



SCIENCE & TECHNOLOGY

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computers and automation



Computerized Word Pronouncer

Workable, Sound, Data Processing Decisions
The Computer and The Community College
The Satisfaction of Companies with Service Bureaus
Computers and Dossiers — I
Common Sense, Wisdom, General Science, and Computers — II

- Robert A. Gagnon
- Raymond A. Pietak
- Michael J. Cerullo
- Vern Countryman
- Edmund C. Berkeley

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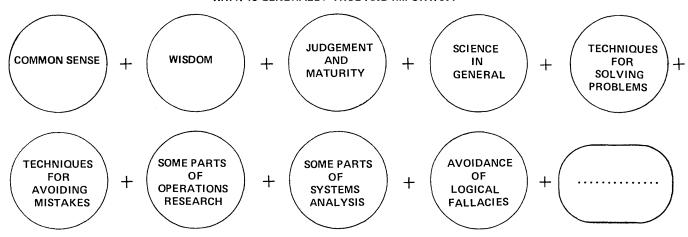
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Editor: Edmund C. Berkeley, author, businessman, actuary, scientist, computer professional, first secretary of the Association for Computing Machinery 1947-53, editor of *Computers and Automation*.

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Vol. 21, No. 1 January, 1972

computers and automation

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

The Computer Industry – Retrospect

EIGHT HUNDRED PEOPLE INTERESTED IN [NT A] **MECHANICAL BRAINS**

by Edmund C. Berkeley, Editor, Computers and Automation What the Association for Computing Machinery looked like in 1950, as perceived by its then Secretary.

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Essential Computer Concepts for Top Management – IV [T A] WORKABLE, SOUND, DATA PROCESSING DECISIONS

> by Robert A. Gagnon, Woods Gordon and Co., West Montreal, Quebec, Canada

How responsibility should be assigned for data processing decisions; and the role of the consultant.

THE COMPUTER AND THE COMMUNITY COLLEGE

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An index by author, title, and subjects, of all informative information published in the thirteen 1971 issues of "Computers and Automation.. (Vol. 20) and also "The Computer Directory and Buyers' Guide" issue bearing the date Nov. 30, 1970 (Vol. 19, no. 6B) which came off the press in January, 1971.



Front Cover Picture

Janet Crotchfelt, a primary grade student, uses a telephone to enlist a computer's help in pronouncing a word she spells. She is participating in "Operation Bookstrap", a Bell Labs experimental project at the Mechanic Street School in Red Bank, New Jersey. This kind of technique may help teachers give individual supplementary instruction, even in overcrowded classrooms. For more information, see page 49.

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[E] - Editorial

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[T] — Technical Computer Information



Hurray for the Univac Division of Sperry Rand

An encouraging piece of news as 1971 finishes is that the Univac Division of Sperry Rand will take over all the installations of RCA computers in the United States, Canada, and Mexico, paying RCA for them. The Univac Division will make sure that the users of RCA computers will be taken care of, in regard to maintenance, support, and delivery of equipment on order. Univac is apparently devoted to "winning" RCA users as Univac customers eventually.

Mr. David L. Rau, president of the RCA Computer Users Association, says that he has been impressed with the interest and concern shown by the Univac people of highest level with whom he has talked, and their desire to please RCA computer users.

This splendid action is in keeping with the historic decision of a prior generation of Remington Rand executives, when they arranged, more than twenty years ago, to take over in a very cooperative way the Eckert-Mauchly Computer Corporation. In this way they put the resources of a great business organization behind the research, development, marketing, and maintenance of automatic digital computers of the Univac type, "UNIVersal Automatic Computer" — an Eckert-Mauchly invention and trademark.

In those years hardly any businessman could foresee the enormous usefulness or the fantastic possibilities of automatic computers. But Presper Eckert and John Mauchly did. The invention of automatic computers is probably the most significant and most far-reaching human invention of the twentieth century.

Sperry Rand is to pay RCA on January 2, 1972, \$70 million. Additional amounts to be paid in the future are estimated between \$30 million and \$60 million. These figures illuminate another facet of the situation: that the business decision by the RCA Board of Directors in September to "drop" the computer division precipitously was an over-reactive and therefore questionable decision. There were alternative decisions available to the Board, and some of the alternatives would have displayed more common sense. For example, the price RCA is now receiv-

ing from Sperry Rand — between \$100 and 130 million — would likely have been rather higher; and in the meantime there would have been avoided the shattering of the confidence of users of over 1000 RCA computers.

Mr. Robert E. McDonald, executive vice president of Sperry Rand and former president of the Univac Division, looks on the acquisition of the RCA computer installations "as a unique opportunity to grow".

Growth in the computer field is bound to occur and will be enormous; and there are many kinds of opportunities for astute, forward-looking, well-managed organizations. The possibilities for automatic computers, after some 20 years of commercial development, still have only been barely scratched.

For example, the standard central processing unit of the future is likely to be smaller than a football. It will be attached like a plug-in circuit to a peripheral, such as an electric typewriter or a line printer.

If a man's brain made of chemicals and protoplasmic cells can do as much as it does, think what an automatic computer made of other kinds of chemicals and other kinds of cells can do in the future.

We wish the Univac Division of Remington Rand "good growth" in many directions.

Edmund C. Berkeley

Edmund C. Berkeley Editor

Eight Hundred People Interested in Mechanical Brains

Edmund C. Berkeley

"The name of this new organization is the Association for Computing Machinery;
... The dues are \$2 a calendar year. ... The Council has established policy:
to encourage meetings and discussions; to put out mimeographed information
but no printed or more formal publications ..."

(Reprinted from *The American Statistician*, June-July 1950, Vol. IV, No.3, published by the American Statistical Association, Washington, D.C.)

In the last three years an organization eight hundred strong has come into existence. It is devoted to informal communication among the men and women who are seriously interested in the new machinery for handling information automatically. These machines are often called automatic computers, or large-scale calculating machines, but often nowadays they are called *mechanical brains*. The name of this new organization is the Association for Computing Machinery; and its purposes are to advance the science, design, construction, and applications of the new machinery for computing, reasoning, and performing other operations of mathematics, logic, and kindred fields. Membership is open to any one who is seriously interested in the field; dues are \$2 a calendar year.

Birth of the Association

How did this organization begin? In January 1947, the Harvard Computation Laboratory held its first symposium on "Large Scale Calculating Machinery," a three-day conference where more than 300 people were present. On the third day, Professor Samuel H. Caldwell of Massachusetts Institute of Technology, in the course of a talk, suggested an association of those who were interested in the new field of automatic computing machinery. The discussion of Professor Caldwell's talk at the conference endorsed his proposal, and in an informal way referred action on it to the National Research Council committee on large-scale calculating machinery.

On April 28, the committee held its next subsequent meeting in New York. The proposal was put before the committee that it should take the initiative in forming an association to bring together those who were interested in automatic computing machinery. The committee was not convinced that there was as yet sufficient interest, or that it was desirable to form still another society. They decided that they would take no action until their next committee meeting, a year later.

Such a decision did not satisfy some of the younger men in the field, who felt very much the need for getting together informally with men in other organizations and excended informally with men in other organizations and exchanging ideas and information. A "Temporary Committee promptly formed in May. It consisted of two or three men from each of four centers of computer interest, Boston, New York, Philadelphia, and Washington. The group in-

cluded E. G. Andrews, E. C. Berkeley, R. V. D. Campbell, John W. Mauchly, James L. McPherson, John B. Russell, T. Kite Sharpless, Richard Taylor, and C. B. Tompkins. The temporary committee sent out an inquiry early in the summer, received over a hundred expressions of interest, and called a meeting in September at Columbia University. Over seventy-five persons attended that meeting. The first part of the meeting was devoted to a discussion of the pilot model of the Edvac, and the second part of the meeting organized the "Eastern Association for Computing Machinery," with a Council with some temporary officers, and a mandate to the Council to proceed.

Growth of the Association

In the next few months the Council met several times and discussed its mission. It gradually established policy; to keep the organization informal, to encourage meetings and discussions, to put out mimeographed information but no printed or more formal publications, and to maintain a mailing list of persons interested in the field (at first both members and nonmembers, later only members).

The Council discussed the possibility of becoming a section of some other society that was interested in the field, such as electrical engineering, or radio, or physics or mathematics; but always came back to the conclusion that that would be inefficient: it did not want to saddle computing machinery men with the heavy dues of a regular professional society or send them a large proportion of information that they would not be interested in.

From a modest beginning of about a hundred members in the fall of 1947, the Association grew rapidly. Soon there was such wide representation of membership that the Council dropped the term "Eastern," and the association became the "Association for Computing Machinery." Four of the seven members of the National Research Council committee have become members of the Association. The Association has in all over eight hundred members who are located all over the United States, and in many other parts of the world including Australia, Belgium, Canada, England, France, the Netherlands, and Sweden. At the present time, discussions are going on for organizing sections in California and Sweden, in addition to the four existing sections in Boston, New York, Philadelphia, and Washington.

Fields of Interest

Many fields of interest are represented among the members of the association. For example, in the sciences, there

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Essential Computer Concepts for Top Management: IV WORKABLE, SOUND, DATA PROCESSING DECISIONS

Robert A. Gagnon, Senior Consultant Woods Gordon and Co., Management Consultants 630 Dorchester Blvd. West Montreal 101, Quebec, Canada

"There are two types of data processing decisions: business decisions concerning the use and performance of data processing resources and ... decisions concerning data processing matters specifically. There is a need to make a distinction between the two ... in discussing the 'who's and how's' of decision-making."

In reading the comment, appearing in the October, 1971 issue of "Computers and Automation", I was particularly "grabbed" by the sentence fragment "workable, economically sound data processing decisions".

I believe that the question of D.P. decisions concerns the role of top management and D.P. staff in the decision-making process, and that this process is related to, among other things, the allocation of D.P. resources, the determination of systems specifications, the review of development, progress and operational performance.

Decisions

It seems to me that in order to understand the individual and complementary roles of top management and D.P. staff, it should be recognized that there are, in fact, two types of decisions to be made. Firstly, there are business decisions concerning the use and performance of D.P. resources and, secondly, there are decisions concerning data processing matters specifically. I believe that there is a need to make a distinction between the two types of decisions in discussing the "whos and the hows" of decision-making.

All, I believe, will agree that business decisions are the responsibility of top management. In arriving at the decision top management will, when required, ask for advice, detailed analyses, and opinions concerning the issue to be resolved by the decision. D.P. staff will be asked to contribute in that context to business decisions concerning D.P. issues. There is no doubt that top management will welcome any useful contribution prior to and during the decision-making process. But surely top management does not expect data processing staff to make the decision.

Top management will delegate, within practical limits, the responsibility of decision-making concerning D.P. operations specifically to a lower level manager. The distinction between the two types of

Note: Previous discussion of this topic in "Computers and Automation" may be found in:

- T. "What Top Management Should Know About Computers", editorial by Edmund C. Berkeley, October, 1970
- II. "Essential Computer Concepts for Top Management" by Frank J. Gabriel and the Editor, May, 1971
- III. "Essential Computer Concepts for Top Management Comment", by Eugene S. Stark, and the Editor, October, 1971

decisions which I am discussing here will most probably be based upon considerations such as the following:

- The degree of economic importance of the issue to the enterprise and the time span of effect or involvement.
- The type and the size of contribution of the issue to the achievements of the enterprise's objectives.
- Is it a question of resource, system or performance requirements or is it a question of means?

D.P. Knowledge of Top Management

It seems clear to me that in order to understand the meaning and the value of D.P. resources and concepts the senior executive must have a level of knowledge sufficient to carry on a useful dialogue with either the D.P. staff or with other line staff who are involved or affected by the D.P. issue under consideration. Over a period of time the senior executive develops his own feel for each situation and adds his own weighting to the advice, technical arguments, or opinions that come into play in such situations.

The question of the level of knowledge would seem to me to depend very much on the individual manager's style and method. It is only the language that changes when one is considering either a warehousing problem, a marketing problem, or a D.P. problem. The manager generally deals with a variety of problems; thus he must be conversant with a variety of particular languages or jargons. The level of knowledge a manager uses is surely a matter of individual choice. It is also probably very dependent on the level of confidence that the manager has in his D.P. staff, which is of course a matter of one man understanding another and the cumulative result of past understandings arrived at over a period of time. It would seem to me that the D.P. subject matter that should be taught to managers is a concern for the designers of business school curricula more than to managers. The manager will take the course that will provide him with the level of knowledge he wants to acquire.

The Consultant's Role

The consultant can have only one role. His specific expertise, experience, and judgment are employed by the senior executive to obtain a better perspective upon the issue under consideration. The consultant provides a higher level of knowledge to the executive. This knowledge can be used in many ways such as:

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THE COMPUTER AND THE COMMUNITY COLLEGE

Raymond A. Pietak, Provost Community College of Philadelphia 34 South 11 St. Philadelphia, Pa. 19107

"The governing board, faculty, students and other administrators will begin to question the appropriateness of a computer installation if it does not do everything and anything that they think it should do. The only answer to this questioning is to insure that a comprehensive plan is developed and implemented."

Administrators with overall responsibility in community colleges will inevitably face the problem of what role the computer will play in their institution. Specifically, they may have to ask themselves some questions: Are we in a position to buy or lease a computer for our institution? Do we actually have a need? The answers provided by marketing people will undoubtedly be in the affirmative. The differences among various configurations of one company's models are sufficiently complex to make the head of any administrator swim. If the final decision is based on faulty planning and examination, the administrator may find that troubled waters run deep. The governing board, faculty, students and other administrators will begin to question the appropriateness of a computer installation if it does not do everything and anything that they think it should do. The only answer to this questioning is to insure that a comprehensive plan is developed and implemented.

Background

I have had some experience in helping to solve problems in three different community colleges. The colleges ranged from a medium-sized institution to a large multi-campus district. In each case, the problem was different and the final solution was successful. In retrospect, certain common elements began to surface as I thought about the process of formulating appropriate solutions. Here I propose one methodology for examing and evaluating the needs for a computer in a comprehensive community college environment.

The need for planning or providing for the orderly growth and efficient utilization of resources in the context of a community college is extremely important — especially when we note the financial constraints present today. I submit that a systematic and coherent method of planning for the development of a computer installation must be carefully selected and properly executed. Whether we call it "comprehensive planning" or "systematically approaching a problem", is unimportant! The fact is that we must insure that whatever the solution, it meets the needs that were identified and is sufficiently flexible to be modified as new needs arise.

The plan that is developed must be capable of being put into effect and it must be capable of being understood by the decision-makers who will permit its implementation. It must be designed with the requirements of the institution in mind, with the possibility of conflict among its various components, and with a definite consideration of the resources

that will be available in the years to come. It must be capable of undergoing a periodic review and the hardware must be to some extent modular. Once all these factors have been considered, it is important that a commitment be received from the governing board and all other parties concerned.

Methodology

The first step is to identify the problems and needs of the institution. This means that the overall goals must be formulated. These goals should be established on a short-range, mid-range, and long-range basis. In conjunction with these general goals, specific objectives or aims that are measurable and achievable must be established. It is very possible that these objectives may be re-formulated as conditions change. In order to accomplish this first task, one must have information concerning instructional needs, administrative needs, financial parameters, and facilities available. Finally all of these factors must be considered in terms of their relationship to each other and to time.

The second task is to develop alternative courses of action for the short-range, mid-range and long-range objectives. These alternative courses of action are based on objectives, requirements and resources available to the community college.

The third step requires an evaluation of the alternatives. At this point, we must decide which alternative is best for the institution based on preset priorities.

