go on the Computer

There is another matter which I think is essential, and that is that the administrator cannot have it both ways. If matters are to be kept secret, then they must be kept by the conventional system; if they are to be put on a computer, then there must be a right of print-off. We cannot mix the two. There are, of course, certain matters which it is very proper to keep secret. The whole system of references and referees depends on security between the referee and the potential employer to whom the reference is addressed. 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. Therefore references must not go on the computer. And there may be other records which should not go on the computer.

At this stage of our knowledge nothing should go on a computer unless we are prepared to grant the person to whom the computer records relate the right of print-out. The same applies to what I might call inter-Ministerial data transfers – and I do not mean those as between ministers, but as between ministries. I do not think one ministry should have automatic right of access to the data files of another except by authorisation at some appropriate level, possibly at the level of the Minister himself. I do not see why the Minister of Education needs to know that somebody has been to prison unless he is applying for a job as a schoolmaster, in which case, if there are records about these matters kept at the Home Office, the Home Secretary's permission would have to be obtained for a particular piece of information to be available – not in general, but in particular terms – to the ministry that asks for it.

Human Rights

If we will think of it as some kind of principle which could almost be added to the list of human rights, then one of the basic human rights should be: 'No secret information on a computer, and right of print-out for the person to whom the computer records relate.' These, I believe, are basic freedoms which are necessary for all those who might easily become the victims of mistakes, let alone malice, unless we take precautions against it. □

Based on an address by Lord Halsbury who spoke in the House of Lords in the debate on computer privacy.

"The House is on Fire" — THE PROFESSION OF INFORMATION ENGINEER

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 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.

The article which follows is based on an address by Kingman Brewster, Jr., President of Yale University, at the 57th anniversary dinner of the Bureau of Advertising of the American Newspaper Publishers' Association in New York on April 21, 1970. We feel it is significant and thought-provoking.

The Dangers of Silence

Kingman Brewster, Jr., President
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206 Elm St.
New Haven, Conn. 06520

"If the country does not re-discover its own sons and daughters, no amount of law and order or 'crisis management' will make much difference in the long run."

There is one silence which I think is greatly misinterpreted; a state of mind which I think is dangerously misunderstood. I mean the attitude and outlook of the majority of university students these days, no matter how calm the surface of their particular campus may be.

The Silent Student Majority

I am not talking about those bent upon the destruction of the institutions of society. Nor am I talking about those who seem to be slipping into private, personal self-destruction. Their lot is dramatic, sordid, and sad. Their numbers are still very small. I am talking, rather, about the relatively silent student majority.

I would assert that even though the disruptive violence on many campuses is less this year than before, the underlying morale of great numbers of students is worse, even on the campuses which are superficially placid. The malaise, the disenchantment with life and its prospects, is greater now than a year ago among most American students.

The futility of violence may have been learned by many. Measures to deal with disruption have generally been improved. Faculties and administrators are no longer as split on the issue of willful coercion as they were two years ago at Columbia, or a year ago at Harvard.

The press would be misinterpreting and the public and the politicians would be misled, however, if they believed that the violence or non-violence of the few is a measure of the morale, the state of mind, of the many.

Nor is the level of violence the most important measure of university life. Peace on the campus is wonderful – you don't have to persuade a college president of that! But far more important to the country is the attitude, the motivation, and the potential of the majority of the nation's students.

Like it or not, among them are your children's future leaders. If they are constructive, purposeful, hopeful, we will survive any passing violent aberrations by their classmates. But if the best students turn cynical, sour, negative; then, no matter how orderly their campuses may be, the country will not be safe when their time of responsibility comes.

Our preoccupation with the choppy seas and currents of the moment tends to distract us. Deeper tides may have a lot more to do with where in fact we are headed.

How do I *know* that the majority of students are less hopeful, more dejected than they were a year ago? Of

"Our preoccupation with the choppy seas and currents of the moment tends to distract us. Deeper tides may have a lot more to do with where in fact we are headed."

course I cannot *prove* it. But I *feel* it; from bull session conversations on my own campus and elsewhere. I find it confirmed, without exception, by faculty members, deans, and officers; and by presidents of other universities to whom I have put the question.

Deeper Misgivings

There are some plausible explanations why misgivings might be deeper now than they were a year ago:

> The killing in Vietnam goes on without prospect of an end.
>
> The poor get poorer. Urban poverty, housing, and health programs are curtailed. Inflation reduces the power of everyone to buy food and clothing, shelter and fuel, and hits hardest those who can absorb it least.
>
> The dedication to racial equality is pushed back to the inner limits of constitutional necessity. Even this is grudgingly accepted and narrowly defined.

Topical symptoms of such deepening human distress might be easier for the younger generation to take if there were some indication that basic problems were being tackled or admitted. It would be reassuring if it were felt, at the very least, that discussion of fundamental problems was welcomed.

Foreign Affairs

Yet many basic questions seem to be ducked, glossed over, or ruled out of debate. For example, in foreign affairs:

> If we are not to police aggression everywhere, what is the rationale of United States self-interest which would tell us when commitment of our force is justified?
>
> If peace is indivisible, even though *we* are not the world's policeman, are we willing to support the United Nations, or some other world policeman, even though he is not under our exclusive control?

So far the only answer is the "Nixon doctrine". Neither its assumptions nor its practical consequences are made explicit. One is reminded of the British cartoonist Low's characterization of Stanley Baldwin's policy in the late thirties: "Trust me" was its first and final plea – symbolized in pen and ink by a mouth sealed with adhesive tape.

On The Home Front

On the home front, even more fundamental issues seem to be evaded; or at least their discussion is discouraged:

> What is the rationale for defining priorities? Is the decision for the SST to be made simply to keep the Aerospace industry alive, as Mr. Volpe suggests? Is a space program to be pursued for the advancement of human welfare? for the advancement of understanding? or primarily for the advancement of chauvenistic self-congratulation?
>
> How can concern with the "quality of life" be squared with exclusive reliance on cost, price, and profit to decide what shall be built and what shall be produced, where, and how? These touchy questions are bound to be raised. Will their exposure be welcomed, or will they be disparaged by the smug, or vilified by the fearful?
>
> How can one reconcile the distribution of income in terms of the value a person contributes to society with the ease with which capital can beget capital without adding value? Or how can one reconcile private power and the public interest when sanitary workers, transportation workers, and government employees feel they have to use their indispensability to blackmail the public to achieve a fair wage? How can one determine the proper levels of wages which may in fact be deserved when they bear no necessary relation either to productivity or to competition?
>
> How can one reconcile federal commitment to full employment with control of inflation? Is it possible for a representative democracy to tax constituents adequately and also to avoid excessive expenditures? "Truth or Keynesequences?" might be the proper query to a system which favors the election of those who vote for expenditures and vote against taxes.
>
> How can one reconcile democracy and laissez-faire with social emergency? Will democratic capitalism ever be able to mobilize for a constructive war on poverty and racial degradation? Can a democracy muster a will and a sacrifice for social objectives as great as that it would arouse in order to defend the nation against foreign enemies?

These are not rhetorical questions. They are real ones. Their reality is more convincing because the students who ask them don't pretend to have the answers. Most students are smart enough to know that there are no easy answers. But they would like their elders to admit that the questions are real.

"Perhaps because students are themselves dissenting social critics, they do have an acute awareness that criticism will never stand a chance of persuading the majority to change things if everyone can be frightened easily into silence."

They would like their government to try to call such questions to the attention of all of America. Instead they see their leaders using the alleged complacency of "middle America" as an excuse for evading the challenges which matter most. They would especially welcome encouragement and respect for people who do try to raise such issues.

Instead there is a widespread sense that no-one in the government establishment is moved to urgent, controversial action. Thoughtful reports, like the Kerner Report on Civil Disorders and the Eisenhower Report on Violence, have provoked no concerted executive or legislative follow-up.

In the Name of "Law and Order"

Most frustrating of all to the most highly motivated, concerned students is the glorification of silence; the disparagement of dissent and non-conformity; and the ease with which the presumption of innocence is overridden in the name of "law and order".

It is not surprising that potentially constructive critics, skeptics, and heretics – what I would call "considerate radicals" – are being driven into the ranks of those enraged destructivists who would tear down the system.

It would be wrong to say that the young "blame" the President in a personal sense. They did not expect much better of a hucksterized process, whoever was, whichever package, was "sold" and "bought".

They assume that the mainsprings of political ambition require most politicians to be governed by a crass calculation of popularity. They can even explain, if not excuse, the Vice President as a pawn in the strategic effort to co-opt the right wing, to head off a Wallace candidacy.

Political Realism

Political realism, however, does not in their eyes explain away the apparent disregard for the quality and the political integrity of the Supreme Court of the United States. A generation quick to detect, even falsely to accuse, its elders of hypocrisy does not take well to scolding preachments about respect for law. Such pontifications set very poorly when they are coupled with shoddy research into the credentials for nomination to membership on the law's highest tribunal, and acceptance of mediocrity as a satisfactory standard.

Because of their respect for constitutional values, rather than in scorn of them, many members of the silent disaffected majority of students are deeply concerned that order seems to have risen above justice as the objective of law.

Perhaps because they are themselves dissenting social critics, they do have an acute awareness that criticism will never stand a chance of persuading the majority to change things if everyone can be frightened easily into silence.

If the police are not restrained from wire tapping, unlawful entry and seizure, and preventive detention, students know that the politically unpopular will be the first to feel the brunt.

The greatest blame, the sharpest resentment, however, is not aimed at the officers of government. It is focused on those in nominal political opposition. It is aimed also at those in positions of private power.

Partisan opposition seems petty, timid, and disorganized. Active, organized political opposition sponsors little criticism of government policy on a scale and at a level worthy of the hopes and fears which preoccupy the student generation.

The young would admit that it may be the counsel of "realism" for a politician, even an opposition politician, to be dominated by an effort – as the saying goes – "to preserve the options".

But where, oh where, are the "citizen spokesmen"?

"Competition of Ideas"

We all talk about the "competition of ideas in the market place". We appeal to "pluralism" as democracy's answer to the totalitarians' blueprint.

But if there is only one establishment voice; if silence is honored above dissent, what do these cliches about freedom and diversity mean?

If the system is closed by threat and frozen into timid conformity, what does it mean to "work through the system?"

You, the press, and we, the universities, have something to do with whether the young continue to believe in the openness of the "open society".

Your profession – journalism; my profession – law;
Your colleagues – editors and reporters; my colleagues – teachers and scholars;
Your institution – the newspaper; my institution, the university,
– each of these has a special obligation, a special

"The press would be misinterpreting and the public and the politicians would be misled, however, if they believed that the violence or non-violence of the few is a measure of the morale, the state of mind, of the many."

mission. It is your job as well as mine to see to it that the most talented members of the oncoming generation arrive at their age of public responsibility as constructive, hopeful leaders and citizens. If they lose confidence in the rule of law, if they lose confidence in the integrity of learning, if they lose confidence in the freedom of press and of opinion, then we will have lost them.

If they cannot keep the faith, then their generation, in turn, may well forfeit much that America has stood for.

Truly independent – sometimes nose-thumbing – courts, universities, and newspapers are, of course, a continuous irritation and frequently real trouble-makers for any government.

"Most students are smart enough to know that there are no easy answers. But they would like their elders to admit that the questions are real."

It is the unique Anglo-American heritage, however, to have preserved and protected these critics as needling monitors of official accountability – accountability to law, accountability to professional criticism, and accountability to public opinion.

Beyond the Reach of Official Retribution

The judicial, academic, and journalistic critics have been, for the most part, remarkably and convincingly beyond the reach of official retribution. The brief periods when they have been tampered with, or persecuted, by officialdom are counted by history as the dark days of the Republic.

All citizens, of course, bear a responsibility for that vigilance upon which liberty depends. Those to whom constitutional and other privileges are given in order that they may be watchdogs and critics have a special responsibility. Your institution and mine are among these.

The scope of the Bill of Rights includes all the media. But some media are more free than others.

The privileges and immunities of academic freedom include all universities. But some universities, also, are more free than others.

The newspaper, precisely because it is not licensed by government, has a special obligation to be sure that the franchised media, too, remain free of official recrimination. Many newspapers, I gather, did just this in the *Pacifica* case.

The private university, precisely because it is not predominantly dependent upon government funding, has a special obligation to exercise the full scope of its liberty. It also has traditionally shouldered the duty of spokesmanship for university autonomy generally, not only for itself alone but also in behalf of those more vulnerable to harassment by state or federal officials.

These obligations, to be stalwart in the exercise as well as the defense of freedom, are going to be sorely tested in our time.

The illness of the world calls for a diagnosis which questions inherited assumptions. Yet the powers that be, public and private, are bound to get "uptight" and seek to smother dissent in blandness, scare it with slander, or clobber it with the billy club.

The stakes are terribly high, for those who will by the simple passage of time inherit the earth, are now at the crossroads.

The problems raised by the young, the questions they ask, are not going to be solved speedily, or even in the time of your generation and mine. But the chance of our children to solve them, to answer them, will depend greatly on two things;

First, whether or not the younger generations feel that the critic, the skeptic, the heretic are still welcome, even honored and respected, in the United States.

Second, whether or not they feel that the channels of communication, persuasion and change are truly open, as the Bill of Rights intended they should be.

The ability of universities and newspapers to defend and to utilize their freedom will have much to do with the ability of the young to keep their faith in freedom.

My experience is limited. My lot as a college president has for the most part been favored. But I have seen the challenge of the nation in the microcosm of my own campus. Students have tested my patience. I certainly have tested theirs. But if you disregard the ugly among them, and if you disregard the ugly among us, I am optimistic.

Experience as well as hope give me confidence that they will not fail us if we do not fail them. □

TRAINING FOR COMPUTER PROGRAMMERS

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We are all aware that we must train and place on the job 500,000 new programmers during the first half of this decade. This figure is twice the number now working in the industry. How can we accomplish such a task? This article will review past and present methods of training computer programmers, and will suggest a new concept for programmer training that may prove to be the answer to this question.

The Qualified Beginning Programmer

Before we examine how we train programmers, it is necessary to determine what experience and knowledge are required of good beginning programmers. In general, a qualified beginning programmer is a person who:

1. Is competent in two or more third-generation computer languages.
2. Has had "hands-on" experience and knowledge of how software works.
3. Has acquired knowledge of business and accounting procedures.
4. Has the ability to do basic systems work such as flow charting, etc.
5. Can produce useful work for an employer in three months or less. (It takes about three months to learn specific company procedures.)

Training by the Computer Manufacturer

When business computers first came into use, the training of computer programmers, for the most part, was left to the manufacturer. Programmer trainees were sent to a course or two which taught them the basic concepts about the particular computer their company had "purchased." They were taught how to read a reference manual on the language that the manufacturer's equipment dictated they use. Then the programmer, who was still relatively nonproductive, was brought into the company, and through trial and error he tried to learn the basics of the black art of programming. If he was successful, within about two years he became a productive, competent programmer.

In many cases, the programmer had to go back to the manufacturer's school to learn a new language when his company got new equipment. The programmer who was trained in this manner was limited in scope to the things that he learned from the manufacturer. He was very dependent on the manufacturer, whose ideas and concepts were accepted without question. While some good programmers came out of this type of training, a good many potentially good programmers were lost. The cost of this type of training was extremely high.

As more and more computers were placed in operation, new ways to train programmers were sought. To increase the chances of success through training by manufacturers, companies began hiring college graduates who had a proven learning record which allowed them to be trained at an accelerated rate. When it appeared that these college graduates also had management potential, companies began to turn to the computer department as a source of new management talent. As a result, some computer departments became training grounds for company managers, as well as computer programmers.

Colleges and Universities

Most colleges and universities got into the programmer training business through the back door. The computer was first considered a tool to further the study of subjects such as math or engineering. Courses were offered which were directly related to the discipline involved. As competition for new programmers became more severe, some institutions saw the need for training in business-oriented languages. But these courses were still slanted to the discipline of the department controlling the computer facilities. Most courses were heavily math oriented. This was fine for training scientific programmers, but did little to meet the needs of business data processing other than provide a slightly improved student for the manufacturer's process.

Some institutions now include a four-year course in business data processing with some 20 to 30 hours of computer-related subjects. But a graduate of this type of program usually only meets the qualifications for an entry level programmer in industry. And these programmers are usually sent for further training from manufacturer of the computer they will be using.

The goal of most colleges and universities in computer education has been to prepare for further education; their goal has not been vocational. Thus colleges and universities are, in most cases, not meeting most of the needs of industry.

Private EDP Schools

As the need for programmers increased, private computer schools emerged. These schools grew rapidly in numbers, and many were exploited for quick financial gain on the part of the owners. For the most part, the subject matter was limited, the hardware antiquated, and the teaching staff sub-standard. The students which these schools turned out had little or no "hands-on" experience and limited useful information. This caused industry to be very cautious about hiring private EDP school graduates.

A few of these schools, however, have succeeded in offering a course of study that does adequately train entry-level programmers. The successful schools are typically franchised operations. They screen their students with an aptitude test which hopefully indicates the students potential for becoming an entry-level programmer; i.e., someone who can code from a flow chart. But students in private EDP schools learn little or nothing about business, and usually need additional extensive training before they become productive for their employers.

The Area Technical Vocational Schools

So we have the manufacturers, colleges and universities, and private EDP schools all attempting to train computer programmers — and all meeting with limited success. There is a fourth training program which may be able to avoid some of the pitfalls that seem inherent in the above programs. That source is the area technical vocational schools which were established under the Vocational Education Act of 1963. These schools are dedicated solely to the training of vocational and technical students. They offer an excellent vehicle for training computer programmers, because they can offer courses that are tailored to the specific need of the student in achieving competency in a specific area, without offering all of the general education courses usually taken during the first two years of college. Technical-vocational schools are oriented toward the high school and post high school training, and most offer both day and night programs.

My experience in training computer programmers in these schools has been at the Tri-County Tech in Bartlesville, Oklahoma. In designing our computer programming course, our goal was to tailor our program in such a manner as to turn out a person who would meet the requirements outlined at the beginning of this article. We also wanted to design a program to accomplish this goal in the shortest possible period of time, taking into consideration the type of students that are attracted to such a program.

The following is a brief course outline as it was developed:

COMPUTER PROGRAMMING

LENGTH: Four 12-Week Quarters

1st Quarter	*Hours Per Week*
Introduction to Computer Programming	4
Physical Level Language	15
Business Math	3
Accounting I	5
Communications I	3
2nd Quarter	
Assembly Language	15
Algebra	4
Accounting II	5
Technical Report Writing	3
Business Organization	3
3rd Quarter	
Report Program 6 Weeks	15
Fortran 6 Weeks	
Business Statistics	4
Accounting III	5
Oral Communications	3
Management Concepts	3
4th Quarter	
Cobol	15
Systems Analysis	10
Accounting Systems	5

This course covers four quarters of twelve weeks each, with students spending six hours a day in class. The average student in the program has had one and a half years of college training prior to coming into the program. All courses are directly related to the art of computer programming. One half of the student's time is spent developing his skills as a computer programmer. The other half of his time is spent on courses such as business mathematics; accounting, communications skills, both written and oral; business organization and management concepts; as well as a course in the concepts of systems analysis. The program is taught by people with a background in business data processing.