The fourth task is a decision-making step and in effect asks the administration and staff to either accept or reject certain alternatives.

The fifth step is to formulate strategies which will translate the decisions into action. At this point, concerned parties are asked to make a commitment based on priorities and resource allocations.

The sixth step is the development of an implementation procedure. The program will be implemented through the institution's organization and structure. It is also at this point that we develop a set of performance standards with which to measure the program achievements.

The seventh step may be identified as program evaluation and review. As the plan is developed during the above steps, it is necessary to devise a series of checks in order to evaluate the level of attainment of our various objectives. Throughout

this entire process it is necessary to formulate procedures which will provide feedback so that as new inputs are generated the system can be changed at an opportune time.

Finally, the eighth step is what can be called the recycling of the planning process. This includes a close re-examination of problems and available resources. It is possible that a whole new set of objectives may have to be developed in order to respond to institutional changes.

In summary this total methodology calls for: (a) a set of objectives, (b) the formulation of an information system and (c) the development of strategies to facilitate the course of "computery" in an institution.

General Comments

A consideration of problems and needs must include an examination of administrative and instructional needs. The impact of these two areas on the computer may have disastrous effects unless sufficient thought has been given to these areas.

As one looks at alternative courses of action one must consider service bureaus, local industry and business, the leasing or outright purchase of equipment, and the use of equipment on the premises of other educational institutions. Regional planning has much to commend it; however, the actual realization of this concept may be more a result of a region's financial resources rather than an actual willingness on the part of an individual college to forsake the possibility of its own installation. Needless to say, not every community college must have its own computer; although, one may observe that the ownership of a computer in many circles is regarded as a status symbol.

The evaluation of alternatives includes at least some of the following factors but does not exclude others which are a function of an individual situation: (1) Dollars available to include the cost of hardware, software, and the personnel required to operate the installation. (2) A configuration which will meet the needs of the institution presently and which may be modified as the needs of the institution change. (3) Funds available to provide in-service education for the faculty who must be brought to a point where they can significantly influence the course of utilization of a computer installation.

This last point brings us to some strategies that may be used in developing faculty awareness of the role of "computery" in education. Undoubtedly, a given institution will have some members of the faculty who are aware of computer uses in education, others who may have some programming experience, and still others who are relatively unaware of its great potential in the field of education. One strategy that may be used in attempting to identify the needs of an institution is the development of seminars for the faculty which bring to their attention uses of the computer in education and which also give them an opportunity to discuss what they would like to do with the computer in their subjects. A careful structuring of these seminars along with proper resource personnel will enable faculty to reach realistic aspirations for the computer. Essentially these seminars will give the administration an idea of what the needs are and what they might be in the future. We must also keep in mind that these seminars may generate a great deal of interest which will result in increased utilization in years to

come which may not be foreseen at this point. Visits to other community college installations and attendance at certain selected conferences, both proprietary and institutional, may also be of great value to both administrators and faculty.

The development of alternatives over a three year period may be seen in terms of a simple bar graph. For example, if x number of dollars are available, the following configurations can be purchased. These configurations will allow the institution to do the following things in the instructional and administrative area with the following personnel requirements. This visual device enables a governing board to see the total picture and to make decisions based on meaningful input. When the input is based on overall goals and specific objectives, the governing board are in fact attempting to meet the needs as have been set down by all concerned parties. Once this initial alternative has been chosen, it is extremely important that the plan be examined and updated each year so that new input can be accommodated.

Conclusion

The prevailing note of caution in this entire article is a call for total systems approach. To move into a computer installation on a fragmentized basis is to ask for the worst kind of chaos, at all levels in an institution. A great deal of money has been wasted by business, industry, and education through faulty planning of total service needs. We may not be able at the start to implement the ideal total system, but we must be in a position to attack module by module the needs of an institution.

Footnotes

Juan A. Casasco, <u>Planning Techniques for University Management</u>, <u>American Council on Education with the Eric Clearinghouse on Higher Education</u>, (Washington, D.C., American Council on Education, 1970) pp. 1-7 passim.

Gagnon - Continued from page 8

- Identifying the true (hidden) issue as opposed to the false (evident) issue,
- Evaluating all dimensions of the issue.
- Developing the best ways and means to resolve issues.
- Assisting in the design or implementation of systems.

At all times the consultant's role is complementary. The executive always carries the burden of responsibility. No outsider (consultant) can carry that responsibility. The executive will enter into a dialogue at the level of his choice with those involved (or that he chooses to involve) in a given situation. His ability to function as an executive depends upon the quality of that dialogue in terms of useful profitable solutions to issues and problems. The quality of that dialogue surely depends on the top manager's level of knowledge. However, as I said before, each manager will tend to have his own level of knowledge. It will tend to conform to his method and style of doing business.

Common Sense, Wisdom, General Science, and Computers - II

Edmund C. Berkeley Editor, Computers and Automation

"This subject could have wide usefulness in dealing with many problems – including the great unsolved problems facing humanity in the world today."

In the April 1971 issue of "Computers and Automation" we published an article "Common Sense, Wisdom, General Science, and Computers" in which we talked about a branch of knowledge much neglected in recent years: "what is generally true and important". This subject includes: common sense; wisdom; judgment and maturity; science in general; techniques for solving problems and for avoiding mistakes; some parts of operations research and systems analysis; avoidance of logical fallacies; and more besides. This subject could have wide usefulness in dealing with many problems, including the great unsolved problems facing humanity in the world today where wisdom is needed: control over nuclear weapons; pollution of the environment; the population explosion; etc.

We said that for more than a dozen years we had been gathering material on this subject, ever since a search in a large and good public library had revealed no textbook on common sense and wisdom. We have collected data, information, references, principles, topics, definitions, etc. until the accumulated folders of notes occupy sixfeet of file drawers.

Action

Accordingly, we launched in April another publication, newsletter style, 24 issues a year, called "The C&A Notebook on Common Sense, Elementary and Advanced." As of present writing 26 issues have been finished and published. The subjects these issues deal with are discussed in more detail below. First, a word about the format.

Format

In presenting short reports on various topics in the subject of common sense, wisdom, and science in general to the subscribers to the Notebook, it makes little sense to be dry or uninteresting or technical or profound. With a fertile subject like this, it is easy to be interesting and nontechnical, yet meaty. Perhaps this "most important of all branches of knowledge" will one day be studied scientifically. Then will be time enough to be technical, mathematical, statistical, etc. In the meantime, we need to look at the forest and the landscape, as well as the trees, the leaves, and the life that lives on them.

The format of each issue has been a short report of 2 to 6 pages, often beginning with an introductory note, often finishing with "some questions for further reflection". This amount of space has so far

provided room for a sufficient number of words to do justice to a topic.

Subjects

The subjects covered so far may be roughly and not very systematically classified under eight headings:

- The Identification of the Subject (the nature of common sense, wisdom, and science in general, i.e., what is being referred to)
- 2. Collections of Principles
- 3. General Concepts
- 4. General Procedures
- 5. The Systematic Prevention of Mistakes
- 6. Avoiding Fallacies in Reasoning
- 7. Parables (invented characters)
- 8. Anecdotes (true stories)

1. Identification of the Subject

The Investigation of Common Sense, Elementary and Advanced (No. 10) / ways to investigate the subject

Common Sense — Questions for Consideration (No. 12) / questions for study regarding the parameters of common sense

What is Common Sense? — An Operational Definition (No. 24) / a proposed definition for common sense not using synonyms but using observable operations

The Subject of "What is Generally True and Important" — Common Sense, Elementary and Advanced (No. 25) / the identification and nature of the subject, with illustrative examples.

2. Collections of Principles

Four issues present some collections of principles (or in the case of Issue No. 20, "anti-principles"):

Right Answers — A Short Guide for Obtaining Them (No. 1) / <u>Example</u>: "An answer may be wrong, right, both, or neither." / <u>Number</u>: 82 maxims

Strategy in Chess (No. 4) / Example: "Use all your pieces." / Number: 45 maxims

Principles of General Science, and Proverbs (No. 11) / Example: "Nine tenths of Wisdom is being wise in time." / Number: 8 principles, 46 proverbs

How to be Silly (No. 20) / Example: "Use twenty words to say something when two will do." / Number: 71 recipes for being silly

3. General Concepts

Three issues present and discuss some concepts that belong in this subject:

The Cult of the Expert (No. 14) / experts, and their credibility

The Stage of Maturity or Judgment in any
Field of Knowledge or Experience (No. 16) /
"finishing" the learning of a territory of
knowledge

Individuality in Human Beings (No. 19) / the detailed individual real differences between normal members of a class of physical things (such as human beings)

4. General Procedures

Three issues discuss some general procedures:

The Elephant and the Grassy Hillside (No. 7) / the procedure for going from ordinary every-day concepts to the pointer readings of exact science

Ground Rules for Arguments (No. 8) / some procedures for arguing

Natural History, Patterns, and Common Sense (No. 26) / some techniques for observing

5. The Systematic Prevention of Mistakes (PM)

Preventing Mistakes from Failure to Understand (No. 15)

Preventing Mistakes from Forgetting (No. 23)

6. Fallacies in Reasoning

The Barrels and the Elephant (No. 5) / truth vs. believability

The Argument of the Beard (No. 6) / the accumulation of small differences may make a large difference

False Premises, Valid Reasoning, and True Conclusions (No. 9) / the fallacy of asserting that premises must first be correct in order to derive correct conclusions

7. Parables

The Empty Column (No. 2) / a parable about a symbol for zero

The Golden Trumpets of Yap Yap (No. 3) / a parable about the spreading of information The History of the Doasyoulikes (No. 18) /

the consequences of absence of struggle
The Three Earthworms (No. 21) / a parable about
curiosity, and the making of observations
for oneself

8. Anecdotes

Falling 1800 Feet Down a Mountain (No. 13) / the story of a skimobiler who fell a third of a mile down Mt. Washington and was rescued the next day

Doomsday in St. Pierre, Martinique — Common Sense vs. Catastrophe (No. 17) / how 30,000 people died from a volcanic eruption, refusing to apply their common sense The Cochrans vs. Catastrophe (No. 22) / the history of Mr. and Mrs. Samuel Cochran, Jr., who ate some vichyssoise soup

Table 1

THE FIRST 26 ISSUES - TITLES

Volume 1, 1971

- 1. Right Answers A Short Guide to Obtaining $$\operatorname{\textbf{Them}}$$
- 2. The Empty Column
- 3. The Golden Trumpets of Yap Yap
- 4. Strategy in Chess
- 5. The Barrels and the Elephant
- 6. The Argument of the Beard
- 7. The Elephant and the Grassy Hillside
- 8. Ground Rules for Arguments
- 9. False Premises, Valid Reasoning, and True Conclusions
- 10. The Investigation of Common Sense, Elementary and Advanced
- 11. Principles of General Science, and Proverbs
- 12. Common Sense Questions for Consideration
- 13. Falling 1800 Feet Down a Mountain
- 14. The Cult of the Expert
- 15. Preventing Mistakes from Failure to Understand
- 16. The Stage of Maturity and Judgment
- 17. Doomsday in St. Pierre, Martinique Common Sense vs. Catastrophe
- 18. The History of the Doasyoulikes
- 19. Individuality in Human Beings
- 20. How to be Silly
- 21. The Three Earthworms
- 22. The Cochrans vs. Catastrophe
- 23. Preventing Mistakes from Forgetting
- 24. What is Common Sense? An Operational Definition
- 25. The Subject of "What is Generally True and Important" Common Sense, Elementary and Advanced
- $26.\$ Natural History, Patterns, and Common Sense

Evaluation

It is reasonable to consider that these 26 issues are a fair beginning.

People have been learning from comparing experiences and observations ever since prehistoric men began to talk together. The ideas derived from frequent experiences become the principles that go into common sense, to be tested and filtered by the methods of science.

Relations to Computers

This "most important of all branches of knowledge" can be aided in a number of ways by computers. First, this subject can be assisted in much the same way as over 2000 other branches of knowledge, by: classifying; sorting; summarizing; making calculations; etc.

Many of the principles of common sense, wisdom, and science in general can be investigated by computer programs, which can make experiments using sets of random numbers. The computer can swiftly try out and summarize many different experiments. For example, how true is it that "a stitch in time saves nine"? Answer: try it out on a computer, under suitable assumptions and variations.

(Please turn to page 46)

COMPUTERS AND DOSSIERS - Part I

Vern Countryman Harvard Law School Cambridge, Mass. 02138

"If the trend continues, the day will come when the push of a button will produce a complete "data profile" on every citizen, from his departure from the womb (or perhaps several months earlier) to . . . after he enters the tomb."

(Reprinted with permission from the "Texas Law Review," May, 1971)

The compiling of dossiers on individuals is not new in this country. The Federalists, enforcing the first Alien and Sedition Acts, doubtless compiled dossiers on known and suspected Jacobins. But when they had served their purpose in the prosecution of the suspects, or at least when the Alien and Sedition Acts were repealed, those dossiers were apparently discarded. I find no record of their having been used for any other purpose.

However, as our numbers have increased, as our society has grown more complex, and as we have come to recognize more and more reasons - political, social and economic - why one man may have a "legitimate" interest in the affairs of another, the business of compiling personal dossiers has multiplied. The company that contemplates extending credit to, insuring, or employing John Doe has a "legitimate" interest in knowing something about his ecomonic condition and perhaps some of his other characteristics also. An entire industry has developed in response to this "need." And since it is more "efficient" that a new compilation should not be developed from scratch every time a new need arises, this industry maintains permanent dossiers on each of its subjects. And the final entry, on the death of one subject, becomes only an entry along the way in the dossiers on his heirs.

Because law-enforcement agencies have a "legiti-mate" interest in a variety of information on suspected malefactors, they also compile dossiers. Here again, it is more "efficient" to retain the record permanently, even after the case is closed — and even though it be closed with the conviction of someone else.

"Preventive" Investigation by Government

During World War II and in the ensuing and apparently endless period of the cold war, it has become fashionable to put trust in a variety of prophylactic measures designed to identify potential

criminals before they can commit their intended crimes, and to frustrate them in their supposed intentions. Chief among these efforts are loyalty programs, a bewildering variety of laws defining sedition and other political crimes, and the antics of certain legislative committees. To meet the "legitimate need" of government to protect itself, the same governmental agencies referred to above, and some new ones, have compiled dossiers on the political beliefs, expressions and the associations of all who appear, in the eyes of the compilers, to be "subversive" — in intent if not yet in deed. And it is more "efficient" that these dossiers also should be permanent.

Complete Dossiers by Computer - A Future Threat

But the demands of that most outstanding of American virtues — efficiency — do not end here. If it is efficient for any one compiler to maintain a permanent dossier on each subject, so that he need not start from scratch each time interest in the subject is renewed, it is by the same token inefficient for one compiler to begin from scratch when another compiler already has a file on the subject. Hence, a considerable interchange of data occurs among the compilers — within the generous limits allowed by law, and sometimes beyond those limits.

Even that interchange does not exhaust the demands of efficiency. Technology has provided the computer, an instrument with endless capacity to store data and to regurgitate them at lightning speed. It is, of course, "inefficient" not to use such an instrument to combine the dossiers on a given individual that are accumulated by various private and public compilers: to a considerable extent, that has been done.

Vern Countryman, a professor at Harvard Law School since 1964, was clerk to Justice William O. Douglas (1942-43); assistant and associate professor, Yale Law School (1948-55); and dean, University of New Mexico Law School (1959-64. He has published several books.