This type of training is indeed practical. A student can learn the essentials of programming, and obtain a basic business background in a relatively short period of time. The course is also ideal for training and updating existing programming talent. It is possible, for example, for a programmer who has a need to update his skills in accounting to attend only that section of the program.

Upon completion of this program, students do meet the requirements for being a good beginning programmer. The big question to be resolved is: Will industry accept people trained in this manner? Can we break down the prejudice against persons without college degrees, or has this become an enigma to the programming industry? □

ACROSS THE EDITOR'S DESK

APPLICATIONS

SEASONAL MOSQUITO BATTLE GETS COMPUTER ASSIST

The Metropolitan Mosquito Control District (MMCD) in St. Paul, Minn., is using a Univac 9300 computer in their seasonal battle against mosquitoes. The computer is providing quick, easy access to a mass of information that assists crews from the MMCD in their work. (The MMCD includes six counties — Hennepin, Ramsey, Scott, Dakota, Washington and Anoka — in and around Minneapolis and St. Paul. It is the largest mosquito control district in the nation — 2,850 square miles. Mosquito breeding sites cover 14% of the total land area in the district.) A. W. Buzicky, MMCD director, explained how the computer helps in their battle against the mosquito.

MMCD crews (about 80) take samples from some 56,000 mosquito breeding sites in the district. Inspection crews estimate the number of mosquito larvae in the samples taken from each site. At the MMCD laboratory various species of mosquitoes are identified from the samples. All the information is compiled on the Univac computer (operated by the Ramsey County Data Processing Department) and provides the MMCD with a master file listing the type and numbers of mosquitoes found at each site.

The type and kind of treatment are added to the site master file as the season progresses. Crews continue site sampling throughout the season and reports are inserted into the master file to keep it updated. When rain initiates growth of the larvae, the master file shows which sites had a particular species of mosquito. The crews return to the sites for another check and can provide treatment immediately, if needed. As Mr. Buzicky explained, "What we have is easy access to a large quantity of accurate information. We are saving time by avoiding sites that don't have to be checked."

FOOD CHAIN PUTS REAL COST ON 4,000 ITEMS USING IBM SYSTEM/360

Benner Tea Co., Burlington, Iowa, is one of the first U.S. food chains to provide the actual price of food or other items by weight or measure in all its stores. Using an IBM System/360 Model 25, Benner has calculated the "Tru-Price" of about 4,000 items, nearly all of which come in different size cans or packages. In the past, the housewife selecting a canned vegetable, for example, would be uncertain of the real cost of a 12-ounce can compared with a 16-ounce can. As of June 3rd, a housewife shopping in any of 23 Benner, Giant or Star stores in Iowa, Illinois and Missouri, could tell at a glance the per unit cost of and item — including canned foods, packaged foods, soaps, paper towels or aluminum foil.

Benner's computer prints the labels necessary to give the housewife the price information. Easy-to-read labels contain: the Tru-Price (such as 12¢ per oz), product name, total content, and total cost (such as 26¢ per can). The same label also contains stock information to help store employees mark prices on each item and place it properly on shelves. For easy identification, three different colors are used for — Tru-Price, total price, and the stock information.

Charles C. Fitzmorris, Jr., Benner president, said that without a computer Benner's could not offer unit pricing since there are just too many different prices on too many different sized cans, cartons and packages for any chain to figure the price by hand.

LEVELS AT WHICH CARBON MONOXIDE IMPAIRS HEALTH ARE PINPOINTED BY COMPUTER

Research at Marquette School of Medicine (Milwaukee, Wis.) confirms the suspicion that carbon monoxide (CO) can injure people long before it kills them. The study is aimed at providing information to aid in the formulation of air pollution control standards and programs. Research at present concentrates on CO because it is a major pollutant in cities. Later study will focus on other pollutants, individually and in combination with each other.

Preliminary test results of the computer-aided study show that carbon monoxide in heavy traffic or severe smog conditions slows down human activity. Scientists are exposing volunteers to increasing levels of CO to test the gas's effect on human performance. Volunteers spend from 1 to 24 hours in a carefully controlled environmental chamber performing such tasks as driving, exercising, estimating distance and time, and solving simple math problems. Doctors constantly monitor the subjects physical condition during the time the volunteers are in the special chamber.

At 200 parts per million of air, CO has a strong impact on performance of such everyday activities as driving and working. Dr. Richard Stewart, environmental medicine department chairman at the school, said a person exposed to high carbon monoxide concentrations for several hours develops a headache, loses manual dexterity and has a noticeably longer reaction time to stimuli.

Test data is compiled and processed by an IBM System/360 Model 40 computer. It prepares analytic summaries used to evaluate all aspects of the tests. During experiments, scientists measure the percentage of CO in the oxygen-carrying part of the blood. At a 15-20% carboxyhemoglobin saturation, the brain wave pattern changes and headache develops; manual dexterity is impaired at 30% blood saturation; and, at above 50% saturation, damage to heart and brain may occur in healthy people. Sick persons, especially those with heart disease, may be injured at concentrations as low as 10% — a concentration easily reached by their smoking two packs of cigarettes a day. The study, financed by the U.S. Public Health Service, the Automobile Manufacturer's Association and the American Petroleum Institute, will take three years to complete.

DOD REFERRAL PROGRAM FOR RETIRING MILITARY PERSONNEL

The Department of Defense has instituted a computerized referral program to assist the more than 65,000 military personnel retiring annually in seeking second careers. For most military personnel, with

20 to 30 years total service, retirement comes at 41 or 51 — a time when family obligations are most likely to be heavy, and the retiree cannot live solely on his retirement pay. The retiree is often stationed thousands of miles from his planned retirement home and has no effective way of knowing what job opportunities exist in the area.

The referral program is designed to enlist the aid of both government and industry. Retiring military personnel have to register for the program within six months prior to discharge, while employers from the public and private sectors may list their job orders through the Department of Defense beginning August 1 of this year. The computerized system will match the man to the job and forward the matched resumes to prospective employers. Intended primarily as an improved means of communication for servicemen with prospective employers, the program has a limited amount of matching elements. They include job title, location, availability date, pay, education and investment, if any.

Retirees interested in the program should report to the nearest military installation. Prospective employers contact: Centralized Referral Activity, Defense Electronics Supply Agency, ATTN: DESC-R, Dayton, OH 45401; or, Director, Transitional Manpower Programs, ATTN: Referral Program Coordinator, OASD (M&RA), Room 3D271, Pentagon, Washington, DC 20301.

EDUCATION NEWS

EDUCATIONAL FILMS AVAILABLE FROM GE

Educational films available from General Electric include "You and the Computer" and a new film, "Computers at Work". The films are produced especially for students in secondary schools, colleges, business, and industrial training. The films, designed to be free of commercial content, are available in 16 mm, sound and color.

"You and the Computer" demonstrates the basic functions of a computer. Clear, layman's terms make this film useful for anyone desiring a basic understanding of the subject. The film uses live action, plus animation, to focus on an item that is close to everyone — the issuance of a paycheck. The viewer is in the center of action and sees that we all are involved with computer functions. The film runs 9 minutes.

The new film, "Computers at Work" helps the viewer see the computer in actual working conditions — improving instruction techniques in schools, helping launch spaceships, preparing better-tasting cake mixes, etc. By showing how computers are used, this film (which runs 12 minutes) provides an effective complement to "You and the Computer".

Further information on these, and other non-commercial films in GE's series of educational films, is contained in a new bulletin, GIZ-2203, available free of charge from: General Electric Educational Films, 60 Washington Ave., Schenectady, NY 12305.

"TOTAL EDUCATION SYSTEM" BEING MARKETED BY COMPUTER SCIENCES CORP.

Computer Sciences Corp. is marketing a packaged "total education system," complete from furniture to instructional materials, which enables business concerns to provide a continuing program of education in effective computer usage to management and technical personnel, at their own facilities. The system, known as Advanced Computer Training In a Versatile Environment (ACTIVE), includes a 24-seat classroom, graphics and communications equipment, four courses in computer technology, and advanced instructional techniques. Educational support services are provided over a five-year period. For more information, write to: Computer Sciences Corp., 1901 Ave. of the Stars, Century City, Los Angeles, CA 90067.

PROGRAMMING REVIEW COURSE TO BE OFFERED IN WASHINGTON IN PREPARATION FOR DPMA EXAM

Compudemics, Inc. (Washington, D.C.) will hold a review course within the Washington-Metropolitan area in preparation for the DPMA Registered Business Programmer Examination. The Data Processing Management Association (DPMA) awards the Registration, on the recommendation of the Certification Council, to individuals who have satisfactorily passed the examination. The examination is being given in Washington, on October 10, 1970, at the George Washington University.

Compudemics' review course will be held on September 26 and October 3. Registrants will receive an intensive, formal review of the major areas of computer programming in a course especially designed to comply with the official Registered Business Programmer Study Guide, published by the DPMA. (Review courses may be arranged at any location that interested organizations wish to make them available.) The fee for the course is $60; the course text may be ordered separately for $10. Further information may be obtained from Compudemics, Inc., 1629 K Street, N.W., Washington, DC 20006.

PRACTICAL APT PART PROGRAMMING CORRESPONDENCE COURSE

A Practical APT Numerical Control Part Programming Correspondence Course, announced by NC Sciences, Inc., reflects 108 hours of equivalent classroom instruction. The course is an adaptation of a proven classroom version taught by NC Sciences, Inc. (both on-site and resident courses) to trainees from a variety of technical and manufacturing disciplines.

The course begins with a basic introduction to APT (Automatic Programmed Tools) and continues into a study of a wide range of programming concepts including point-to-point or positional programming and up to three-axis computer assisted continuous path programming. It is designed to acquaint the manual part programmer with the basics of the APT language while giving him a working understanding of the complete APT system. Further information may be obtained by contacting: Donna DiSario, NC Sciences, Inc., c/o Rynham Assoc., 623 Penn Square Bldg., Philadelphia, PA 19107.

SIEMENS COMPUTER SCHOOL IN MUNICH, GERMANY

Siemens AG in Munich has founded one of the largest data processing schools ever opened by a computer manufacturer. The new school has 30 instruction rooms, one lecture hall and two computer training centers where nearly 100 lecturers may train about 800 people at a time. A dozen computers (worth more than DM 20 million and including the most modern models) are installed in the two computer centers.

The existing public and private training schools are not yet in a position to turn out enough trained computer personnel. Computer manufacturers must still support the major share of the training load. Last year Siemens trained a total of 12,000 people in their facilities at home and abroad.

According to a report by the Federal Minister for Education and Science, computer manufacturers and users require about 1,500 to 2,000 academically trained data processing experts per year; in addition, there is a great demand for spe-

cialized system analysts and programmers. With an estimated 15,000 data processing systems installed by 1975 in the Federal Republic of Germany alone (requiring at least 20,000 operators and 30,000 programmers for their operation), one gets an idea of the training effort that will have to be made.

RESEARCH FRONTIER

UCLA ROBOT, A PROMISING AIDE FOR ASTRONAUTS AND AMPUTEES

An automaton, that learns by watching its human master, adapts to its environment, and reacts to reward and punishment, recently demonstrated its skills at the University of California, Los Angeles (UCLA). The Autonomous Control Sub-System (ACS) was designed and built by Dr. Amos Freedy as a research project for his Ph.D. in engineering. ACS consists of an IBM 1800 process control computer which is connected by a small analog computer to a manipulator arm and claw, known as the learning arm.

In the demonstration, Dr. Freedy operated the learning arm to arrange a number of blocks in a given pattern using a joystick control to move the arm in three dimensions — up and down, forward and backward, and sideways — and a foot pedal to open and close the claw. The robot gradually picked up the behavior and manipulations, until it learned enough to take over most of the movements and controls.

Working with Dr. John Lyman, head of the UCLA Biotechnology Laboratory, Dr. Freedy has incorporated some psychological techniques of the learning process into the ACS. The robot responds to reward (after getting an electronic pat on the back) and punishment, changes its behavior with changes in job assignment, and forgets old routines, but relearns them faster than it picks up new ones. When ACS doesn't have enough background experience to handle a new task, it flashes a red light, or guesses at the right move on the basis of highest probability.

The robot's ability to pick up and take over many complicated functions makes the robot a promising assistant for astronauts or amputees, or for any job demanding quick manipulation of many different controls, according to Dr. Freedy. He believes the device eventually can be made small and light enough to be integrated into artificial arms for amputees. Supporting his research, and reflecting its potential range of applications, are the Defense Department and the Social Rehabilitation Service, U.S. Dept. of Health, Education and Welfare.

COMPUTER CONVERTS 'TEXT' TO 'TALK' AT BELL LABORATORIES

Speech researchers have tried many methods for producing synthetic speech — all required human translation of each message into special machine terms. Now, Bell Labs scientists can produce nearly natural sounding synthetic speech directly and automatically from ordinary English text. Recent experiments take advantage of an improved understanding of speech patterns — the way people really use their language and tailor it to match their intended meaning.

Bell researchers gave the computer mathematical approximations to the shapes and motions the human vocal tract assumes when uttering common sounds and sound sequences. They programmed the computer with a basic dictionary of word categories and definitions in digital form. They then approximated, for computer storage, the complex rules of timing, pitch, and stress which people use in every day conversation, e.g., timing cues were provided that distinguish expressions such as 'a nice man' / 'an iceman'.

The text-to-speech converter was devised by Cecil H. Coker (shown at the computer console), with the help of Mrs. Noriko Umeda and other members of Bell Labs' Acoustics Research and Human Information Processing Departments at Murray Hill, N.J. The oscilloscope (shown) connected to the computer produces a line drawing of the model vocal tract,

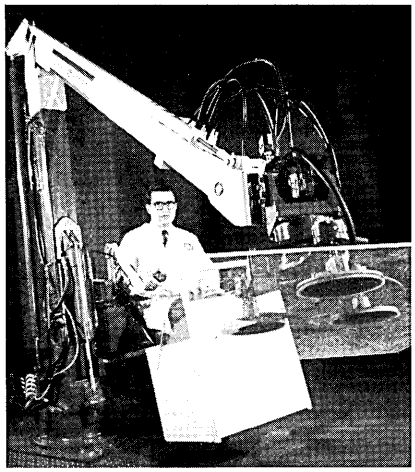
and displays the change in position of the throat, jaw, tongue, and lips as different sounds are produced. The oscilloscope, though unnecessary for text-to-speech conversation, aids researchers in monitoring the performance of the system.

In the experiments, passages are typed and sent to the computer from a teletypewriter. The computer analyzes the sentence, assigns stress and timing to each word, and finds a phonetic description of each word from the dictionary stored in the computer's memory. Mathematical descriptions of vocal-tract motions are computed and these are used to generate electrical speech signals which may be heard over a loudspeaker or a telephone.

AUTOMATION

GE'S MAN-MATE INDUSTRIAL BOOM LIFTS LOADS TO 370 LBS.

Handling sheets of glass up to sizes as large as 12 x 12 feet is effectively done with General Electric's Man-Mate boom, one of a number of advanced "Cybernetic Anthropomorphous Machine Systems" — CAMS — under development by GE. It is cybernetic because man is retained in the system and provides the basic computer capability. It is anthropomorphous because it is man-like in form and uses the operator's dexterity, judgment, and ability to adapt to unpredictable circumstances.



The new model, CAM 1400, now being introduced can lift loads up to 370 pounds. The principle of force feedback control gives the operator a sense of feeling as if he himself were picking up the object with his hand. The end effector used here is a set of vacuum cups. Other end effectors such as mechanical grippers or hooks give the machine versatility in industrial applications. Unskilled operators can master the machine with a minimum of training. The Man-Mate boom, as well as other materials handling products, is manufactured by GE's Specialty Materials Handling Products Operation, Schenectady, N.Y.

NEW PRODUCTS

Product Name/Model No.	Description and Notes	For More Information:
Digital		
501 Datamanager	For business oriented applications / processor's macro-instructions and data structure handles data in strings as well as single characters / software support provides system simple enough for turnkey operation / basic machine sells for under $6000 in quantity	Atron Corp. 1256 Trapp Rd. St. Paul, Minn. Attn: Jack Germaine
CDC 5100 Minicomputer	Originally for military shipboard use, will operate under extreme evironmental conditions / has lithium ferrite core destructive read-out memory, 16-bit internal I/O channel, four 32-word file registers, two external interrupts / CDC 1700 peripherals compatible	Control Data Corp. 8100 34th Ave., South Minneapolis, Minn. Attn: Kent R. Nichols
Data Processing Elephant — 411	Stores 500 million bits and handles 56 computer applications at the same time / combines three computers into a single system / uses real-time COBOL computer programs / provides quick turn-around	Telefile Computer Corp. 2000 Commonwealth Ave. Newton, Mass. 02166 Attn: Mr. S. L. Rankin
cd 200 Minicomputer	For general data acquisition, industrial process control, communication systems / direct memory access, direct peripheral-to-peripheral data paths / allows intermixing memories of different types / operates on 8-bit bytes and 16-bit words	Computer Development Corp. 3001 S. Daimler St. Santa Ana, Calif. 92705
Model 980 Minicomputer	For applications in processing and control / available as stand alone, complete hardware and software / 16-bits, 1 μs memory cycle time, 400 ns memory access time / 4096 word capacity expandable to 65,536 words	Digital Systems Div.-Houston Texas Instruments Inc. Houston, Texas 77006
Models 1.0, 2.0, 3.7	For general business, scientific, and engineering applications / all models have time-sharing capability / each designed around Datacomp 404 processor with various packaging, memory, I/O, and peripheral options	Clary Datacomp Systems 408 Junipero Serra Dr. San Gabriel, Calif. 91776
Special Purpose Systems		
Regitel System, a point-of-sale transaction system	Network of electronic cash registers with own minicomputer / provides edited data to store's central computer / programmed registers lead sales people through steps / provides for cash transactions	American Regitel Corp. 1011 Commercial St. San Carlos, Calif. 94070
DATAPLEX® System	For data acquisition and preparation / uses Recording Typewriters to capture all computer data on tape cassettes as by-product of routine business typing / provides for data transmission via telephone	Data Instruments Co. 16611 Roscoe Place Sepulveda, Calif. 91343 Attn: Ellsworth Hill
Memories		
RK8 Disk Pack System	Provides PDP-8 users with up to 3,325,952 12-bit words of storage / handles up to four disks / 154 msec average access time / software monitor requires 8,192 words of core memory and high-speed paper tape reader or magnetic tape storage	Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754
Model 501 disc memory	Interfaces with 8, 12, and 16-bit minicomputers / storage capacity is 64,000 8-bit, 48,000 12-bit, or 32,000 16-bit words / 8.5 msec average access time / 1.2 MHz data transfer rate / system drives up to 8 discs	Dynacoustics, Inc. 1980 National St. Hayward, Calif. 94545 Attn: Dennis Setera
Mostak II	Two board arrangement; one with all clocking and timing, the other contains memory array / 1024 8-bit word system with 1 msec cycle time / used as direct replacement for core memories with comparable storage capacity	Electronic Arrays, Inc. System Division 9060 Winnetka Ave. Northridge, Calif. 91324
Models 1288E and 1298E read-write memory cards	For register, scratch-pad, and buffer applications / ECL logic compatible / have 64-bit 7 nsec memory device and storage support circuit / typical access time, 12 nsec / Model 1288E, 128-words x 8-bits; Model 1298E, 128-words x 9-bits	Advanced Memory Systems, Inc. 1276 Hammerwood Sunnyvale, Calif. 94086
Disk Cartridge Memories, DSD Series 130 Magnetic Tape Memories, DSD Series 140	For use with minicomputers / Series 130 includes disk drive, power supplies and controller with computer coupler / Series 140 incorporates IBM compatible synchronous Write/synchronous Read tape transports and controllers complete with computer couplers	Data Systems Design 1122 University Ave. Berkeley, Calif. 94702 Attn: W. C. Crawford, Jr.