If the trend continues, the day will come when the push of a button will produce a complete "data profile" on every citizen, from his departure from the womb (or perhaps several months earlier) to some time after he enters his tomb. I cannot say precisely how far off that day may be, because our information about what goes on right now is far from complete. For the same reason, I cannot be precise about how detailed, or how accurate, the "data profile" will be.

But enough is known, I believe, to indicate that I am right about the trend. And enough is known, I also believe, to indicate that every citizen should be demanding more information about and more protection against this development than he is now disposed to demand. He should be asking more questions and asking them more insistently and at the highest levels.

Some of those in the private sector who compile data on individuals, or who support such compilations, do so for profit. Others do so for the purpose of punishing those with whom they disagree, and still others for more benevolent reasons. We know most about the agencies that gather data for sale because Congress has in recent years concerned itself with their operations; they have been the subject of no less than five separate Congressional hearings, culminating in a new federal statute that was enacted just a few months ago. These commercial agencies fall into two categories: the credit bureau and the so-called "investigatory" reporting agency.

Over 2500 Credit Bureaus Have You Covered

The Commercial Compilers. In a very rough way, the credit bureau is to the individual seeking personal credit what Dun & Bradstreet's reporting service is to a business organization seeking commercial credit. As consumer credit in the United States has burgeoned by more than 2,000 per cent in the past quarter century, so has the business of the credit bureau.

There are approximately 2,500 credit bureaus in the country, of which some 2,100 are members of the major trade association, Associated Credit Bureaus, Inc. The files of the bureaus affiliated with ACB include records on approximately 100 million persons, and those bureaus interchange their information. ACB is also operating under a 1933 antitrust consent decree which requires it to interchange data with the 400 credit bureaus not affiliated with it. In 1968 ACB engaged International Telephone & Telegraph Corporation to provide a computer service to facilitate the interchange.

Credit Data Corporation

The largest credit bureau operation outside the ACB is the Credit Data Corporation, which operates in California, Illinois, Michigan and New York, has files on 27 million persons, is adding files at the rate of half a million a month, and is fully computerized. While there is doubtless some overlap between the 100 million ACB files and the 27 million Credit Data Corporation files, the combined accumulation just about covers the 131 million of us who are older than 18 — particularly since most of the 93 million of us who are married will be combined in some 46 million files with our spouses.

What They Know About You

What sort of information do the credit bureau files contain, and where does it come from? The

content, and its reliability, are pretty well dictated by the three principal sources from which the credit bureaus draw:

- (1) Their own subscribers the merchants, banks and finance companies who buy most of their reports supply to the bureaus such information as they obtain on their own credit customers as to employment, approximate income and credit performance. There are at least three significant limitations on this data: (a) The credit bureau files will not reveal the subject's net worth, or whether he is solvent or insolvent, but only whether or not his accounts with the bureau's subscribers are delinquent. Those who extend credit in reliance on a credit bureau report do so on the simplistic assumption that anyone who is managing to keep up his present payments should be able to assume one more debt. (b) The credit bureau files will not reveal the approximate amount of' the subject's debts, since many creditors are not subscribers. (c) When subscribers report that the subject's account is delinquent they are rarely moved to add, where that is the case, that there is a bona fide dispute over the amount owed (perhaps because a computer has gone awry in the billing procedure, as they all too frequently do) or that there is a dispute over the quality of the merchandise deliv-
- (2) The more enterprising bureaus check officaal records for notices of such things as arrests, lawsuits, judgments, bankruptcies, mortgages, tax liens, marriages, divorces, births and deaths. Here again, there are limitations: the possibility of mistaken identity is substantial, and official records frequently do not disclose the ultimate disposition of such things as arrests, lawsuits, judgments, tax liens and mortgages.
- (3) Most credit bureaus also maintain a news-clipping service with some, this substitutes for checking official records. Obviously, this source contains even more danger of error and omission than does the check of records.

The Fragile Reliability of Credit Ratings

Both Congressmen and the news media, during the Congressional hearings on the subject, focused on the man who is denied credit because of erroneous adverse information in credit bureau files. But, since a case of mistaken identity means not only an incorrect adverse entry in one file but also the omission of a correct adverse entry in another file, and since almost all credit files understate the debts of their subjects, it is obvious that misleading credit bureau reports lead also to some granting of credit which should not have occurred. It is no coincidence that, as consumer credit expanded, so did consumer bankruptcies - from 8,500 in 1946 to 178,000 in 1970. If a creditor were to compare the report he received from the bureau with the debts scheduled by a subject in his bankruptcy proceeding, he might conclude that the report was not worth the 35¢ to 75¢ paid for it. (That is what it costs the subscriber to learn what reposes in the compiler's file at the moment he makes inquiry. If he wants the file brought up to date by calls to other subscribers, he must pay an additional fee.) During hearings held in Washington, D. C. in March 1968, a New York Congressman asked for a demonstration of Credit Data Corporation's high-speed computerized retrieval of his New York City credit file. Within the time consumed by 6 pages of printed hearing record, the report came back — on one bank loan as of June 1967, and nothing else. The Congressman's response: "A very inefficient system, thank God!"

Upon entries of such fragile reliability is your "credit rating" built. And when the credit bureau engages also in debt collection — as many of them do, finding their ability to affect the credit rating an effective collection tool — the reliability of the entries is even further threatened by a built-in conflict of interest.

But, as the credit bureaus themselves are fond of stressing, they collect only facts — if what their subscribers report to them and what they read in the newspapers can be regarded as facts. They do not engage in affirmative investigations of their subjects, save as they may on occasion join with local merchants to sponsor the Welcome Wagon lady, who reports back to the merchants on the apparent worldly needs of the newcomers she visits and to the credit bureau on their apparent worthiness — and on where the newcomer came from, so that his file can be obtained from a credit bureau at his former location.

The "Investigatory" Reporting Agency Is More Thorough

For these reasons, credit bureau files do not satisfy some who contemplate commercial relationships with their customers -- particularly prospective employers and prospective insurers. Such clients turn to the "investigatory" reporting agency. Congressional committees heard from representatives of the country's largest agency of this sort -- Retail Credit Company of Atlanta, with 1,225 offices, 7,000 inspectors, and files on 48 million persons. Retail Credit is not yet computerized.

Inspectors for Retail Credit not only check public records and clip newspapers; they also interview friends, neighbors, former neighbors, acquaintances, employers, former employers, business associates — anyone who may know something, or have an opinion about, the subject. For life insurance companies, Retail Credit inspectors inquire about, among other things, the subject's drinking habits (including the reasons for his drinking), any domestic difficulty, any adverse criticism of "character or morals," and whether his living conditions are crowded or dirty.

For automobile insurers, they will inquire about, among other things, the quality of neighborhood, business reputation, morals and "antagonistic-antisocial conduct." Auto insurers are convinced that there is a correlation between frequency of accident and all of these factors except antagonistic-antisocial conduct, and that both immorality and antagonistic-antisocial conduct would impair the subject's effectiveness as a witness in the event of litigation. The latter consideration, of course, should dictate an inquiry also into harelips, unsightly scars and birthmarks, and the use of deodorants. For employers, Retail Credit will report whether the subject has any "known connection with a 'peace movement' or any other organization of a subversive type," and whether he is reported by others to be "neurotic or psychotic."

But Is It More Reliable?

When Congressional investigators began to worry about the reliability of some of the opinions thus solicited, spokesmen for Retail Credit had two assurances:

(1) Its inspectors are carefully trained persons of "unusual inspection ability." This assurance lost some of its force when inquiry revealed that these highly qualified, well-trained sleuths comman-

ded a starting salary of \$475 to \$500 per month, that they prepared anywhere from two to sixteen reports per day (which Retail Credit sold for from \$4 to \$200 apiece), and that half of them had no more than a high school education and another 30 per cent were college dropouts.

(2) Any adverse information not coming from public records is confirmed from a second source or reported as unconfirmed. Whatever comfort might otherwise be drawn from this assurance is somewhat qualified by evidence that at least one well-trained, highly qualified inspector, who claimed to have been told by two sources that the subject had served a prison term, reported what he had been told as an unqualified fact, although he could find no confirmation in court or prison records.

Who Can Obtain These Reports?

The legislators wanted to know who has access to the files of these commercial compilers. Only "reputable" business organizations, they were told, with a "legitimate" business interest. However, spokesmen for the credit bureaus admitted that there had been instances when an employee of a subscriber to a credit bureau had obtained a report for purposes unrelated to his employer's business, and Retail Credit's spokesman admitted that it sometimes gave out reports as a "favor" -- for example, when an executive of a subscriber asked for information on a man being considered as a new minister for his church.

Moreover, the compilers had been under interrogation by Congressional committees for more than a year when CBS News tried an experiment. Using a fictitious company name, it sent out twenty letters to credit bureaus, requesting reports on named individuals. It received ten reports and offers of two more if it would sign a subscriber's contract. On a second round, the fictitious company sent out twenty-eight letters. This time it did not state that it was considering granting credit — it simply asked for a full report. And this time it asked only about individuals who had been complaining to Congressional committees about the credit bureaus. It received only seven of the requested reports — plus one more when it signed a subscriber's contract.

Fourth Amendment No Bar to Government Investigation

The dossiers of the commercial compilers are available also to the government. This includes not only such governmental credit-granting agencies as the Federal Housing Administration and the Veterans Administration, who buy such reports just as do private subscribers, but also such law-enforcement agencies as the FBI and the Internal Revenue Service. Members of ACB and the Retail Credit Company make their files available to the law enforcers "as a public service." The Credit Data Corporation took a different view, declining to turn over its reports to the IRS. It was then met with a statutory summons calling for "all credit information relative to" named taxpayers. When Credit Data refused to obey the summons, it was served with a judicial order of enforcement pursuant to the statute, requiring it to comply on payment by the IRS of 75¢ per report, the fee which Credit Data oharged its regular subscribers. On appeal, Credit Data won a great victory. The decision was affirmed in all respects save that the case was remanded to determine the "fair value" which IRS must pay for the reports, the rate paid by subscribers not being

taken as conclusive because subscribers supply "valuable credit information" to Credit Data.

This result was not surprising. In a long line of cases, the Supreme Court has sustained judicial enforcement of an administrative agency's statutory subpoenas against Fourth Amendment attack, if the subpoena sought testimony about the affairs of, or the records of, the person subpoenaed; if the subpoena was sufficiently specific to satisfy the Fourth Amendment; if the administrative inquiry was authorized by Congress, and if the evidence sought was relevant to the inquiry — the Court's application of the last two requirements when its enforcement order was sought being held to satisfy the Fourth Amendment's requirement of probable cause.

More than forty-five years ago the Supreme Court also summarily affirmed a decision that no Fourth—Amendment question was even presented when the IRS, investigating the tax liability of a bank depositor, summoned the bank to produce its records. And after the Credit Data case was decided, the Supreme Court unanimously extended that ruling to cover an IRS summons to the taxpayer's employer and, by dictum, to any other third person with no established legal privilege, such as an attorney, where the taxpayer has "no proprietary interest of any kind" in the records subpoenaed. The Fourth Amendment, therefore, offers no discernible protection to the subject whose file in a credit bureau is subjected to an administrative subpoena or summons of a governmental agency showing a "legitimate" interest in its contents.

No Legal Recourse Against Commercial Compilers

No matter who else may see the file, however, the commercial compilers are uniformly steadfast on one point — the subject himself must never see it. Three reasons are given, one laughable and two believable. First, if the subject ever got his hands on the file, even in the compiler's office, he might destroy it. Second, to let the subject see the file would be to reveal the compiler's sources and would tend to "dry up" those sources. Third, if the "file" consists of a computer printout, the subject wouldn't be able to understand it. Doubtless the second reason should be expanded to say that nondisclosure of the files protects not only the compiler's sources but also the compiler himself, from trouble, including litigation, with the subject.

As a result, many subjects have not known, when they were denied credit, or a job, or insurance coverage, that the denial might have been caused by an adverse report from a commercial compiler. The subject who did learn of that fact, and who believed that the adverse report was erroneous, seldom obtained legal relief. If he sued on a theory of defamation or interference with economic expectations, he encountered a qualified privilege, based on the subscriber's "legitimate" interest in his affairs, which protected the compiler who was not guilty of gross negligence or malice.

If he resorted, instead, to an action for invasion of his common-law right of privacy he confronted, first, the fact that the famous law review article by Warren and Brandeis which launched that right in American jurisprudence was concerned only with the publicizing, albeit accurately, of private matters (not matters of public record) in the news media. If he persuaded the Court that the concept of a right of privacy had now developed to the point where it protects against offensive intrusion into his private affairs regardless of publicity, he might again have found that his protection against

intrusion was qualified by the "legitimate" interest of the user of the files.

The Fair Credit Reporting Act of 1970

As previously noted, Congressional investigators were impressed by the plight of those whose dossiers were compiled -- at least where the dossiers contained erroneous adverse information. The compilers detected that they were impressed and decided that they could not fight the move for reform and had better join it. The result was the Fair Credit Reporting Act of 1970.

This act, applicable both to credit bureaus and to "investigatory" reporting agencies, attempts to guard against inaccurate or stale information in the reports and to restrict their use by providing that:

The compilers must maintain "reasonable procedures" to eliminate from their reports bankruptcies after fourteen years and other adverse information after seven years.

The compilers must keep their public record entries in employment reports up to date to the extent that the public records are up to date, and the investigatory agencies must confirm their adverse interview information at least three months before reporting it.

Users of investigatory reports must notify the subject that such a report is being made; users of credit or investigatory reports must advise the subject whenever credit, insurance or employment is denied "wholly or partly because of" the report and must identify the reporting agency; and compilers reporting adverse public record information for employment purposes must advise the subject of that fact.

Any compiler, on request of a subject, must disclose to him the "nature and substance" of the information on him in its files (but not the file itself); credit bureau compilers must disclose also the sources of their data; and all compilers must reinvestigate any item which the subject disputes and, if it does not correct the item, include in future reports his statement of not more than 100 words describing the dispute -- unless the compiler has "reasonable grounds to believe" the statement is "frivolous or irrelevant."

The compilers must maintain "reasonable procedures" to confine the furnishing of their reports, without written consent of the subject, to those who have "a legitimate business need" for them.

Compilers must not, without written consent of the subject, furnish to a governmental agency more than name, address and place of employment of a subject, except in connection with licensing, governmental grants or other business transactions where government has a "legitimate business need" -- and except in response to court order.

No Limitations on Contents

The Act also authorizes damage actions when there is negligence in failing to comply with the Act, punitive damages for willful noncompliance with the Act, and administrative enforcement by the FTC. It immunizes compilers and their sources of information from any other liability save for false information "furnished with malice or willful intent to injure" the subject. And it imposes crimitary is negligible.

nal penalties for officers or employees of compilers who "knowingly and willfully" make unauthorized disclosures of information and for any person who "knowingly and willfully" obtains such information "under false pretenses."

The entire reach of the Act -- about which I will have more to say later -- is to accuracy of and access to the reports. No attempt is made to limit their contents. The report to which the Act applies, whether issued by a credit bureau or an "investigatory" agency, is defined to mean any communication bearing, not only on credit but on "character, general reputation, personal characteristics, or mode of living."

The Punitive Compilers

There has been, so far as I can discover, no official investigation of private compilers who assemble dossiers for the purpose of punishing those with whom they disagree. From what I have been able to learn and observe of these compilers over a quarter of a century, they are sponsored and staffed by right-wing extremists. This is not to say that right-wing extremists are less restrained by scruples than left-wing extremists. The much simpler explanation is that official investigations of extremist groups have, with rare exceptions, been aimed at those on the Left end of the political spectrum -- although they tend to hit anyone to the Left of the right-wing extremists. There are two corollaries to this fact: first, private punitive compilers rely for information almost entirely upon official investigations, and there is not enough information available to compile dossiers on rightwing extremists. Second, in the absence of official investigations to whet public interest, there would be no substantial market for dossiers on right-wing extremists if they could be compiled.

Some of the punitive compilers attempt to operate for profit. One such is American Business Consultants, organized by three former FBI agents, which operated effectively, if not at great profit, during the heyday of Sen. Joseph McCarthy. It published the newsletter Counterattack, which provided dossiers on those deemed not sufficiently anti-Communist, with special emphasis on the news media, writers and publishers, and Red Channels, which focused on those thought similarly deficient in the entertainment business. Other compilers, such as the Americanism committees of some American Legion posts, are motivated by their version of patriotism. Still a third group, which includes the John Birch Society and Aware, Inc., which also flourished in the entertainment industry during McCarthy's reign, profess patriotism.

The punitive compilers' principal aim is to cost the subject his employment. Since their dossiers are neither solicited, nor in many cases even wanted, by the subject's employer, they are not well situated to invoke the "legitimate" needs of the employer as a justification in either a defamation or a privacy action. Offsetting their apparent legal vulnerability, however, is the fact that most, if not all, of them are either completely judgment proof or incapable of responding in damages for the full injury they have caused.

Financial Irresponsibility: No Damages for Damage Done

Both of these facts were dramatically demonstrated by a distinguished and courageous graduate of

the University of Texas, John Henry Faulk, who lost his position with CBS in 1956 when Aware, Inc. published his dossier -- largely based on erroneous information in the files of the House Un-American Activities Committee. In part, also, Mr. Faulk was dismissed because of an advertising boycott that was organized by the owner of a chain of grocery supermarkets after the Aware bulletin was published. Faulk sued Aware, one of its employees and the supermarket owner for libel, realizing that Aware and its employee were not capable of responding in damages in any significant amount.

After a trial in which the court ruled that the defense of qualified privilege was not available and that defendants had failed to prove the defense of truth, the jury returned a verdict for \$3.5 million -- of which \$1 million was actual damages against Aware, its employee and the supermarket owner; \$1.25 million was punitive damages against Aware, and \$1.25 million was punitive damages against its employee. There was no award of punitive damages against the supermarket owner because he died shortly before the case went to the jury. The judgment against him was settled with his disappointingly small estate for \$175,000. After an appeal by the surviving defendants, during which they were castigated as "malicious" and "vicious" purveyors of libel, the judgment was reduced to \$450,000 against Aware and \$100,000 against its employee, no part of which was collectible. No private remedy, even for false reports, will avail the victims of punitive compilers who are as irresponsible financially as they are otherwise.

The Benevolent Compilers

Many who compile personal dossiers, or who support their compilation, have no interest in the individual subjects. They are interested in groups. In this category of data collectors are government officials and business executives, who seek to make informed decisions and plans, and scholars (particularly social scientists), who would promote understanding and aid decision making and planning. But though they are interested in groups, most of the information about groups must come from, and relate to, individuals.

At first blush it might seem that such information could be obtained and compiled without preserving a record of individual identity. Unfortunately, some key to the identity of the subjects must be retained if group compilations are to be kept up to date and if they are to be adapted for uses not contemplated at the time of their original accumulation. And as long as keys to the identity of those in the group are retained, these compilations are a potential source of personal dossiers, either because they fall into unauthorized hands or because the policy of the compilers changes.

Many of those who use group compilations are so single-mindedly devoted to their own purposes as to be heedless of this danger. Thus, a committee of the Social Science Research Council proposed in 1965 that the Bureau of the Budget establish a Federal Data Center to collect and computerize all machine readable data from all federal agencies, for use by the government and by individual scholars. The report was eloquent on the "efficiency" of such an operation, but took account of the threat to individual privacy only to the extent of suggesting that where a government agency had obtained data under a pledge of confidentiality, "it is of-

ten possible to disguise the information in such a way that specific data cannot be traced to any individual respondent." The bureau referred the recommendation for review to a research analyst employed by Resources for the Future, Inc., a private foundation. He endorsed the proposal in a report much concerned with organizational and operational problems which did not even mention problems of privacy. The bureau next created a task force, consisting of one statistician and five academicians, to consider the problem. The task force also endorsed the proposed National Data Center, but its report took account of hearings on the subject wherein Congressmen had shown themselves considerably alarmed by the danger to privacy. The task force viewed this criticism rather lightly, however, since it thought that Congress could define an enforceable standard for access to the data in the center, and that the technical possibility that the federal computers might themselves be tapped by other technological means could be met by unspecified "organizational and technical means ... available to control and limit the risks."

The Pursuit of Knowledge vs. Privacy

I shall have more to say about the National Data Center concept later; here I want to add an illustration from my own experience of the scholar's insensitivity to problems of privacy when his thirst for knowledge is aroused. Early in 1969, a private foundation sent out to graduate students in colleges and universities a questionnaire asking their opinions on a variety of subjects ranging, if I remember correctly, from drug use to forcible overthrow of the government. Since the respondents were to sign these questionnaires, one graduate student phoned me to ask if there was any danger, despite the foundation's assurance of confidentiality, that his replies might come into the hands of a government agency. I advised him that, in my judgment, the foundation would have no defense to an administrative or legislative subpoena. Apparently in order to spread this valuable legal advice to other graduate students, the man to whom I talked reported it to the $\underline{\text{Harvard Crimson}}$ which printed it.

I thereupon received a long letter of admonishment from a Harvard professor of government. First, he explained that he had nothing to do with the particular questionnaire, but assured me, on the basis of his thirty-five years of experience, that it was "typical of those used by both academic and commercial pollsters." Second, he explained to me -along lines similar to those given above -- why the identity of those polled must be preserved. Third, he expressed doubt that any government agency would seek to obtain the information. Fourth, though he was not a lwayer, he ventured the opinion that the courts would very likely create some sort of privilege to block a government subpoena. Fifth, he pointed out that advice such as mine might well reduce the number of responses to the questionnaire. Finally, he urged me to "reconsider" and to "issue another statement on the issue." I declined his invitation on the grounds that I thought my legal advice better than his and that I thought the students were entitled to have that advice so that they, rather than he, I, or the foundation, could do their own speculating about the likelihood of a government subpoena.

Not all group compilers are insensitive to the privacy problem but, even when they are aware of the danger, there is not much they can do to forestall it -- once they have amassed their compilations -- beyond attempting to guard the identity of

their subjects and hoping that their successors in control of the compilation will be similarly scrupulous.

Identifying the Subjects — a Real Danger

The reality of the danger is made vivid by the steps taken by the United Planning Organization of Washington, D.C., a private organization devoted to combating poverty. In the course of its work, UPO has found it useful to compile data from public records on such matters as juvenile arrests, school dropouts, evictions and welfare payments. To guard the identity of its subjects, UPO transferred all its data to a trustee under an irrevocable trust, with strictures which permit UPO to have continued access to it only as long as it does not reveal the identity of its subjects. Under the terms of the trust, UPO apparently will indeed lose access to the data if it changes its policy and identifies its subjects, or, possibly, if one of its officers or employees makes an unauthorized disclosure. But. by that time, personal dossiers on all of its subjects may be in someone else's computer.

Publicly Compiled Dossiers and Their Sources

If our information on private compilers of dossiers is incomplete, our information on governmental compilers is fragmentary. Most of what we do know comes from disclosures made by the news media and from sporadic hearings conducted by a Senate subcommittee between 1960 and 1967. Some additional information emerged from hearings in early 1971 before another Senate subcommittee.

In some instances the government can compel a subject to provide information about himself. Obvious examples are the tax and census returns, of which more later. However, most governmental compilers rely for most of their information on the technique used by the Retail Credit Company of Atlanta -- they interview neighbors, associates and acquaintances of the subject. The investigators are better paid, and one hopes better qualified and better trained, than Retail Credit's inspectors, but the superiority may not be enough to inspire great confidence in the objectivity of their results. Most of us in academic life are familiar with the FBI agent and the military investigator who come to inquire about former students seeking government employment or a military commission. Most would agree, I believe, that there is no faster way to get the visitor out of the office than to make clear that you have nothing derogatory to say about the subject. And I can testify that the visitor will depart almost as rapidly if, in a case where you have something to say that might conceivably be considered derogatory, you tell the investigator you want your secretary to take down your statement so that you can send a copy to the subiect.

Wire Tapping

Governmental compilers have another source of information disclaimed by Retail Credit, whose representatives emphatically and repeatedly denied that it ever resorted to wire tapping or bugging. Governmental compilers resort to both. Because of what it reveals, both as to their attitudes about individual privacy and as to the feasibility of legislative efforts to protect privacy, it will be instructive to survey briefly the history of their use of these devices. (See also "Thirty Years of Wire Tapping" by Athan G. Theoharis, The Nation, June 14, 1971).

In 1928 the Supreme Court held that government wire tapping did not violate the Fourth Amendment. In the Communications Act of 1934 Congress made it a crime for anyone, without authority of the sender, willfully to intercept any communication by wire or radio and to divulge the contents of the intercepted communication to any other person. Thereafter, the Court held that, because a wire tap was illegal, evidence so obtained, including the "fruit of the poisonous tree," was inadmissible in federal courts.

Despite the explicit finding that federal agents commit a federal crime when they tap telephones, the FBI continued the practice, which it had begun in 1931, until March 1940, when Attorney General Jackson ordered it stopped. In May 1940, however, President Roosevelt issued a secret directive, whose existence was not made public until after his death, ordering wire tapping resumed for "persons suspected of subversive activities against the Government of the United States, including suspected spies." Thereafter, Attorney General Biddle in 1941 announced that the Department of Justice intended to use wire tapping in "espionage, sabotage, and kidnapping cases when the circumstances warranted," and President Truman in 1947 approved a proposal by Atty. Gen. Tom Clark that wire tapping be used "in cases vitally affecting the domestic security, or where human life is in jeopardy." In 1964 President Johnson issued a directive forbidding wire tapping by federal agents, except in national security cases. And in 1965 Attorney General Katzenbach testified that, "Under present law, [wire tapping] should be permitted only where national security is involved" and acknowledged that the department had sixty-two wire taps then in effect "under my specif-ic direction." In 1967 Atty. Gen. Ramsey Clark issued a memorandum requiring prior written approval from the Attorney General for any federal wire tap or electronic bugging save in "national security' cases which "shall continue to be taken up directly with the Attorney General in the light of existing stringent restrictions.'

Violating the Communications Act

Since the Communications Act contains no exceptions, it is evident that the Department of Justice has been violating that Act for most of the time since its enactment. From time to time spokesmen for the department have argued that the contents of wire taps are not "divulged" -- and hence the Communications Act is not violated -- when they are merely communicated from one federal agent to another, but this proposition has never been tested in the courts. The Department of Justice has never seen fit to prosecute an FBI agent or any other federal agent for violation of the Communications Act, even in cases where convictions have been reversed because the contents of wire taps were divulged in court.

The practice of electronic bugging was governed by a series of decisions beginning in 1942 which held that the Fourth Amendment was not violated by the interception of communications by means of detectaphones or informers wired for sound, as long as the interception was accomplished without a physical trespass on defendant's premises.

Hoover's Version of "Approval in Writing"

Regardless of the state of the law or of the current content of executive directives, FBI Director Hoover has annually since 1965 assured the House Appropriations Committee that every wire tap under-

taken by the FBI has been "approved in advance and in writing by the Attorney General," and that all taps were limited to "national security" or "internal security" cases. But less than two months after Hoover gave that testmony in 1969, an FBI agent testified, during the trial of Cassius Clay under the Selective Service Act, that the FBI had tapped the wires of Martin Luther King, Jr. for four years before his death in 1968. Hoover then produced his version of an "approval in writing in advance by the Attorney General" -- a memorandum written by one of Hoover's own subordinates, reciting that in 1963 Atty. Gen. Robert Kennedy, now also deceased, had inquired "if it was feasible to use electronic devices" to check into allegations that Dr. King "had Marxist leanings." The House Appropriations Committee found no reason to question Hoover's credibility when he appeared before it the following year and again testified that "all" wire taps "were authorized in advance in writing by the Attorney General."

Court vs. Congress on Legal Limits

Meanwhile, both constitutional and statutory requirements applicable to wire tapping and electronic bugging had changed. In 1967 the Court in Berger v. New York invalidated a New York statute authorizing electronic bugging with prior court approval, in a case where physical trespass was involved, because the statute did not satisfy the Fourth Amendment's requirements of specificity as to the crime involved or the conversations to be overheard. Later in the same year, in Katz v. United States, the Court concluded that the Fourth Amendment applied to both wire tapping and electronic bugging, regardless of physical trespass, thus requiring prior court approval for employment of either device under a procedure which would satisfy the specificity requirements of Berger.

In the Omnibus Crime Control and Safe Streets Act of 1968 Congress amended the Communications Act of 1934 so that its prohibition of interception and divulgence of communications is confined to radio communications, and established a procedure for judicial approval of wire tapping and electronic bugging which arguably does not meet the requirements of the Berger case.

That \mbox{Act} also contains the following remarkable provision:

Nothing contained in this chapter or in section 605 of the Communications Act of 1934 ... shall limit the constitutional power of the President to take such measures as he deems necessary to protect the nation against actual or potential attack or other hostile acts of a foreign power, to obtain foreign intelligence information deemed essential to the security of the United States, or to protect national security information against foreign intelligence activities. Nor shall anything contained in this chapter be deemed to limit the constitutional power of the President to take such measures as he deems necessary to protect the United States against the overthrow of the Government by force or other unlawful means or against any clear and present danger to the structure or existence of the Government. The contents of any wire or oral communication intercepted by authority of the President in the exercise of the foregoing powers may be received in evidence in any trial hearing, or other proceeding only where such interception was reasonable, and shall not be otherwise used or disclosed except as necessary to implement that power.

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BUILDING YOUR OWN COMPUTER Part II

Stephen Barrat Gray Amateur Computer Society 260 Noroton Ave. Darien, Conn. 06820

"... I am against the idea of a commercially prepared computer kit. By placing a kit of this type on the market, amateur computer builders would not have any major problems, and few new ideas would result. ... If amateur radio gear were not produced commercially, we would not have as many hams, but those hams together would make more contributions than all of the hams make today."

Part One of this article, which appeared in the December issue, discussed the difficulties facing an amateur who wants to build his own computer. These include, among others, the limitations of existing books on computer schematics and the availability and adaptation of parts. As a result, 110 men joined together to form the Amateur Computer Society in response to the author's suggestion that they share information. The Society's survey of its members revealed the most common features of their models and showed that the average cost "so far" for a home-built computer was \$650 and that most members had spent two years on their project.

Members Report on Their Plans

In their letters, the members of the Amateur Computer Society report on a wide variety of plans for hardware and software. For example, several design and etch their own printed-circuit cards, while others make their cards from Vector boards.

One member, while a Harvard sophomore, wrote this:

If core is used, one can kill two birds with one stone by using the selection matrix decoder as the instruction interpretation decoder; if the memory selection decoder were for a 4K (12 x 12) memory plane, then one 12-bit decoder could be used to hold the op code, while the other could generate the timing signals.

Stephen Wiebking, a first lieutenant now attending the Air Force Institute of Technology in Fairborn, Ohio, is one of the members who haven't started building their computers, but are in the planning or collecting stages. He writes:

I have done very little actual design work on a machine so far, since I am still in the parts collecting stage. So far, I have managed to collect several thousand ICs, which I am in the process of identifying and testing, and about $1-1/2 \times 10^{**}6$ bits of core frames.