Product Name/Model No.	Description and Notes	For More Information:
Software		
AIMES III (Automated Inventory Management Evaluation System)	Designed to optimize inventory performance for retail merchants / yields wide variety of reports / modular structure of AIMES permits selection of only those reports needed / available through Data Link centers or for lease/purchase on own equipment	Data Link Div., UCC 1949 Stemmons Freeway Dallas, Texas 75207 Attn: Jim D. Fleming
AUTO-SOURCE	Virtually eliminates program pilferage and tampering / cryptographic techniques scramble programs it protects; passwords prevent unauthorized access, modifications / available for IBM System/360 installations	Rapid Response Systems, Inc. 1040 Avenue of the Americas New York, N.Y. 10018
BASIC (for PDP-11)	Requires 4,096 words of core memory, but can be used on larger systems as well / BASIC programs for other computers often can be run on PDP-11 without modification / has machine language calling capability / free	Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754 Attn: Dennis C. Goss
COBOL-MAP	Reference aid comprised of three programs, two IBM DOS sorts, and compiler interface / provides two listings: a standard alphabetical reference directory; a substitute for COBOL compiler's listing / $199.95	Pioneer Data Sciences, Inc. P.O. Box 236 Wilbraham, Mass. 01095 Attn: Bob Burnham
DEEP/360	A 3K subroutine linked into problem program to inhibit "data exception" type program checks / is called only twice; all logic spanned by these calls is protected / OVRLAY2 (auxialiary package) permits DEEP/360 usage in COBOL overlay programs / for DOS use only / $225	Macro Services Corp. 131 Tremont St. Boston, Mass. 02111 Attn: Joseph Battista
HEARTS	A 12-lead ECG analysis program / for use with Sigma 5, 6 and 7 computers / certified by Nat'l Center for Health Research and Development / off-line portion available without charge; on-line real-time portion, later in year	Xerox Data Systems 701 So. Aviation Blvd. El Segundo, Calif. 90245 Attn: Ken Allen
Hill System of Engineering Computations	Allows easy computations by engineers and architects, requires no programming, offers various problem solving methods / office terminals connect with XDS Sigma 5 over phone lines / programs now include Building Analysis Design, Member Design, Truss Analysis	Transdata Corp. 4808 N. Central Ave. Phoenix, Ariz. 85012
IAL (Investment Analysis Language)	To assist bank management in solution of investment and financial problems / A.B.A. certified for distribution through time-sharing suppliers / currently has 59 commands in system	Autom. and Tech. Research The American Bankers Assoc. 90 Park Ave. New York, N.Y. 10016 Attn: John MacDougall
Numerical Control		
Bar Mill Retrofit Package	Provides NC conversion for used equipment (Giddings & Lewis Model 330, 340 or 350 horizontal table type boring milling and drilling machines / includes Model 2200 numerical control (2- or 3-axis solid state); magnetic control; hydraulic drives / manual control unaffected	The Bunker-Ramo Corp. Numerical Control Sys. Div. Highland Hgts., Ohio 44143 Attn: Robert Denega
New World	All-computer numerical contouring control / incorporates Prodac® 2000 CPU as logic element / operates on instructions from any punched paper tape system or from a general purpose computer as part of DNC hierarchy system	Westinghouse Electric Corp. Box 868 Pittsburgh, Pa. 15230 Attn: R. J. Benke
Peripheral Equipment		
Model 8000 Card Reader (photoelectric)	Reads 8-column cards at over 300 cpm / field conversion kit adds capability of reading IBM System/3 96-column cards / desk top size (about 2' x 2' x 2')	Bridge Data Products, Inc. 738 South 42nd St. Philadelphia, Pa. 19104
Statos-5 Printer/Plotter Model 514	Transforms digital info directly into graphics at 800,000 plot points per second / 1400 styli across 14"-wide chart grid / variable paper transport speeds / interfaces with computer to print own chart paper, time bars, etc. / also prints own alphanumeric annotations electrostatically	Varian Assoc., Graphics Div. 611 Hansen Way Palo Alto, Calif. 94303 Attn: Robert Pecotich
SC 1035 Tape Transport	Provides bi-directional tape speeds to 45 ips / precision edge guidance / 9-channel, 800 bpi or 7-channel, dual density, NRZI format	Potter Instrument Co., Inc. East Bethpage Rd. Plainview, L.I., N.Y. 11803
Xerox 400 Telecopier	Transmits and receives letter-sized documents over standard phones at speed of 4 minutes per page / portable (18 lbs), carrying case available / designed for broad, decentralized office use	Xerox Business Products Group Xerox Square Rochester, N.Y. 14603 Attn: Robert L. Stearns
Seventy Series Model 73 Interactive Display	A CRT display and keyboard terminal for batch and real time applications / plug interchangeable with Model 33 and 35 Teletypes® / on-line and block/edit operating modes	Data 100 Corp. 7450 France Ave. South Minneapolis, Minn. 55435

Product Name/Model No.	Description and Notes	For More Information:
BR 2280 Scopewriter	Hard copier for reproducing CRT data displays / up to 960 characters in 12 seconds, about 1¢ per copy / operates with any of Series 2200 CRT data terminals / no special operator required / 36"L x 20"W x 23"H	The Bunker-Ramo Corp. Business and Industry Div. 445 Fairfield Ave. Stamford, Conn. 06904
LP11 Line Printer	For PDP-11 minicomputer / prints 356 eighty-column lines a minute / uses 64 characters / an impact printer / can take six-part forms, using fan-fold paper, 4 to 9-7/8"W	Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754
TRACE (Time Repetitive Analog Contour Equipment)	Console CRT display unit provides seven display modes / push-button control / compatible with all analog and hybrid computers	Basic Computing Arts Inc. 3555 Torrance Blvd. Torrance, Calif. 90503
Logiport/1	Portable CRT computer terminal / includes standard typewriter keyboard, integral acoustic coupler, 512-character alphanumeric display (folds down for portability)/ two operating modes / teletype interchangeable	Logitron Inc. 197 Albany St. Cambridge, Mass. 02139
A/D Converter, Model 6409	9-bit, high-speed (over 250,000 conversions/second) / complete with internal reference, clock generator, control logic and data register / fully contained on double printed circuit board with sgle edge connector	Data Technology Corp. 1050 East Meadow Circle Palo Alto, Calif. 94303 Attn: Gary Mickelson
"500" Reader-Printer	Produces enlarged Dry-Silver, low-cost, hard copies / 8½ x 12½" prints / 12 x 16 inch screen / easy-to-load Dry-silver 500-foot roll paper / automatic paper cutting / minimum maintenance	3M Company, Microfilm Products Div., Dept. MI0-30 St. Paul, Minn. 55101 Attn: W. Doug McLuen
AAT-101 TV Display Driver	Converts any TV or 525-line video monitor into 256-character alphanumeric display / memory I/O is 6-bits parallel at TTL levels / data can be loaded, read or exchanged asynchronously at rates up to 120 cps	Ann Arbor Terminals Inc. 918 Greene St. Ann Arbor, Mich. 48104 Attn: Edward F. Zimmer

Data Processing Accessories

Hi-Line Security	Digital coding system / transmits alarm signal to a police monitor / attempt to compromise the random and complex set of signals will cause alarm, yet not given to false alarms / signals differ for different problems	Mosler 1561 Grand Blvd. Hamilton, Ohio 45012
Prefabricated Clean Rooms with Air Conditioning	Available up to 1000 sq. ft. in size / factory engineer supervises erection at customer's plant / clean rooms pass requirements as stated in Fed. Std. 209a for Class 100 in first air areas	Agnew-Higgins, Inc. P.O. Box 857 Garden Grove, Calif. 92642
Memorex Mag Cards	Fully compatible with IBM MAG CARD SELECTRIC typewriters / prices begin at $26.25 for 25 Mag Cards with folders / protective indexing folder allows fingertip filing or retrieving of Mag Card	Memorex Corp. 1180 Shulman Ave. Santa Clara, Calif. 95050
Jet-12 Paper Shredder	Portable paper shredder / destroys outdated confidential documents at rate of up to 550 pounds per hour / plastic bag attachment facilitates disposal	Shredmaster Corp. 891 So. Ocean Ave. Freeport, L.I., N.Y. 11520