Steve has arranged with several semiconductor manufacturers to buy their reject-but-usable integrated circuits, if there is enough interest among

ACS members to enable him to buy in large quantities and thus at low prices.

"Memory" for Cerebral Meningitis Victim

An ACS member in California has an unusual reason for wanting to build a computer. Some years ago he had cerebral meningitis. Among other effects, the accompanying fever damaged his memory considerably, both in the ability to remember things, and the memories that were already in it, back to when he was eleven. At first he couldn't remember the fact that he couldn't remember things. First he kept a journal of his activities, and copies of every letter and order he wrote. This worked for ten years, but the problem of finding anything in the mountain of paperwork made him look for another solution. He hopes to put all the things to be remembered on magnetic tape, and let a computer keep track of it. His trouble in building a computer is that any suitable machine is so complex that while he concentrates on what's going on in one area, the activity elsewhere escapes him. So he has to depend, much more than most people, on circuit diagrams. But these are usually so large that he gets lost in the pages and pages of circuitry. He notes:

However, it seems possible that the type of limited-scope, single-purpose computer I have in mind might be encompassed in only a few drawings that I could eventually comprehend.

Completed Computers

Only two of those surveyed reported being anywhere near completion of their computers.

Jim Sutherland, now a Fellow engineer with Westinghouse in Pittsburgh, noted that his ECHO-4 took a year to build, and would require ten years to program. ECHO-4 is seven feet long, one and a half feet deep, and six feet high. The central processor is complete, but, as with all amateur computers, the input/output system is still growing. ECHO-4 uses 2N4O4 transistors and RTL (resistor-transistor logic) NOR logic elements. The NOR gates were originally used in process-control systems built by Westinghouse a dozen years ago, and had been declared scrap. The gates were mounted on etched circuit boards, with 35-pin connectors. A total of 120 boards was used in the entire system, but only 16 types of boards were used, so "spare boards do not take up much room."

The memory unit, an Ampex 4096-RQ-30A, came from an obsolete process-control computer. Memory cycle time is six microseconds, but since the NOR gates require from one to three microseconds to switch, the add time is pushed down to 216 microseconds.

ECHO-4 has four flip-flop registers, and three registers in core memory. There are 8.192 words of 15-bit core memory; clock speed is 160 KHz, and there are 18 instructions.

Input is by six alphanumeric control keyboards, 8-channel paper tape reader, 15 interrupts, and 75 contact closures. Output includes two printers, 60 contact closures, 8-channel paper tape punch, and four digital clocks. Interconnections are wirewrapped.

Another Completed Computer

Hans Ellenburger, a Swiss member, worked a year on his computer, and finished it in 1965. A small desk-top machine, looking something like the electronic desk calculators now available, the EL-65 had a separate keyboard for input, and Nixie-tube readout.

A serial-type computer, EL-65 had three registers, 30 words in flip-flip memory, and 15 instructions. Certainly a minimal computer, but within the ACS definition. According to the January 1968 ACS Newsletter:

The cost of materials alone was 1500 Swiss francs, which is about \$345. Hans tried to market his computer, calling it "der erste Schweizer Pult-Elektronenrechner," meaning the first Swiss desk-top electronic calculator. But the sales price of 6,000 SF (\$1,380) seems to have put it beyond the means of most Swiss and also it may have been too much of a novelty on the market. As Hans notes, "It seems almost impossible for an amateur to build a computer that can compete with commercial machines. The amateur who can do that would be, before long, employed by a computer company."

When last heard from, Hans was working on a new model, with 16 registers, using Philips LTC cores.

Help From the Members

One of the helpful articles sent in by an ACS member was "What to do with cores of unknown origin," by Sal Zuccaro, who has been designing memories for a dozen years or more, has patents in core-diode logic, and is now a Research Scientist with Teledyne Systems in California. Sal devised a simple set-up using a bidirectional constant-current source, with a method that could take readings on a core in or out of a matrix.

There are many small areas of computer design and construction that the amateur does not recognize as important, or is not skilled enough to handle. A simple problem for the professional designer is RC decoupling filters. For the amateurs, Louis Frenzel, who lives in Maryland and is Assistant Director of Education at the National Radio Institute, wrote several hundred words on these filters, when and where to use them, and what component values are required. His good advice includes:

In some systems the 100-mfd capacitor (shunted by a 0.01 to 0.1 disk) just isn't needed. The only way to find out is to experiment. Take a scope and look across your ground buss between the power supply terminal (scope ground) and a ground point in the system. You will probably see a lot of high-frequency junk here. Experiment by connecting capacitors at the point under observation and notice any change. Use the smallest capacitor that best minimizes the noise. A 0.1-mfd disk fixed my problem in a recent design.

A Computer Kit?

The April 1967 ACS Newsletter proposed a Standard Amateur Computer Kit, with the acronym of SACK. As expected, comments on SACK were a mixed bag. Don Fronek, now an instructor at the University of Idaho, commented, in part:

A standard computer should have:

- Plug-in cards (can buy ready-made cards, or cards without components).
- Frame construction with card receptacles (allows the builder to locate his circuits as he wants them).
- 3. Power supplies to fit within the frame.
- Universal front panel (pre-punched holes -when using the kit-builder's approach).
- Input/output (plugs should be available at rear for additional or special outputs).

I find that two things are the most important: (1) printed-circuit boards and (2) frame chassis mounting hardware. With little exception, the rest of the machine can be expanded in bits and pieces.

I would also use solderless connectors, in all the wiring between receptacles. I find that I am continuously changing circuits. With close pin spacing, a soldered connection gets very messy even when you are trying to keep things neat. The wires get burned, the solder slops over onto the adjacent pin, and on and on. This means added cost, but I'll have to vote for solderless connectors.

Jim Haynes, a development engineer at a university computer center in California, noted:

Seems to be that the essential problem is trying to decide what you want to do with what you have. I guess memory is the pacing item. Anybody who goes in for core, even small core, is talking about money. Depending on the supply of delay lines, that is probably the way to go for a cheap machine

Without some storage, there's little point in building up the instruction execution logic. And I would really hate to see the thing get mixed up in a formalized educational setup, because then a lot of professional education marketers would get into the act, and the price would go skyhigh.

An ACS member who was a high-school member when he joined the ACS, and is now with a California engineering consulting firm, wrote: I must say that I am against the idea of SACK. By placing a kit of this type on the market, amateur computer builders would not have any major problems, and very few new ideas would result. Amateur radio is a good case in point. Today most of the gear in use is not home-brew, but manufactured to commercial standards. This is great for the hams who don't know how to build, but what is the purpose of amateur radio? The FCC thinks that the U.S. hams should increase radio technology. This is being done, but not to the extent that it could be. If amateur radio gear was not produced commercially, we would not have as many hams, but those hams would make more contributions than all of the hams make today. I might add that I am also a radio amateur (WB6UHM).

Several ACS members are working independently on the idea of a computer kit. One is "seriously dabbling with the idea of a PDP-8/S kit, since the logic for the machine is rather simple." Another is trying to build a small prototype of his computer kit, and hopes to keep the number of registers down to a minimum. He says that with the right backing, he would consider producing the kit commercially. However, that kind of money is scarce.

Critique

Very few good letters of constructive criticism are received by most publications. Here is part of the best one yet received, from a Long Island reader of the ACS Newsletter:

Let me preface my remarks by stating that I can't help getting the impression that many members are having considerable trouble with their machines mainly because they don't seem to be aware of the huge work effort involved. Commercial computer manufacturers expend tens of thousands of manhours designing their products, and with all their engineering talent, computer aided design, etc., they still have problems! I think that for anyone without advanced technical training, knowledge about (or even access to) computers and programming, designing a computer may prove impossible altogether.

This leaves, in order of decreasing difficulty: improving on the design of an existing computer, copying an existing computer, or depending on some type of computer kit. I also think that, in general, members ought to concentrate more on technique, organization and planning, instead of diddling around a flip-flop at a time and considering the soldering of an IC into a circuit a "real" accomplishment as far as the progress of their machine is concerned. A computer is considerably more than the sum of all its hardware. Getting a particular shift register to function is not the major stumbling block; integrating the system is the problem. Now for some more specific comment.

In the past issues of the Newsletter, some rather ingenious instruction sets have been devised which either simplify hardware, decoding, or subsequent programming. It should be borne in mind, however, that the use of an instruction set which is already implemented on a commercial machine means a great reduction in problems with software, which would then be readily available. Remember that commercial

manufacturers also look for instruction sets which tend to optimize both hardware and software, and many machines have instructions worth copying. If you've never written an assembler or Fortran compiler, don't just laugh it off as an easy project; it may well take you longer than to build the machine itself. Coming up with a new, unique instruction set may be a thrilling idea, but getting someone else's instruction set to function with your hardware is no small feat either.

The report on the PDP-8 in issue #10 of the Newsletter was most informative. As to the feasibility of a PDP-8 kit, you laughed off the possibility of having to do the backpanel wiring yourself as being an invitation to insanity. It seems to me that this is what amateur computer building is all about: the wiring and the insanity.

Renewal Time for the Newsletter

Eight issues had been promised to the ACS members; there was enough money to print eleven. The eleventh noted that the money had finally run out, and asked for another \$3 for a new subscription.

As any publisher knows, subscription renewal time is the moment of truth for a periodical. No matter how many subscribers, if not enough renew, all is lost. Three months passed before enough money was received to guarantee publication of at least eight issues of Volume II of the ACS Newsletter.

As of this writing, over 70 members have renewed their subscriptions. As expected, most of the overseas members dropped out. They had written earlier about the scarcity of surplus or used computer components, and the high prices of transistors and integrated circuits. Most of the Canadians renewed.

AMATEUR DIGITAL SOCIETY?

Of the six magazines that printed the original ACS letter, only one had space for the last paragraph:

If there is enough interest in a lowerlevel group, it may be possible to form an "Amateur Computer Logic Society," for those interested in constructing logic circuits and simple computers.

The letter to the first five publications had said:

To limit the membership to the really serious, the ACS is open only to those who are building or operating a homemade computer that can at least perform automatic multiplication and division.

Although the definition for the required computer was changed to that described in the opening letter, because an ACS member pointed out that some fairly complex computers cannot perform automatic multiplication and division, the line was still drawn at the "really serious." This was done to maintain the ACS as a high-level organization, simply because I didn't have time to answer the interminable questions that would have been sent in, were the level lowered to "anybody interested in

(Please turn to page 40)



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THE CHECKERBOARDING PROBLEM

Tactical Air Command Langley Air Force Base, Virginia

Computer experts said it couldn't be done, but two young Air Force computer programmers at Tactical Air Command (TAC) headquarters, Langley Air Force Base, Virginia, refused to believe it, and set out to prove otherwise.

Efficient Computer Creating Problems

Staff Sergeants James D. Kennedy, 25 of Leavenworth, Kan., and Joseph E. Sperber, 24, of Dumont, N.J., were helping to set up a newly authorized computer system at TAC bases throughout the U.S. late in 1969 when they discovered that the computer, a Burroughs 3500, was so efficient it was creating problems for itself.

Their solution was to design a set of instructions, or "program", even though many experts said it could not be done.

The B-3500, a third generation system, used by the Tactical Air Command, possesses a disk storage capacity of up to 500 million characters and the ability to handle 10 jobs at the same time. It has a master control program which performs repetitive processing functions such as placing data on the disks, or the "assignment" of disk "files".

Problem of Loss of Control

This process saves numerous man-hours at each base, but it creates the problem of loss of control over disk storage, a control which is necessary if the overall system is to operate at maximum capacity and economy.

"Checkerboarded" Syndrome

As the computer, officially designated the Base Level Standard Air Force Phase II Computer System, removes data which is not needed, it leaves unused space. Over a period of time, a disk becomes "checkerboarded" with random spaces which could be used for storing information.

"The available space on each disk gets to be quite significant," Sergeant Kennedy explained recently, "but the computer can only use those individual areas which are large enough to accommodate the various data segments to be stored."

Cumbersome, Expensive Process

Eliminating the wasted space caused by "checker-boarding" was a cumbersome process involving several data transfers. Computer programmers had to rearrange the stored material so that the unused spaces formed a continuous segment large enough for the computer to assign new data.

This manipulation was usually necessary about two or three times a week for each of the 16 to 20 disks at each base, and required up to an hour and a half each time. Some bases required a complete reloading of the entire system each week, at the cost of an additional two to four hours. The process is doubly expensive because of the man-hours involved and because of the normal production time lost while a disk or the system is being reworked.

They Said "Checkerboarding" Couldn't be Solved

Various computer experts had known about "checker-boarding" for some time, but said the problem could not be solved.

In between their work with TAC's conversion team, Sergeants Kennedy and Sperber set out independently to devise a program to reduce the time lost to "checkerboarding". They discovered their mutual interest in July 1969, when they were assigned to the same conversion team at Luke AFB, Arizona.

Beating the "Checkerboarding" Problem

By March of last year, TAC's conversion program had reached the stage that the two men could be taken off the various base teams and returned to the Data Automation Center at TAC Headquarters. They were to work full time to find a way to beat the "checkerboard".

It was no accident that they accomplished their mission. Both men came to TAC with impressive credentials. Sergeant Sperber's association with computers began in high school and continued with course work at Purdue University, Lafayette, Ind. Sergeant Kennedy's background included a bachelor of science degree in mechanical engineering from the University of Kansas, Lawrence, Kan., and a fulltime job as systems analyst at the computer center there.

Both men by-passed the intensive eight-week computer course that the Air Force ordinarily requires of its computer programmers. Both hold Certificates of Data Processing, an accreditation with the Data Processing Management Association of the U.S., which is similar to the accreditation for a Certified Public Accountant.

They Accomplished the "Impossible"

A self-imposed workday of 15-18 hours had become commonplace for the two sergeants while working with the TAC conversion teams. This type of perseverance, coupled with the attitude that "there's nothing that can't be done", paid off early last summer when they accomplished the "impossible". They developed a program that reworks storage disks and wipes out the "checkerboard" in a matter of minutes, as opposed to several hours required by the old transfer and manipulation process.

"Obviously, all the knowledge wasn't available to us," Sergeant Sperber commented recently. "We just had to find it, and that involved a lot of experimentation."

"We borrowed a lot of techniques from some unlikely sources," Sergeant Kennedy added. "When we put them together, we discovered quite a bit about the capability of the Phase II computer. We could do one thing here, if we could get something else to work in another place. Every time we tried something, even when we failed, we were closer to the solution."

In June, the finished program was mailed on magnetic tape to each TAC base that had completed conversion to the Phase II system. However, as Sergeant Sperber put it, "Initial response at the base level was rather disappointing. They didn't seem to grasp the full significance of the program."