New Literature

Government Industrial Complex	A marketing notebook, 1000 pp / describes marketing opportunities for all organizations in computer field with the Government and the top Government prime contractors / identifies computer installations, users, selection and reviewing offices, procurement procedures / directory of companies in U.S. doing business with Government is included as appendix	Stearns House Company 1747 Summer St. Stamford, Conn. 06905
DECUS Catalog	Annual spring revision of the Digital Equipment Computer Users Society (DECUS) program catalog / lists over 70 programs available for PDP-10; this is in addition to standard software supported by PDP-10 product line	DECUS Program Librarian DECUS Office Digital Equipment Corp. Maynard, Mass. 01754
Minicomputer Reports (three volumes) Minicomputer Notebook (one volume)	For EDP manufacturers, users, marketing organizations and consultants / looseleaf references / both include hardware characteristics comparison charts, price data lists, summaries of commercially available minicomputers, monthly updates / more comprehensive "Reports" serves different level of information needs	Auerbach Info, Inc. 121 N. Broad St. Philadelphia, Pa. 19107 Attn: Mr. R. G. Scott
Abstracts from the Computer Software Library, Vol. I	Concise abstracts of software available for purchase through COMSEC (COMputer Software Exchange Center, Inc.) / each program fully evaluated and run with test data to verify its accuracy, before listing / periodically up-dated to keep subscriber informed on the lastest information about software that is available	COMSEC, Inc. One Gateway Center Fifth at State Kansas City, Kans. 66101

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
General Electric Co., Phoenix, Ariz.	U.S. General Services Admn., Washington, D.C.	A dual GE-615 information system to be installed at Wright-Patterson AFB, Dayton, Ohio; proposed complex called CREATE (Computational Resources for Engineering and Simulation Training and Education) will link bases across nation to Wright-Patterson AFB	$7.3 million
Moll Associates, Inc., Watertown, Mass.	Computer Catalogs, Inc. (CCI), Boston, Mass.	Implementation and management of a computerized information retrieval system, called "Compulog," designed to serve the automotive parts distribution industry	$5 million
General Instrument Corp., Hicksville, L.I., N.Y.	Viatron Computer Systems Corp., Bedford, Mass.	Packaged MOS arrays for use in Viatron's data management terminal, as well as the Model 2140 and 2150 general purpose computers	$3.5 million
Computer Sciences Corp., Los Angeles, Calif.	NASA, Goddard Space Flight Center, Greenbelt, Md.	Extensive services in systems analysis and computer programming; Goddard Center serves as hub of NASA's worldwide tracking, communications network for space missions	$3 million
	U.S. Army Combat Developments Command, Fort Leavenworth, Kan.	Scientific and analytical studies and provide technical support to the Command's war gaming facilities	$3 million (approximate)
Sanders Associates, Nashua, N.H.	Federal Aviation Admn.	Developing prototype of radar air traffic control display subsystem	$2.7 million
RCA Computer Systems Div., Cherry Hill, N.J.	So. Carolina State, Dept. of Education, Columbia, S.C.	An RCA Spectra 70/55 computer system to serve as hub of a computerized network for the entire state education system	$2 million
Philco-Ford Corp., Willow Grove, Pa.	U.S. Air Force	A telecommunications network to be installed in Europe	$1.8 million
RCA Computer Systems Div., Cherry Hill, N.J.	Macro Services Corp., Boston, Mass.	An RCA Spectra 70/46 remote computing system; firm offers full line of services to business and industry	$1.6 million
Computone Systems, Inc., Atlanta, Ga.	Bowles, Andrews and Towne, Atlanta, Ga.	1,475 portable KeyPact computer terminals	$1.5 million
RCA Computer Systems Div., Cherry Hill, N.J.	Jefferson and Boulder Valley Counties, Public School Systems, Lakewood, Colo.	RCA Spectra 70/45 system to be used in a pilot program for computer-assisted instruction	$1 million
Precision Instrument Co., Palo Alto, Calif.	Univ. of Illinois	A one trillion-bit computer mass memory storage unit for the Illiac IV computer complex	$1 million
Wyle Laboratories, El Segundo, Calif.	Dept. of Transportation (DOT), Federal Railroad Admn.	Development of a rail transportation equipment test facility to enable laboratory testing of high speed railroad and rapid transit cars at simulated speeds to 300 mph	$999,958
Astrodata, Inc., Anaheim, Calif.	State of California, Dept. of Water Resources	Supervisory Control System complete with central processor, display panel, control console, remote telemetering station and associated communication equipment	$889,000
System Development Corp., Santa Monica, Calif.	U.S. Air Force, Electronic Systems Division	Development of computer programs for Army's White Sands Missile Range Air Surveillance System	$864,000
Programming Methods Inc., New York, N.Y.	Sylvania Electric Products, Inc.,	Front-End Communications Facility (FCF), a complete turn-key message switching computer system; will be installed at Sylvania's computer center, Camillis, N.Y.	$700,000
Conrac Corp., New Jersey Div., Caldwell, N.J.	Teledyne-Ryan Aeronautical Co.	Air data computers for use aboard the supersonic Firebee II Drone	$500,000+
Ampex Corp., Culver City, Calif.	Eclectic Computer Corp., Dallas, Texas	Model TMZ digital tape drives; used in Eclectic 640 system which interfaces with DEC PDP-8 computers to read/write IBM compatible tapes	$350,000
	Data Pathing, Inc. (DPI), Sunnyvale, Calif.	Model TMZ digital tape memory systems for incorporation in a new DPI system for a wide range of industrial data-collection uses	$350,000 (approximate)
Sanders Associates, Nashua, N.H.	International Reservations Limited of England	Forty Sanders 720® Data Display systems; will be part of hotel reservation network eventually spanning the Atlantic	$240,000
Clary Corp., Precision Instruments Div., San Gabriel, Calif.	IMC	Modified Clary Model 1900 serial entry printers to be used in a retail point-of-sale data entry system known as Registron	$200,000+
Computer Products, Inc., Fort Lauderdale, Fla.	Florida State Univ., Geophysical Fluid Dynamics Institute	An Electronically Controlled 2,000-Channel Digital Data Acquisition System; will be used in weather and atmospheric research	$138,800
Univ. of Calif. at Los Angeles	National Institutes of Health, Division of Dental Health	Development of a computer-aided instruction course in introductory biostatistics	$133,380
Singer-Librascope, Glendale, Calif.	Inventory Management Systems, Los Angeles, Calif.	500 L107 minimemories to be used with a computerized checkout and inventory system for supermarkets	—
Aspen Systems Corp., Pittsburg, Pa.	State of Utah	A 15-month period of unlimited computer searches of Utah Code and statutes of other states	—

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B350 system	Georgia Bank & Trust Co., Macon, Ga.	Internal banking applications; also mortgage loan amortization schedule for banks and other financial institutions throughout the state (system valued at approximately $230,000)
Burroughs B500 system	Sugarman Brothers, Medford, Mass.	Implementation of company's change-over to computerization; Burroughs B2500 on order for on-line system later this year
Burroughs B2500 system	Chaffey College, Alto Loma, Calif.	Instructional tool (80%) and administrative tasks (system valued at about $300,000)
	Diversified Computer Applications (DCA), Palo Alto, Calif.	On-line and batch processing services to clients (system valued at about $600,000)
Burroughs B3500 system	Irving Bank and Trust Co., Irving, Texas	All data processing for bank; also for Trinity Industries (18 locations and about 2,000 employees) (system valued at over $575,000)
	Reilly Tar & Chamical Corp., Indianapolis, Ind.	Engineering, production simulation and forecasting; some chemical research activities; business data processing operations
	Tri-Valley Growers, San Francisco, Calif.	A food processing total information system (system valued at over $1.2 million)
Control Data 3500 system	Bell Telephone Laboratories, Holmdel, N.J.	Upgrading hybrid (analog/digital) system
Digital Equipment PDP-8/S	British Milk Marketing Board, Alfreton, Derbyshire, England	Inventory control and process monitoring of a recently opened creamery (system valued at $10,000)
Digital Equipment PDP-10	Graphic Controls Corp., Computer Systems Div., Buffalo, N.Y.	Meeting expanding market for Remote Terminal Computing Services; substantially increases computer capacity
IBM System/3	Allied Computer Technology, Inc., Santa Monica, Calif.	Proving out development of several new interfaces for own line of peripheral hardware
	Bryce E. Dressel & Co., New Orleans, La.	Analyzing the individual business needs of the outboard motor distributor's 186 dealers
	Keller-Crescent, Evansville, Ind.	Expanding activities in a number of client service areas, including market and media analysis
	City of Painesville, Ohio	Financial and accounting functions, including preparation of city income tax bills, utility bills and payroll
	Sutliff Chevrolet, Harrisburg, Pa.	Helping handle paperwork and keeping inventory on 17,000-item spare parts business
	Zero-Max Industries, Minneapolis, Minn.	Producing more complete sales reports and handling a variety of financial statements
IBM System/360 Model 40	McCall Information Services Co., Dayton, Ohio	Handling increasing workloads in subscription fulfillment and other business applications; will allow computer support for remote locations
IBM System/360 Model 85	Standard Oil Co. (Indiana), Chicago, Ill.	Processing commercial and scientific information for parent company and three Chicago-based subsidiaries: American Oil Co., Amoco International Oil Co., and Amoco Chemicals Corp.
	U.S. Dept. of Defense, Strategic Air Command, 544th Aerospace Reconnaissance Technical Wing (ARTW), Offutt AFB, Nebr.	Support of the intelligence requirements of the Joint Strategic Target Planning Staff, the SAC deputy chief of staff, intelligence, and the 544th ARTW; replaces five computers formerly used by ARTW
NCR Century 100 system	Marlboro Hospital, Marlboro, Mass.	Financial and general administrative data processing; planning various medical uses later
	Westminster College, Fulton, Mo.	Administrative data processing, student training, research projects — shared by Westminster and nearby William Woods College
RCA Spectra 70/45	United Press International, New York, N.Y. (two systems)	Providing its newspaper clientele with updated stock market reports ready for immediate high-speed typesetting throughout the trading day (systems valued at $1.5 million)
UNIVAC 418-III Real Time System	Ashikaga Bank, Utsunomiya, Japan	Serving as heart of an on-line system connection to 84 branches (system valued at about $5 million)
UNIVAC 1106 system	Denver School District #1, Denver, Colo.	Instructional, administrative and business applications for all schools within its administration (system valued at $1.2 million)
UNIVAC 9200 system	Hood Dairy Inc., St. Petersburg, Fla.	Route accounting, payroll processing and inventory control
	H. E. Schurig & Co., Houston, Tex.	Creating necessary documents for foreign shipments
	Washtenaw Community College, Ypsilanti, Mich.	"Hands-on" student training in computer programming and operation; also administrative applications
UNIVAC 9300 system	Colonie Central Schools, Albany, N.Y.	Administrative operations and student instruction
	Comet Rice Mills Inc., Houston, Tex.	General accounting and sales reporting
	Crowley's Milk Co., Inc., Binghamton, N.Y.	Route accounting, sales analysis, general accounting, payroll processing
	National Bank of Detroit, Mich.	Processing bond programs and for preparing data for entry into other computers
UNIVAC 9400 system	Motorists Mutual Insurance Co., Columbus, Ohio	Processing claims; future plans include use in billing, file maintenance, a variety of insurance accounting applications