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JIM GARRISON, DISTRICT ATTORNEY, ORLEANS PAR-ISH, VS. THE FEDERAL GOVERNMENT, by Bernard Fensterwald, Attorney, Executive Director, National Committee to Investigate Assassinations (Aug. 71, p. 37)

THE FEDERAL BUREAU OF INVESTIGATION AND THE ASSASSINATION OF PRESIDENT KENNEDY, by Bernard Fensterwald, Jr., Attorney (Sept. 71,

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THE ASSASSINATION OF PRESIDENT KENNEDY: THE PATTERN OF COUP D'ETAT AND PUBLIC DECEPTION hy Edmund C. Berkeley, Editor, Computers and Automation (Nov. 71, p. 24)

THE ASSASSINATION OF PRESIDENT JOHN F. KEN-NEDY: A MODEL FOR EXPLANATION, by Vincent J. Salandria, Attorney (Dec. 71, p. 32)

The Most Important of All Branches of Knowledge

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

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

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

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

Examples, Understanding, and Computers / December 1964

The Barrels and the Elephant: Crackpot vs. Pioneer / May 1965

Some Questions of Semantics / August 1965 Perspective / April 1966

Computers and Scientific Models / May 1967

New Ideas that Organize Information / December 1967

How to Spoil One's Mind — As Well as One's Computer / August 1968

The Catching of Errors by Inspection / September 1968

Tunnel Vision / January 1969

The Cult of the Expert / May 1969

Computers, Language, and Reality / March 1970

Computers and Truth / August 1970

The Number of Answers to a Question/March 1971 In the editorial "The Cult of the Expert" we offered a leaflet that belongs in this subject, "Right Answers — A Short Guide for Obtaining Them". More than 600 readers asked for a copy; so clearly this subject is interesting to the readers of C&A.

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

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

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

Input – in the selection and acceptance of the data with which they begin;

Processing – in the processing through a system;
 Output – in the interpretation and use of the answers.

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

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

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

All major cities on the planet are only a few hours apart by jet plane.

Millions upon millions of people who otherwise would be dead are alive because of miracle drugs, — thus creating a population explosion;

Nuclear weapons if used can destroy mankind and civilization in a few hours; etc.

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

The staff of "Computers and Automation" have decided that it is desirable to make the drawers full of information we have been collecting on this subject more accessible and more widely distributed. We have decided to publish twice a month a publication of newsletter type called "The C&A Notebook on Common Sense, Elementary and Advanced". For more details, see the announcement on page 2. (The first few issues of the Notebook are free.)

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

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

Edmund C. Berbeley
EDITOR

"THE PROMOTION OF DOMESTIC DISCORD"

Vincent J. Salandria, Attorney Philadelphia, Pa.

(Based on the last portion of an address at the conference of the New England Branch of the Women's International League for Peace and Freedom, October 23, 1971; published at the request of the author.)

In the article "The Assassination of President John F. Kennedy: A Model for Explanation" which was published in the December, 1971, issue of "Computers and Automation", I said:

We must be alert to the CIA agents who would promote the polarization of our society. We must examine the evidence which indicates that fake revolutionaries, who are inciting insurrection in our cities, have had their pockets and minds stuffed by the CIA.

Is there any evidentiary support for such a design of social engineering having been foisted on us by the CIA and its conduits through the foundations?

The Ocean Hill-Brownsville Dispute

One of the most polarizing events in our recent history was the Ocean Hill-Brownsville dispute over decentralization and community control which led to the New York teachers' strike of 1968. Martin Mayer said of this strike:

The New York teachers' strike of 1968 seems to me the worst disaster my native city has experienced in my lifetime comparable in its economic impact to an earthquake that would destroy Manhattan below Chambers Street, much worse in its social effect than a major race riot. Worst of all, the strike will very probably reduce to the condition of a Boston or an Alabama, or some mixture of the two. a school system that was wretchedly ill organized and weakly led but relatively alert intellectually and by no means so completely ineffective as it has become fashionable to say — and that was almost the only real hope the city could offer for the future of tens of thousands of Negro and Puerto Rican children. 1

Ford Foundation Provocation

Naomi Levine described how the Ford Foundation under McGeorge Bundy used Ocean Hill-Brownsville to deliberately provoke a confrontation:

Why did the Ocean Hill governing board order the "termination of employment" of the nineteen teachers and administrators in Ocean Hill in such a peremptory manner and at a time when the State Legislature was considering various proposals that would have enacted into law many of the Bundy report recommendations? Why did the union react so strongly?

The answers to these questions go to the heart of the controversy. For it is clear that if Rhody McCoy had merely wanted to move some unwanted teachers out of his district he could have done so without provoking the U.F.T. and angering vast segments of the general public. He could, for example, have quietly requested the Board of Education to transfer the teachers a few at a time rather than attracting public attention by sending telegrams to nineteen teachers and administrators without warning or other prior notice. There is, moreover, strong reason to believe that Superintendent Donovan had told Mr. McCoy that if he sent him, in confidence, the names of the teachers he wanted transferred, the Board of Personnel would have handled the matter without further incident. Apparently, Mr. McCoy declined this offer. The conclusion is inescapable that the Ocean Hill governing board wanted a confrontation with the Board of Education in order to fix its powers and responsibilities once and for all, and that it created the situation to provoke such confrontation.

The New York Civil Liberties Union pamphlet, highly sympathetic to Ocean Hill, supported this conclusion, albeit unwittingly. It indicated that the \$44,000 of Ford Foundation planning money had run out in the fall of 1967 and that Ocean Hill was not going to receive a previously promised additional grant of \$250,000 from Ford until the local board's powers and authority had been defined and agreed upon by the Board of Education ...

Howard I. Kalodner, professor of law at New York University and legal counsel to the Bundy committee and to the Ocean Hill governing board, has confirmed the confrontation theory. "If they had asked me, I would have probably tried to dissuade them or at least picked and chose more among those nineteen names," he has stated. "But they were looking for a confrontation. They had to make a display with the community and with the central Board."2

Shutting Down New York's Educational System

McGeorge Bundy's Ford Foundation's experiment caused New York City to shut down its educational system. That city became polarized: new-black militant radicals against old-left radicals, black trade unionists against anti-union black-power advocates, black against Jew, black against white, striker against non-striker, and ACLU civil libertarians against seekers of due process.

Martin Mayer puts the following question regarding Ocean Hill-Brownsville and the Ford Foundation's social experimentation in that district:

Not the least of the political questions left dangling at the end of the tragedy of the teachers' strikes is the best way to make tax-exempt foundations responsible for the consequences of their actions.³

Martin Mayer says the following concerning the Bundy Report which precipitated the Ocean Hill-Brownsville confrontation:

The Bundy Report on decentralization contains one inexcusable folly — inexcusable because ... Bundy ... recognized it as folly ... that communities can 'unite' around the issue of education. In fact, communities inevitably divide about the issue of education.⁴

Edith Kermit Roosevelt said about McGeorge Bundy's provocateurism as head of the Ford Foundation:

A new political alliance is being forged in this country between the super-rich and the super-poor — especially the alienated and activist members of minority groups.

The Ford Foundation, under the aggressive leadership of McGeorge Bundy, is providing the major thrust for this power bloc ... This is a dangerous game but it doesn't seem to worry those members of the 'Eastern Establishment' who are involved. They're sure that no matter what happens they'll still be on top.

The Ford Foundation's support of provocateurs and revolutionaries throughout the nation is raising numerous eyebrows. Many believe Bundy, former coordinator of intelligence for President Kennedy, is fostering a new political alliance.

Its effect, at the moment, appears to be the destruction of the American constitutional system. The Foundation seems to be bypassing the legally constituted federal bureaucracy. Congress and state and local governments in order to build a movement of revolutionary proletarians. 5

The Ford Foundation

The Ford Foundation funded the autobiography by Huey P. Newton. 6 Ford Foundation's Pacifica educa-

tional radio has featured regular news commentaries by identified Communists and Black Panthers, tapes made by Radio Hanoi, Red Chinese propaganda and advocacy of blowing up police stations and fire houses. Over a Pacifica station on December 26, 1968 and January 23, 1969, Tyrone Woods said, in part:

What Hitler did to six million Jews is nothing in terms of what has been done to black folks over hundreds of years. ... As far as I am concerned, more power to Hitler. Hitler didn't make enough lampshades out of them. 7

Mexican Americans

Congressman Henry Gonzalez of Texas complained that the Ford Foundation had promoted racism among his people, Mexican-Americans. He related how the Ford Foundation made a grant of \$630,000 to the Southwest Council for LaRaza. He said:

The Ford Foundation wanted to create new leadership, and in fact the new leaders it has created daily proclaim that existing leadership is no good ...

... the president of MAYO, ... likes to threaten to 'kill' what he terms 'gringos' if all else fails ...

... I must come to the sad conclusion that, rather than fostering brotherhood, the foundation has supported the spewings of hate, and rather than creating a new political unit, it has destroyed what little there was ... $\!^{8}$

Coleman McCarthy has very wisely shown the evil and cynicism behind the approach used by McGeorge Bundy. He points out the only legitimate function that the intellectual should play in dealing with ethnics and racism is to:

... explain that the blacks and white working class are actually in the same urban fix together. Instead of letting them fight each other for useless innercity leftovers, the intellectuals could act as a referree, creating a black-white coalition based on hard, mutual needs, not any sentimental notions of integration. 9

Experiments with Ethnics

I feel that McGeorge Bundy's social engineering experiments with ethnics are designed to cause this country to unravel under a systematic program of polarization. Where the foundations leave off, the government agencies directly involve themselves in provocateur attempts to splinter this nation. Senator Edward Kennedy has expressed his fear of the government's efforts at crisis creation. He complained:

Now I fear that we are entering another era of crisis, an era of inaction and retrogression and repression ...

Growing use of domestic spies — in schools, in political groups, at public meetings, of informants who sometimes help to foment the very acts they are supposed to be investigating. 10

Congressman William Scherle of Iowa in answer to the question of how serious the problem of radicals and revolutionaries on government payroll has become said:

The situation is <u>unbelievable</u>. It runs rampant throughout the country. It almost appears that the poverty agencies are seeking out the worst sort of militants!¹¹

Police Provocateurs

Karl Meyer, chairman of the Chicago Peace Council, said on the question of American political intelligence infiltration of his group:

At our meetings they (police agents) invariably took the most militant positions, trying to provoke the movement from its nonviolent force to the wildest kind of ventures. They were about our most active members 12

Frank Donner says of intelligence provocation:

There are powerful reasons for viewing provocation as the handmaiden of infiltration, even when it is no part of a planned intelligence strategy. A merely passive, 'cool' infiltrator-observer cannot hope to play more than a lowly 'Jimmy Higgins' role in the target group, if he gains entry at all. In order to enhance his usefulness, he must penetrate planning circles by becoming highly active. Moreover, the pressure to produce results in the form of concrete evidence of illegal activity often drives the infiltrator into provocative acts ... ¹³

Emergence of Radical Protest

Now, I am not suggesting that every radical and violent act in our society is the direct consequence of foundation or governmental funding. There are many disillusioned youths who are easily induced to follow the provocateurs. Former Nixon White House aide, Daniel P. Moynihan, explained this well:

One of the defining qualities of the period of current history that began, roughly, with the assassination of President Kennedy has been the emergence of widespread, radical protest on the part of American youth. The generation was already marked 'by the belief that its government is capable of performing abhorrent deeds.'

The matter may be put simply. For a long period the distrustful responses of youth, and of others of course, to national events and the seeming course of national policy was essentially rational. Much begins, more than we yet know, with the assassination of President Kennedy. A whole generation was marked — and in ways deformed — by the crashing recognition that the world was not a safe or pleasant place at all, that the world was blind, destructive, unheeding.

Then came the war. The same generation learned that things need not be what they seem if they are coming out of Washington. And so outrage and distrust mounted 14

Minority Opportunities in Higher Education

But let us not be so outraged as to lose our bearings. Yes, admittedly I have difficulty at times in maintaining my poise. This is especially true when I hear that McGeorge Bundy, the great nephew of A. Lawrence Lowell, one of the murderers of my Italian brothers, Nicola Sacco and Bartolomeo Vanzetti, through Ford Foundation grants will provide aid aimed at increasing minority opportunities in higher education. ¹⁵ How ironic that the Ford Foundation which has polluted the urban school systems with its provocateur activities and thereby foreclosed educational opportunities for so many ethnic children, seeks to parade as the ethnics friend by buying off scholars of ethnic backgrounds!

Edith Kermit Roosevelt describes this process:

The operations in New York City of the Ford Foundation typically illustrate the ruthless tactics used by the foundation's self-described 'elite' in their drive for political power. One of the Ford Foundation's goals has been to fundamentally change the direction and control of New York City's public-school system. City educational institutions provide the Ford Foundation with a vehicle in their drive to control minority and ethnic groups in urban areas through dollars distributed to key personnel who will be beholden to them. 16

But we must retain our calm in the face of provocation. We must be tranquil even when confronting the irony that the Ford Foundation, which has bought up so many fake revolutionaries, has as its head McGeorge Bundy, who said recently:

We must hope that the angry extremes will be rejected. But if it really does come to a test, the violent left and right are the enemies of all the rest of us.¹⁷

David Halberstam was correct to quote one of McGeorge Bundy's colleagues as stating that Bundy "... is a very special type, an elitist, part of a certain breed of men whose continuity is to themselves, a line to each other and not the country." 18

Somehow, McGeorge Bundy appears to feel that money can buy off anyone and everything. Was McGeorge Bundy buying the silence of the aides of Robert Kennedy when the Ford Foundation gave \$131,069 to eight members of the staff of the late Senator Robert F. Kennedy on November 8, 1968?19

Choices for Action

If we are to understand and bring under control the forces which are shaping today's America and are endeavoring to shape its future into a monstrous 1984, we cannot rest with the official version of the killing of President Kennedy. The model of explanation offered in the prior article and this one, it seems to me, explains the available data.

I believe we can and must employ this tool of analysis to learn more about our current-day society. If peace workers seek to bypass the task of understanding the Kennedy assassination in order to take

(Please turn to page 47)

Gray - Continued from page 22

digital circuits." The hobby magazines print construction articles about "digital computers" that are simple accumulators with fancy input/output, and I didn't have the time to answer questions such as "Why didn't my flip-flop work?"

Logic Trainers

G.A. Michael, writing in the May 1969 ACM Computing Reviews about an article on "Computer training aids" in the British Computer Society's June 1967 Computer Bulletin, says that some of these devices are "simple patch panels for interconnecting logic elements." He notes that quite a few such patch panels are manufactured in the United States, and adds, "It is interesting to speculate on how many of the hundreds of thousands of people now working as programmers would like a chance to play with one of these gadgets...."

There are several dozen of these logic trainers available, most of them costing several thousand dollars, as I discovered when writing a survey article on them. One of the least expensive is made by Digital Equipment Corp., whose Computer Lab, with eight JK flip-flops, 18 NAND gates, four AND/NOR gates, variable clock, eleven switches and lamps, assembled in an attractive cabinet, costs \$445. This price, of course, puts the Lab beyond the means of nearly all digital hobbyists.

A logic demonstrator described in one of the electronics hobby magazines has four JK flip-flops, four NAND/NOR gates, two buffer inverters, three switches, and a lamp at each circuit output. A kit containing all parts is available for \$27; a manual with 124 experiments costs \$5.25. However, although the author of the manual is ingenious in thinking up experiments, the configurations possible with only four flip-flops and six gates must obviously be rather limited. The designer balanced cost against variety, and understandably leaned toward lower cost.

Therefore, the digital hobbyist who wants to go beyond simple logic configurations and has a limited amount to spend, must build his own circuits. Some can; the rest, unable to find any help, and knowing little or nothing of electronics, give up.

Foundations

The hope, as expressed in that last paragraph that only one magazine printed, was that it might be possible to get backing for full-time operation of an Amateur Digital Society, as I later came to call it. Accordingly, a letter was drafted, and first sent to a foundation.

As anyone who has tried to get money from a foundation knows, you can get money if you don't really need it. That is, once you have an organization underway, money can be obtained to continue its operation. But foundations are understandably reluctant to give money for starting an enterprise. Although there was little chance of getting financial help for the Amateur Digital Society (and perhaps some for the Amateur Computer Society too), it was worth a try.

For a short while, during the weeks when letters were first being sent to foundations, it seemed that one of them might just provide a grant and enable the ADS/ACS to be run as a full-time job.

The daydreams accompanying that hope included such grand ideas as having two meetings a year, one in Los Angeles, the other in the East; designing a digital logic breadboard for the Amateur Digital Society that, when an ADS member upgraded to become an ACS member, could be used as part of his computer; and eventually offering courses or manuals on constructing digital logic and computers.

National Science Foundation

The first letter was to the National Science Foundation, explaining, in part:

Although the members of the Amateur Computer Society need a lot of help, there is a much greater need among the potential members of the lower-level group, the Amateur Digital Society. They are the ones who, for the most part, are just beginning to explore the world of computer circuits, and have run into many blank walls. Although there are many textbooks and manufacturers' brochures on computer circuitry, they usually go into the more complex circuits, which are too hard for a beginner to understand and too expensive to build.

To get the Amateur Digital Society going, and to extend the services of the Amateur Computer Society would take more time than I have at present.... If I could give my full time to the two Societies, I believe I could provide educational services of high importance in what many call the "Computer Age."

The reply to this high-flying prose noted that:

The National Science Foundation awards grants to scientific societies, academic institutions, and other non-profit scientific organizations for the support of research, science education, research facilities, and science information activities. The Foundation has not provided funds for the establishment of scientific and technical societies.

and suggested writing to the Association for Computing Machinery. The ACM, although admitting that the two societies "could be useful," went on to say that:

Unfortunately, the ACM would not be prepared to support them to the extent of paying the salary of a full-time man to work on them.

A new letter was drafted for the philanthropic foundations, adding a new factor:

With the right kind of help, especially for the lower-level society, I believe many more young people would become interested in a career in computers. Those who did not enter the world of computers would learn much that would help them understand, appreciate and cope with what has been called "The Computer Age."

Educational Grants to Individuals

The Foundation Directory was searched for those giving educational grants to individuals. Only five seemed at all likely; three of them had been set up by companies that manufacture computers. Letters were sent to all five.

The Sperry Rand Corporation was the first to answer, within a week:

In view of the many requests we receive for financial assistance to worthy causes and organizations, we recently made a thorough study of the philanthropic area and have instituted a specific corporate policy on the subject. Unfortunately, your particular proposal is not within the guidelines established by this policy.

The Ford Foundation regretted that:

... the Foundation has no current program under which activities in this field might be supported.

Burroughs referred the letter to their Corporate Committee on Contributions, which was most understanding:

Although we are all well aware of what you are trying to accomplish and certainly commend you for your efforts, I am sure you will understand the difficulty of allocating a limited budget to the many worthy causes which come to our attention

Much as we would like to be able to contribute to your societies, I must regretfully advise you that we are unable to include your request in our contributions program.

The Olin Foundation advised that:

... our grants are made almost exclusively to colleges and universities for the construction of buildings. We find there is such a great need for what we are now doing that it is unlikely we will depart from our pattern. Therefore, I cannot offer you any encouragement in the idea that we would make a grant for your project.

General Electric was last, with these words from the secretary of the GE Foundation:

While we are, of course, interested in the work you are doing in the computer field, particularly the work you are proposing to do with young people, I am indeed sorry to inform you that it will not be possible for us to extend any financial support at this time.

... our support activities are directed primarily to higher education, with grants being made directly to colleges and universities in specified disciplines, and to allied educational associations and organizations.

IBM Approached

Why not try IBM? The foundation letter was used, with a new paragraph at the end:

Here is an opportunity for IBM to get a foothold in the area of amateur computers, which could grow as big as amateur radio (now that integrated circuits are so cheap), and which could do much for IBM's prestige in new and different ways. The two societies could also serve as information departments to answer the many questions IBM receives from people, most of them probably youngsters, who want to know more about what goes on inside a computer.

The letter outlining this ground-floor opportunity was sent directly to Thomas J. Watson, Jr., and brought a personal letter by return mail, saying that matters of this kind are the responsibility of the Assistant Treasurer, and that the letter was being passed along to him. However, the Assistant Treasurer had more pressing business to attend to, and I did not hear from him.

Several weeks after Mr. Watson wrote, the manager of engineering publications at IBM's plant in Rochester, Minnesota, wrote, by coincidence:

We get numerous inquiries from high school students who are building some form of computer for science fairs, etc. We try to answer all inquiries, but sometimes find it difficult to find good information that we can refer them to at their level.

Perhaps your society would have information of a general nature that would be helpful in our answering such requests. Would you please send me more information on the society and add me to your mailing list for the newsletter?

The letter from Rochester provided just the right excuse to write the Assistant Treasurer:

As I pointed out to Mr. Watson, the two societies could serve as information departments to handle such inquiries and other similar requests. Such an arrangement would free this manager and other IBM personnel who "try to answer all inquiries" for more pressing duties, and provide a single, uniform source of information for all such inquiries.

But before this letter could be sent, the $\mbox{\sc Assistant Treasurer}$ wrote:

Our Contributions Committee has reviewed your recent request for IBM support of the Amateur Computer Society and the Amateur Digital Society.

I regret to advise you it was their decision that we would be unable to provide financial assistance to your organizations. Our corporate contributions commitments in the educational, scientific and charitable areas make it impractical for us to take on additional support projects, and as a result it is just not possible for us to respond favorably to all of the many appeals which we receive.

General Learning Corporation

One more attempt was made to obtain help, with a letter to the General Learning Corporation, the "educational affiliate" of Time Inc. and General Electric:

... I estimate the maximum potential membership, at present, of the Amateur Computer Society to be two or three hundred, and of the Amateur Digital Society to be about two or three thousand, mostly young people. Three years from now, these figures could easily be be doubled or even tripled, as integrated circuits become cheaper and cheaper.

The respondent put it this way:

My responsibilities include developing of

expertise in all aspects of educational technology: applying the systems approach to the specification of materials, systems and services for educational situations; and designing and producing educational materials and equipments. Within this general framework, we at General Learning Corporation have defined particular objectives.

Your area of interest does not match our immediate objectives, although, I think it is very significant to the educational process. For this reason, we cannot consider your offer to help us at this time.

The last try was with the National Science Foundation's Office of Computing Activities, which had just been set up. The letter was similar to the previous one. No answer was received.

The Future

The Amateur Computer Society Newsletter is well into Volume II; ten issues have been printed as of this writing. There is enough money for about the same number of issues (eleven) that were in Volume I. After that, another renewal notice will determine if there is enough interest to continue for a third volume. Perhaps, by then, one of the integrated-circuit manufacturers will have produced a computer on a chip for less than \$100, with only input and output to be added, and then everybody, with a minimum of effort and expense, can build his own computer.

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Countryman — Continued from page 19 The President: 'Inherent Power' to Tap?

Whatever other effect this provision may have, it has emboldened Attorney General Mitchell to argue that the President has "inherent power ... derived from the Constitution itself," free from judicial review under the Fourth Amendment, to employ wire taps and electronic bugging (1) "to gather foreign intelligence information" including "information necessary for the conduct of international affairs and for the protection of national defense secrets and installations from foreign espionage and sabotage"; and (2) "to gather intelligence information deemed necessary to protect the nation from attempts of domestic organizations to use unlawful means to attack and subvert the existing structure of government." This argument was first made and accepted by Judge Julius Hoffman in a case where the domestic threat to the "structure of government" consisted of the disturbances at the Democratic National Convention in Chicago in 1968. It has been rejected by the U.S. Court of Appeals for the Sixth Circuit and by a federal district court in California, and appeals are pending.

The 1968 Act also requires annual reports to Congress of all court-approved wire taps and bugs obtained under the Act by either federal or state authorities. In 1969, the first full year that the Act was in operation, these reports revealed thirty federal interceptions and 241 state interceptions, 176 of the latter being in New York alone. For the second year, there were 180 federal interceptions and 403 state interceptions, including 213 in New York and 129 in New Jersey. By these taps and bugs, federal authorities in one year listened in on more than 146,000, and state authorities on more than 244,000 conversations. But the federal figures do not reveal all federal wire taps -- the government is acting on Attorney General Mitchell's contention that no court approval is required for tapping and bugging in "national security" cases. On one day, in March 1970, the FBI operated thirty-six wire taps and two bugs in such cases.

Snooping in the Mails

The governmental compilers have still another source of information not available to private compilers — the "mail cover," provided by the Post Office Department, which supplies the name and address of anyone sending mail to a suspect and, if desired, a facsimile of the sender's handwriting. The Post Office provides this service on request to any federal or state law-enforcement agency, and averages about 1,000 mail covers a month.

One of the chief users of the service is the Internal Revenue Service, but both it and the Post Office declined to supply Congressional investigators with the names of those subjected to such surveillance -- not only because some were still under investigation but also because such disclosure would constitute an invasion of the privacy of those investigated and found innocent of tax violations! Although not specifically authorized by statute, the Post Office finds its authority for the practice in a general statutory power to prescribe rules and superintend the business of the department, and courts have held that it does not violate provisions of the Criminal Code forbidding delay of the mails.

Part Two, to appear next month, discusses what information gets into official dossiers, where it comes from, and who can gain access to it — and suggests congressional interest and action in protecting privacy.

Satisfaction of Companies With Services Received from EDP Service Bureaus

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"... an average of forty-one per cent of respondents have requested an expansion of services... but many service bureaus could not provide them. ... Thirty per cent of New England clients plan to discontinue using service bureaus. ... yet most of these clients, who plan to purchase or lease computer equipment, will not have enough initial applications to justify their own computer."

In 1945, Mauchly and Eckert completed the Electronic Numerical Integrator and Calculator (ENIAC), the first truly electronic computer.\(^1\) ENIAC was installed at the Ballastic Research Laboratory Center at Aberdeen, Maryland, and was used by the United States Army and Air Force to compute ballistic firing tables. Other government agencies began using the computer facilities at Aberdeen to solve various scientific and mathematical problems. As a result, the laboratory became "the first Service Center for Electronic Data Processing."\(^2\)

Since 1945, there has been a phenomenal increase in the number of U.S. service bureaus. In 1969, there were approximately 2,270 service bureaus used by all sizes and types of companies. A study conducted by the Research Institute of America (RIA) concluded that more than one out of five (23%) companies uses a service bureau exclusively for processing its data. The discussion in this paper will refer only to these exclusive users of service bureaus.

The purpose of this article is to investigate the satisfaction of these users with their service bureaus and is based on the results of personal interviews and a mail questionnaire. The population of the questionnaire sent to service bureau clients was limited to medium-sized companies with sales between three and ten million dollars 5 that were listed in the Dun and Bradstreet Million Dollar Directory 1969 and to companies located in the major metropolitan areas of the South Central and New England states. The sample size of the questionnaire for both geographical regions achieved an overall 90% confidence with a maximum error of 5%. 8

An examination of the following factors should disclose the degree of client satisfaction with their service bureaus:

- The number of different service bureaus used.
- The per cent of service bureaus unable to provide clients with requested services.
- The per cent of clients planning to expand services.
- The per cent of clients planning to continue using service bureaus.

The Number of Different Service Bureaus Used

The first factor which indicates the degree of satisfaction of clients is the number of different service bureaus used. Even though an average of sixty-four per cent of responding clients have used only one service bureau (Table 1), significant differences exist between the two geographical regions

surveyed. Only fifty-one per cent of New England respondents have used one service bureau, while a surprising one out of four have used three or more different ones.

Table 1 NUMBER OF DIFFERENT SERVICE BUREAUS USED BY RESPONDING CLIENTS

(Per Cent of Respondents)

Region	<u>One</u>	Two	Three	<u>Four</u>	<u>Five</u>	More <u>Than Five</u>
So. Central	73%	22%	5%	0%	0%	0%
New England	51	23	13	5	3	5
Average	64	21	9	3	1	2

Source: Service Bureau Client Questionnaire

The number of different service bureaus used by responding clients becomes more significant when one realizes that forty-nine per cent of all respondents have used service bureaus for two years or less and seventy-six per cent for four years or less (Table 2). Differences in the first three categories shown in Table 2 reveal that New England respondents have used service bureaus longer than South Central respondents. Thus, fewer South Central respondents have had time to fully assess the services they are receiving, and this accounts for the seventy-three per cent still using their original service bureau.

Table 2 LENGTH OF TIME RESPONDING CLIENTS HAVE USED SERVICE BUREAUS

(Per Cent of Respondents)

		Time i	n Years		
Region	Less Than l	2 or Less	4 or Less	7 or Less	10 or Less
South Central	17%	53%	81%	89%	92%
New England	5	42	68	84	95
Average	12	49	76	88	94

Source: Service Bureau Client Questionnaire

The Per Cent of Responding Clients That Have Requested An Expansion of Services

The per cent of responding clients who have requested but were unable to receive expanded services from service bureaus is another indicator of client satisfaction. Attempting to increase satisfaction, many respondents have changed service bureaus, hoping to find one capable of providing satisfactory services. However, many respondents have discovered that is is difficult to find a bureau able to provide the requested services. For both geographical regions surveyed, questionnaire tabulations reveal that an average of forty-one per cent of respondents have already requested an expansion of services from $% \left(1\right) =\left(1\right) \left(1\right)$ service bureaus. But, Table 3 points out that many service bureaus could not provide these services. A significantly higher per cent of South Central respondents received the requested services because they have used service bureaus for a shorter time than New England respondents, and are requesting to expand into mainly routine services which most service bureaus can provide. On the other hand, many New England respondents are expanding into more sophisticated non-routine services which many service bureaus cannot provide.

Table 3

PER CENT OF SERVICE BUREAUS THAT COULD NOT PROVIDE CLIENTS WITH REQUESTED SERVICES

Region	Unable to Provide Requested Services
South Central	15%
New England	50%
Both Regions	30%

Source: Service Bureau Client Questionnaire

The Per Cent of Responding Clients Planning to Expand Services in the Future

Third in the list of factors which indicates client satisfaction is the percentages of responding clients who plan to expand services in the future. Questionnaire tabulations reveal these percentages to be:

South Central	64%
New England	37%
Average	50%

Since more South Central responding clients are newer to the service bureau movement than New England clients, a high per cent plan to expand services. Although slightly over one-third of New England responding clients plan a future expansion of services, they have by no means reached the saturation point of services they can receive; of the thirty-seven per cent that plan to expand services, about six per cent represent respondents that plan to expand into non-routine services for the first time. This per cent coupled with the current twenty-seven per cent of New England responding clients receiving non-routine services means that approximately sixty-seven per cent apparently have no plans to automate higherpayoff applications, such as those applications that reduce items affecting cost of goods sold or those applications that improve management information. Nevertheless, all clients responding to this survey could profitably automate these higher payoff applications and at a fraction of what it would cost to own or lease a computer.

The Per Cent of Responding Clients Planning to Continue Using Service Bureaus

The fourth and final factor which indicates client satisfaction is the per cent of responding clients who plan to continue using service bureaus. Clients were asked the question: "Does the company plan to continue using a service bureau in the foreseeable future?" The responses were:

Region	<u>Yes</u>	<u>No</u>
South Central	82%	18%
New England	70%	30%
Average	75%	25%

A significant thirty per cent of New England clients plan to discontinue using service bureaus. Perhaps as South Central clients gain in user experience, they like many New England clients, will become dissatisfied with service bureaus and discontinue use.