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 JUNE 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 I. United States Manufacturers							
Autonetics	RECOMP II	11/58	2.5	30	0	30	X
Anaheim, Calif. (R) (1/69)	RECOMP III	6/61	1.5	6	0	6	X
Bailey Meter Co.	Bailey 750	6/60	40-250 (S)	32	3	35	0
Wickliffe, Ohio (R) (6/70)	Bailey 756	2/65	60-400 (S)	13	5	18	1
	Bailey 855	4/68	100-1000(S)	5	0	5	20
Bunker-Ramo Corp.	BR-130	10/61	2.0	160	-	-	X
Canoga Park, Calif.	BR-133	5/64	2.4	79	-	-	X
(A)	BR-230	8/63	2.7	15	-	-	X
(10/69)	BR-300	3/59	3.0	18	-	-	X
	BR-330	12/60	4.0	19	-	-	X
	BR-340	12/63	7.0	19	-	-	X
Burroughs	205	1/54	4.6	25-38	2	27-40	X
Detroit, Mich.	220	10/58	14.0	28-31	2	30-33	X
(N)	B100	8/64	2.8	90	13	103	X
(1/69-5/69)	B200	11/61	5.4	370-800	70	440-870	31
	B300	7/65	9.0	180-370	40	220-410	150
	B500	10/68	3.8	0	0	0	70
	B2500	2/67	5.0	52-57	12	64-69	117
	B3500	5/67	14.0	44	18	62	190
	B5500	3/63	23.5	65-74	7	72-81	8
	B6500	2/68	33.0	4	0	4	60
	B7500	4/69	44.0	0	0	0	13
	B8500	8/67	200.0	1	0	1	5
Control Data Corp.	G15	7/55	1.6	-	-	295	X
Minneapolis, Minn.	G20	4/61	15.5	-	-	20	X
(N)	LGP-21	12/62	0.7	-	-	165	X
(2/69-4/69)	LGP-30	9/56	1.3	-	-	322	X
	RPC4000	1/61	1.9	-	-	75	X
	636/136/046 Series	-	-	-	-	29	-
	160/8090 Series	5/60	2.1-14.0	-	-	610	X
	924/924A	8/61	11.0	-	-	29	X
	1604/A/B	1/60	45.0	-	-	59	X
	1700	5/66	3.8	65-130	41-50	106-180	C
	3100/3150	5/64	10-16	68-90	15-20	83-110	C
	3200	5/64	13.0	40-45	15	55-60	C
	3300	9/65	20-28	38-100	17-25	55-125	C
	3400	11/64	18.0	12	4	16	C
	3500	8/68	25.0	1	0	1	C
	3600	6/23	52.0	30	9	39	C
	3800	2/66	53.0	18	2	20	C
	6400/6500	8/64	58.0	23-50	14-17	37-67	C
	6600	8/64	115.0	32-40	11	43-51	C
	6800	6/67	130.0	1	0	1	C
	7600	12/68	235.0	1	0	1	C
							Total: 160 E
Data General Corp.	NOVA	2/69	8.0 (S)	445	58	503	1200
Southboro, Mass. (A) (6/70)	SUPERNOVA	5/70	11.7 (S)	8	1	9	100
Datacraft Corp.	DC6024	5/69	54-200 (S)	7	0	7	5
Ft. Lauderdale, Fla. (A) (6/70)	DC6024/3	2/70	33-200 (S)	3	0	3	64
Digiac Corp.	Digiac 3080	12/64	19.5 (S)	14	-	-	2
Plainview, N.Y. (A) (2/70)	Digiac 3080C	10/67	25.0 (S)	5	-	-	1
Digital Equipment Corp.	PDP-1	11/60	3.4	50	2	52	X
Maynard, Mass.	PDP-4	8/62	1.7	40	5	45	X
(A)	PDP-5	9/63	0.9	90	10	100	X
(6/70)	PDP-6	10/64	10.0	C	C	23	X
	PDP-7	11/64	1.3	C	C	160	X
	PDP-8	4/65	0.5	C	C	1450	C
	PDP-8/I	3/68	0.4	C	C	2157	C
	PDP-8/S	9/66	0.3	C	C	1020	C
	PDP-8/L	11/68	-	C	C	2350	C
	PDP-9	12/66	1.1	C	C	425	C
	PDP-9L	11/68	-	C	C	41	C
	PDP-10	12/67	8.0	C	C	144	C
	PDP-11	3/70	10.5 (S)	C	C	27	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
Digital Equipment Corp. (Cont'd.)	PDP-12	9/69	-	C	C	275	C
	PDP-15	2/16	17.0	6	C	15	C
	LINC-8	9/66	-	C	C	142	C
							Total: 1350 E
Electronic Associates Inc.	640	4/67	1.2	85	35	120	15
Long Branch, N.J. (A) (6/70)	8400	7/65	12.0	19	6	25	2
EMR Computer	EMR 6020	4/65	5.4	C	-	-	C
Minneapolis, Minn.	EMR 6040	7/65	6.6	C	-	-	C
(N)	EMR 6050	2/66	9.0	C	-	-	C
(6/70)	EMR 6070	10/66	15.0	C	-	-	C
	EMR 6120	-	0.8	-	-	-	-
	EMR 6130	8/67	5.0	C	-	-	C
	EMR 6135	-	2.6	-	-	-	-
				Total: 90 E			Total: 30 E
General Electric	105A	6/69	1.3	-	-	-	-
Phoenix, Ariz.	105B	6/69	1.4	-	-	-	-
(N)	105RTS	7/69	1.2	-	-	-	-
(6/70)	115	4/66	2.2	200-400	420-680	620-1080	-
	120	3/69	2.9	-	-	-	-
	130	12/68	4.5	-	-	-	-
	205	6/64	2.9	11	0	11	-
	210	7/60	16.0	35	0	35	-
	215	9/63	6.0	15	1	16	-
	225	4/61	8.0	145	15	160	-
	235	4/64	12.0	60-100	17	77-117	-
	245	11/68	13.0	-	-	-	-
	255 T/S	10/67	17.0	-	-	-	-
	265 T/S	10/65	20.0	-	-	-	-
	275 T/S	11/68	23.0	-	-	-	-
	405	2/68	6.8	10-40	5	15-45	-
	410 T/S	11/69	11.0	-	-	-	-
	415	5/64	7.3	170-300	70-100	240-400	-
	420 T/S	6/67	23.0	-	-	-	-
	425	6/64	9.6	50-100	20-30	70-130	-
	430 T/S	6/69	17.0	-	-	-	-
	435	9/65	14.0	20	6	26	-
	440 T/S	7/69	25.0	-	-	-	-
	615	3/68	32.0	-	-	-	-
	625	4/65	43.0	23	3	26	-
	635	5/65	47.0	20-40	3	23-43	-
	655	-	80.0	-	-	-	-
Process Control Computers:	4020	2/67	6.0	148	46	194	70
(A)	4040	8/64	3.0	45	20	65	-
(6/70)	4050	12/66	7.0	22	1	23	1
	4060	6/65	2.0	18	2	20	-
Hewlett Packard	2114A	10/68	0.25	-	-	843	-
Cupertino, Calif.	2115A	11/67	0.41	-	-	661	-
(A) (6/70)	2116A, 2116B	11/66	0.6	-	-	1102	-
Honeywell	DDP-24	5/63	2.65	-	-	90	X
Computer Control Div.	DDP-116	4/65	0.9	-	-	250	-
Framingham, Mass.	DDP-124	3/66	2.2	-	-	150	-
(R)	DDP-224	3/65	3.5	-	-	60	-
(6/70)	DDP-316	6/69	0.6	-	-	230	-
	DDP-416	-	-	-	-	225	-
	DDP-516	9/66	1.2	-	-	635	-
	H632	12/68	3.2	-	-	10	-
	H1648	11/68	12.0	-	-	12	-
Honeywell	H-110	8/68	2.7	150	70	220	0
EDP Div.	H-115	6/70	3.5	-	-	-	-
Wellesley Hills, Mass.	H-120	1/66	4.8	800	160	960	-
(A)	H-125	12/67	7.0	120	220	340	-
(6/70)	H-200	3/64	7.5	800	275	1075	-
	H-400	12/61	10.5	46	40	86	X
	H-800	12/60	30.0	58	15	73	X
	H-1200	2/66	9.8	230	90	325	-
	H-1250	7/68	12.0	130	45	175	-
	H-1400	1/64	14.0	4	6	10	X
	H-1800	1/64	50.0	15	5	20	X
	H-2200	1/66	18.0	125	55	180	-
	H-3200	2/70	24.0	0	0	0	-
	H-4200	8/68	32.5	15	2	17	-
	H-8200	12/68	50.0	8	3	11	-
IBM	System 3	1/70	1.1	0	0	-	-
White Plains, N.Y.	305	12/57	3.6	40	15	55	-
(N) (D)	650	10/67	4.8	50	18	68	-
(1/69-5/69)	1130	2/66	1.5	2580	1227	3807	-
	1401	9/60	5.4	2210	1836	4046	-
	1401-G	5/64	2.3	420	450	870	-
	1401-H	6/67	1.3	180	140	320	-
	1410	11/61	17.0	156	116	272	-
	1440	4/63	4.1	1690	1174	2864	-
	1460	10/63	10.0	194	63	257	-
	1620 1, 11	9/60	4.1	285	186	471	-
	1800	1/66	5.1	415	148	563	-
	7010	10/63	26.0	67	14	81	-
	7030	5/61	160.0	4	1	5	-
	704	12/55	32.0	12	1	13	-
	7040	6/63	25.0	35	27	2	-
	7044	6/63	36.5	28	13	41	-
	705	11/55	38.0	18	3	21	-
	7070, 2	3/60	27.0	10	3	13	-
	7074	3/60	35.0	44	26	70	-

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
IBM (Cont'd.)	7080	8/61	60.0	13	2	15	-
	7090	11/59	63.5	4	2	6	-
	7094-1	9/62	75.0	10	4	14	-
	7094-11	4/64	83.0	6	4	10	-
	360/20	12/65	2.7	4690	3276	7966	-
	360/25	1/68	5.1	0	4	4	-
	360/30	5/65	10.3	5075	3144	8219	-
	360/40	4/65	19.3	1260	498	1758	-
	360/44	7/66	11.8	65	13	78	-
	360/50	8/65	29.1	480	109	589	-
	360/65	11/65	57.2	175	31	206	-
	360/67	10/66	133.8	9	4	13	-
	360/75	2/66	66.9	14	3	17	-
	360/85	-	150.3	0	0	0	-
	360/90	11/67	(S)	5	0	5	-
	360/195	-	232.0	-	-	-	-
Interdata	Model 2	7/68	0.25	-	-	18	0
Oceanport, N.J.	Model 3	3/67	0.4	-	-	223	77
(A) (6/70)	Model 4	8/68	0.6	-	-	154	98
NCR	304	1/60	14.0	15	2	17	X
Dayton, Ohio	310	5/61	2.5	8	0	8	X
(R)	315	5/62	8.7	460	400	860	-
(2/70)	315 RMC	9/65	12.0	125	45	170	-
	390	5/61	1.9	240	500	740	-
	500	10/65	1.5	1700	950	2650	-
	Century 100	9/68	2.7	550	150	800	-
	Century 200	6/69	7.5	100	50	150	-
Philco	1000	6/63	7.0	16	-	-	X
Willow Grove, Pa.	2000-210, 211	10/58	40.0	16	-	-	X
(N) (1/69)	2000-212	1/63	52.0	12	-	-	X
RCA	301	2/61	7.0	140-290	100-130	240-420	-
Cherry Hill, N.J.	501	6/59	14.0-18.0	22-50	1	23-51	-
(N)	601	11/62	14.0-35.0	2	0	2	-
(5/69)	3301	7/64	17.0-35.0	24-60	1-5	25-65	-
	Spectra 70/15	9/65	4.3	90-110	35-60	125-170	-
	Spectra 70/25	9/65	6.6	68-70	18-25	86-95	-
	Spectra 70/35	1/67	9.2	65-100	20-50	85-150	-
	Spectra 70/45	11/65	22.5	84-180	21-55	105-235	-
	Spectra 70/46	-	33.5	1	0	1	-
	Spectra 70/55	11/66	34.0	11	1	12	-
Raytheon	250	12/60	1.2	155	20	175	X
Santa Ana, Calif.	440	3/64	3.6	20	-	20	X
(A)	520	10/65	3.2	26	1	27	X
(6/70)	703	10/67	(S)	148	20	178	5
	704	3/70	(S)	5	2	7	15
	706	5/69	(S)	29	4	33	15
Scientific Control Corp.	650	5/66	0.5	23	0	23	X
Dallas, Tex.	655	10/66	2.1	137	0	137	0
(A)	660	10/65	2.1	41	0	41	0
(6/70)	670	5/66	2.7	1	0	1	X
	4700	4/69	1.8	16	0	16	1
	DCT-132	5/69	0.7	40	0	40	24
Standard Computer Corp.	IC 4000	12/68	9.0	6	0	6	8 E
Los Angeles, Calif.	IC 6000	5/67	16.0	9	0	9	-
(N) (6/70)	IC 7000	6/69	17.0	3	0	3	10 E
Systems Engineering Laboratories	810	9/65	1.1	24	0	24	X
Ft. Lauderdale, Fla.	810A	8/66	0.9	211	5	216	32
(A)	810B	9/68	1.2	75	1	76	26
(6/70)	840	11/65	1.5	3	0	3	X
	840A	8/66	1.5	36	2	38	X
	840MP	1/68	2.0	31	0	31	2
	Systems 86	-	10.0	0	0	0	2
UNIVAC (Div. of Sperry Rand)	I & II	3/51 & 11/57	25.0	23	-	-	X
New York, N.Y.	III	8/62	21.0	25	6	31	X
(R)	File Computers	8/56	15.0	13	-	-	X
(1/69-5/69)	Solid-State 80 I, II, 90,I,II, & Step	8/58	8.0	210	-	-	X
	418	6/63	11.0	76	36	112	20 E
	490 Series	12/61	30.0	75	11	86	35 E
	1004	2/63	1.9	1502	628	2130	20 E
	1005	4/66	2.4	637	299	936	90 E
	1050	9/63	8.5	138	62	200	10 E
	1100 Series (except 1107, 1108)	12/50	35.0	9	0	9	X
	1107	10/62	57.0	8	3	11	X
	1108	9/65	68.0	38	18	56	75 E
	9200	6/67	1.5	127	48	175	850 E
	9300	9/67	3.4	106	38	144	550 E
	9400	5/69	7.0	3	0	3	60 E
	LARC	5/60	135.0	2	0	2	-
Varian Data Machines	620	11/65	0.9	-	-	75	X
Newport Beach, Calif.	620i	6/67	0.5	-	-	1200	400
(A) (6/70)	R-620i	4/69	-	-	-	30	30
	520i	10/68	0.4	-	-	110	330
	620/F	8/70	0.5	-	-	-	125
	520/DC	12/69	1.6	-	-	15	25
Xerox Data Systems	XDS-92	4/65	1.5	10-60	2	12-62	-
El Segundo, Calif.	XDS-910	8/62	2.0	150-170	7-10	157-180	-
(N)	XDS-920	9/62	2.9	93-120	5-12	98-132	-
(4/70)	XDS-925	12/64	3.0	20	1	21	-
	XDS-930	6/64	3.4	159	14	173	-
	XDS-940	4/66	14.0	28-35	0	28-35	-
	XDS-9300	11/64	8.5	21-25	1	22-26	-
	Sigma 2	12/66	1.8	60-110	10-15	70-125	-
	Sigma 3	12/69	2.0	10	0	10	-
	Sigma 5	8/67	6.0	15-40	6-18	21-58	-
	Sigma 7	12/66	12.0	24-35	5-9	29-44	-

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

CORRECTIONS

In the June 1970 issue of Computers and Automation, the following corrections should be made:

Page 4, Letters to the Editor, "March Front Cover — Comments": The last two sentences of the first paragraph should be combined to read: "This picture depicts the real meaning of data processing to me — the honest-to-goodness hard work that it is, and the meaningful contribution which computers can make to society."

Page 24, col. 1, paragraph two: The statement, "In fact, it is desirable ... and adverse reactions.", should be attributed to Dr. Otto Barnett of Massachusetts General Hospital as quoted in "The New Physician", Feb. 1970.

Page 25, col. 1, paragraph 1: The sentence "Medical records are really composed..." should read "Medical records are rarely composed...".

Page 34, col. 2, paragraph 1: The last sentence should read "Over the past ten years, ... in many cases, only because of the knowledge that several key clerical employees have of the systems' inherent idiosyncrasies."

Page 34, col. 2, paragraph 5: "black book" should be replaced with "black box".

CLASSIFIED ADVERTISEMENTS

Rates for Classified Ads: 90¢ per word — minimum, 20 words. First line all capitals — no charge. Ads must be prepaid.
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- Rosters of Computer Associations and Computer Users' Groups
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