For the most part, those responding clients who plan to discontinue using service bureaus will purchase or lease computers. Service bureau clients were asked: "Does the company anticipate purchasing or leasing its own electronic computers within the next 5 to 10 years?" The responses were:

Region	<u>Yes</u>	<u>No</u>	Don't Know
South Central	23%	44%	33%
New England	36%	28%	36%
Average	29%	37%	34%

Questionnaire tallies indicate that most clients who plan to purchase or lease computer equipment will not have enough initial applications to justify their own computer. Responding clients to this survey are all small and medium in size and if they were to purchase or lease a computer, it probably would be a small computer, such as an IBM 360/Model 20. The Research Institute of America indicates that companies who own or lease such a computer process an average of five or six applications. 10 However, responding clients who anticipate the purchase or lease of a computer indicate that they will only have an average of four applications to process on it:

Average Number of Applications <u>Processed by Service Bureaus</u>

Region	Currently	Anticipated	<u>Total</u>
South Central	3	1	4
New England	3	1	4
Average	. 3	1	4

Hence, processing an average of four initial applications will not be profitable enough to offset the high computer operating costs. 11 Responding clients who plan to purchase or lease a computer have no choice except to continue using an automated system because a return to a unit record or manual system would be as "unthinkable as giving up the typewriter for the quill pen." 12

Summary

An examination of the number of different service bureaus used, the per cent of service bureaus unable to provide clients with requested services, the per cent of clients planning to expand services, and the per cent of clients planning to continue using service bureaus leads to the conclusion that many responding clients are, in varying degrees, dissatisfied with the services they are receiving from service bureaus.

Footnotes

- C. Orville Elliott and Robert S. Wasley, <u>Business Information Processing Systems</u> (Homewood, <u>Illinois</u>: Richard D. Irwin, <u>Inc.</u>, 1968), pages 225-226.
- Joseph W. Fischbach, "Service Center: Data Processing for the Business Community," <u>California</u> Management Review, IV, Fall, 1961, page 35.
- Management Review, IV, Fall, 1961, page 35.

 3. "Data Center Survey and Directory," Data Systems News, X, August, 1969, page 14. The 2,270 figure includes 870 home office service bureaus with 1,400 branch offices. Also, the figure includes firms not only specifically set up as service bureaus but also such companies as colleges and universities, banks, insurance companies, and others not specifically set up as service bureaus.
- 4. Computers in Business, Research Institute of America Survey Report (New York: Research Institute of America, April 14, 1969), p. 21.
- 5. Although this paper is primarily concerned with responding service bureau clients having sales between three to ten million dollars and who are located in the South Central and New England states, much of the discussion should be relevant to all service bureau clients. Information collected from interviews with service bureau personnel, from questionnaires received from service bureau clients having sales less than three million dollars or greater than ten million dollars and from other sources indicate that all service bureau clients possess similar characteristics and receive similar services.
- 6. <u>Dun and Bradstreet Million Dollar Directory 1969</u>
 (New York: Dun and Bradstreet, Inc., 1969), 5293
 pages.
- 7. The South Central states are Alabama, Kentucky, Louisiana, Mississippi, and Tennessee. The New England states are Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
- 8. Three hundred and twenty-nine service bureau clients were surveyed in the South Central and New England regions. Overall, a 59% response was achieved.
- Questionnaire tabulations reveal that New England respondents have used service bureaus an average of 4.1 years compared to 3.0 years for South Central respondents.
- 10. Computers in Business, op. cit., p. 37.
- 11. Of course, after the client properly learns how to use the computer, he should eventually have enough profitable applications to offset these high operating costs.
- 12. Unlocking the Computer's Profit Potential, A Research Report to Management (New York: McKinsey and Company, Inc., 1968), page 7.

C.a NUMBLES

Neil Macdonald Assistant Editor Computers and Automation

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

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

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

Andrew M. Langer Newton High School Newton, Mass.

NUMBLE 721

V E R Y

× C H E A P

V H P R R

C A H H

D I E C

H C Y E

V V E P A

70143

75463

Solution to Numble 7112

In Numble 7112 in the December issue, the digits 0 through 9 are represented by letters as follows:

E = 0	0,U = 5
D = 1	M = 6
H,L,P=2	S = 7
I = 3	R = 8
T = 4	N = 9

The message is: First impressions rule the mind.

V V C D S I P D R

Our thanks to the following individuals for submitting their solutions to Numble 7111: Marijoe Bestgen, Shawnee Mission, Kans. — to Numble 7110: Curtis C. Morgan, Alexandria, Va., and Harold L. Smith, Thomson, Ga.

Third, since a computer professional is governed by the law "garbage in, garbage out", he can benefit by applying common sense to his input data, and to the results offered by the computer as output.

Finally, he needs to design computer programs which meet the common sense requirements of human beings, who are very error-prone.

A good example is a program command DWIM, "Do what I mean". This command has been implemented in the general programming language LISP, being used at Bolt, Beranek, and Newman, Cambridge, Mass. Here is how DWIM works. Suppose a computer programmer sitting at a console misspells the function REVERSE by writing it REVRESE. Instead of complaining and halting, the computer program hunts among the terms it "knows" about, finds a close match with REVERSE, and then asks the programmer "Do you mean REVERSE?" When he indicates yes, the computer program takes off and runs

Prospects

For future issues of the Notebook, a great many topics are still to be reported. The topics covered and to be covered should be of interest to many groups of people. One group is computer professionals, who need to function well in the interaction of information processing with common sense and wisdom. Another group is managers, who over and over again find themselves delayed, impeded or blocked because their subordinates (or they themselves) did not have enough common sense or wisdom for a particular situation. Eventually, textbooks on common sense, wisdom, and science in general, should be available.



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Berkeley - Continued from page 7

are physicists, atomic scientists, chemists, crystallographers, biologists, psychologists, economists, mathematicians, statisticians, and many others. As to engineering, there are electrical engineers, mechanical engineers, radio engineers, methods engineers, and other kinds. In business, there are men from insurance companies, mail order houses, office machine manufacturers, railroads, public utilities, market research organizations, department stores, and many other businesses. In government, there are men from ordnance laboratories, proving grounds, the Social Security Administration, the Bureau of the Census, the National Bureau of Standards, research offices, the Bureau of the Budget, and many other government organizations. It is striking to read the list of members of the association, and notice the wide appeal of automatic machinery for handling information – seeing the large number of people who have already realized that a mechanical brain is likely to be useful to them in the problems which they have on hand to solve.

The Usefulness of Automatic Computing Machinery to Statisticians

Automatic computing machinery is of considerable significance to statisticians.

For example, in order to determine the properties of complicated physical situations (structures or processes), a method called the Monte Carlo method has been developed. Briefly, a table of random numbers is used to construct one by one a statistical collection of a thousand or ten thousand instances of the physical situation; the properties of the statistical collection are then computed; and these properties are then assumed to apply generally, within a margin of error. An automatic computer is often useful in producing the collection of instances, and there are processes whereby the machine itself can compute random numbers just as well as almost any other process can produce them.

Another example of the importance of computing machinery to statisticians is multiple factor analysis and similar analysis of large collections of statistical information. For example, suppose we give 20 tests to 100 persons, each test with 50 items in it. We shall obtain 100,000 statistics. What have we measured? Which of these tests are important, which can be dispensed with? Answering such questions as these often requires computing capacity of high order.

For a third example, consider the statistical work of the Bureau of the Census. The Bureau was the place where automatic computing machinery for handling information was first invented. Here in the 1880's punch card calculating machinery was devised by Dr. Herman Hollerith. The data from the current 1950 Census is expected to be analyzed in part on a large-scale electronic calculating machine that has been on order for two years. The machine is Univac, being constructed by the Eckert-Mauchly Computer Corp., a subsidiary of Remington-Rand, Inc. It is expected to have a speed of 1,000 arithmetical operations a second. If it is available soon enough, it will greatly shorten and sweeten the calculations of the 1950 Census.

The statistical field is one of the important fields for the application of automatic calculating machinery; and the Association for Computing Machinery is a good way for keeping abreast of developments, a highway of easy communication through many scientific worlds, and across many intellectual boundaries.

Salandria - Continued from page 39

up causes which appear more challenging and more immediately relevant to our society, I would suggest that peace workers are erring in their chosen course of social action.

What is your cherished fight? Civil Rights? Civil Liberties? If John F. Kennedy, a most gifted, rich and popular President, did not have the right or liberty to hide successfully from governmental guns in the United States, then are not civil liberties and civil rights long departed in our country not only for ethnics but all other citizens as well?

Would you, before you study the implications of the Kennedy assassination, seek first to destroy the capitalist system? But was not the capitalist system on November 22, 1963 overthrown by a new class in the United States? Was not Wall Street successfully stormed by way of Dealey Plaza? Did not the intelligence community force upon the financial interests an uncontrolled war machine which eroded American economic power and well being?

Would you first seek to improve our public schools? But the military has usurped for itself the funds required to educate our children. And the intelligence community has deposited provocateurs in at least some of our schools so that the conditions necessary for learning have been, through the ensuing turmoil, destroyed.

Would you first drop out of school, job, and society in order to change the system? There is no place to hide from the power which can gun down a President. Dropping off the face of the earth is your only refuge if you are unwilling to drop into the struggle to wrest our government from the grip of murderers.

Would you seek to join the Communist world? But the Communist world has revealed that it too can accept a frameup in the killing of Kennedy just as easily as it can accept a frameup in the assassination of Kirov.

No, let us not turn away from the horror of the killing of John F. Kennedy. Let us join together, black and white, rich and poor, jew, gentile, consertive and radical, to tell the truth about the killing of Kennedy. Through this refusal to live a great lie we will come together to understand and love ourselves and our society better. Let us not delay in this union of truth. If we do not join together in the search for truth, then guns backed by cover-story lies will pick us off one by one and ultimately join us together - in death.

This is the lesson to be learned from the killing of President John F. Kennedy and the overthrow of the Republic of the United States by the CIA.

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Tactical Air Command - Continued from page 24

Known as the Interim TAC Unique Disk Management System, the program performs several tasks in addition to reallocating disk storage space and combatting the "checkerboard".

Additional Benefits

One additional benefit is that the program instructs the computer to store data according to how frequently it is changed. Data that is often changed is stored at a "high disk" position and data that is seldom changed is stored at a "low disk" position. By assigning different types of data to these relative positions, the computer saves time by not having to search its entire data bank every time it needs storage space. It can concentrate on those areas where available space is most likely to be found.

Another process handled by the program is that of analyzing the system to determine what information is stored on the disks is necessary, and to find out what additional data needs to be added to the files. Prior to the sergeants' program, this type of validation was extremely time-consuming and required a great deal of training and experience.

Operating Computer at Peak Efficiency and Savings

Sergeants Kennedy and Sperber's program also provides a summary of disk utilization which enables TAC's computer managers to determine how the overall system is being used, and to insure that the computer is being operated at peak efficiency and savings.

"At first, nobody believed that we'd been able to do all this," Sergeant Kennedy acknowledged, "but once they tried the program and became aware of the benefits,it made us a lot of friends."

Potential Savings of \$1.5 Million

The American taxpayer could certainly be included in their list of friends, because the potential Air Force-wide savings of their program has been estimated at \$1.5 million.

CORRECTION

In the December 1971 issue of Computers and Automation, the following addition should be made:

Page 52, "Teaching Devices Inc.": include Telephone: (617) 369-2390

ACROSS THE EDITOR'S DESK

Computing and Data Processing Newsletter

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APPLICATIONS

MOVEMENT OF SOUTH DAKOTA PHEASANTS TRACKED BY COMPUTER

Dr. Donald Progulske South Dakota State University College of Agriculture and Biological Sciences Brookings, SD 57006

Here, where wildlife is a product of the land and the state's economy depends partly on its proper management, knowing that pheasants move pretty quickly— both on the ground and in the air— is not enough. In our research project, aimed at finding out more about how the birds live, pheasants within the one-square mile intensive study area are caught at night by workers using bright spot lights and long-handled nets. Captured birds are then fitted with a small radio transmitter which broadcasts a signal at a particular frequency in the range of 150 to 151 megahertz. The radio and harness do not harm the bird or hamper his normal activity in any way.)

Readings are taken on each bird every three to four hours. The signals from the radio transmitter and picked up by a central receiving tower, and by a mobile receiving unit located at one of 20 predetermined sites surrounding the central tower. Researchers pinpoint coordinate locations for the birds at specific times. The computer processes the information and provides a diagram of the bird's roosting and feeding pattern over a two-week period.

The computer provides us with the radius of activity for each of the seven or eight birds being studied at any one time. From the data we are learning more about the pheasant's habits and how the birds can be properly managed. We already know the pheasant is polygamous, sets up a crowing territory and gathers a harem of hens. But we don't know how big either his territory or his harem is. We know that additional cover is needed for pheasants. Many groups and agencies are cooperating in the attempt to increase pheasant populations. Our studies should produce valuable information to better understand the biology and needs of the birds. (The computer is an IBM System/360, Model 40.)

AERIAL PHOTOGRAPHY AND COMPUTERS AID THE BATTLE AGAINST BLIGHT AND POLLUTION

Dr. David Landgrebe
Purdue University
Laboratory for Applications of Remote Sensing
1220 Potter Drive
West Lafayette, IN 47906

Scientists here at Purdue University are converting photographs taken by aircraft and space satellites into detailed computer-produced maps which identify such surface features as water resources, vegetation types, and soil characteristics. These techniques have been used successfully in experiments to identify crop damage in the Corn Belt resulting from blight and insect infestations.

Researchers here have pioneered in the use of a technique known as "remote sensing", or obtaining information through distant yet precise measurements together with machine processing procedures, in hopes of improving man's ability to manage the earth's resources more efficiently. Projects at the Laboratory for Applications of Remote Sensing (LARS) may open the way for wide-ranging aerial observations processed by computers that will aid private and governmental agencies in their efforts to assess pollution and take remedial actions.

Recent studies were centered around the Corn Blight Experiment — a joint venture of the U.S. Agriculture Department, NASA, several states and universities — designed to map the progress of Southern corn leaf blight. Information gathered by special instruments aboard aircraft flying over corn fields is relayed here and analyzed by a computer. Results are sent to the Agriculture Department, clearing house for all corn blight information. The Agriculture Department has reported that corn blight, which last year attached nearly every major crop area in the country, has been found in more than 34 states this year.

Additional experiments here based on photographs taken during the Gemini 5 and Apollo 9 space missions reveal that remote sensing techniques can be applied to virtually any part of the environment. LARS researchers already have mapped large areas of forest and have used the computer in water pollution and soil characteristic studies.

Satellites and aircraft used in the studies carry instruments, called multi-spectra scanners, which record light emitted by and reflected off natural objects. Every object produces a distinct energy or light pattern to the scanners. By matching field samples of objects with aerial observations, the computer can be 'trained' to remember the light 'signature' of the object. Purdue's system, an IBM System/360 Model 67, has been programmed, in the corn blight experiments, to identify signatures for five different levels of infection.

Virtually every state is trying to gather information about its resources. By using remote sensing techniques over large areas, scientists obtain far more information about crop-killers or other environmental changes than is accomplished with current methods. Remote sensing offers a means of covering entire tracts of land to provide detailed computer analysis of the natural resources in these areas. The impact of such remote sensing techniques is expected to be dramatic.

MARRIAGE OF COMPUTERS MEETS SPECIAL DATA PROCESSING NEEDS OF B. F. GOODRICH

Arthur Williams Director of Information Systems B. F. Goodrich 500 South Main Akron, Ohio 44318

B. F. Goodrich has created a unique data processing system by hooking together two new-generation computers with an "inter-computer coupler" (ICC) of its own design. The combination not only replaces four older computers, but also operates much faster at about 30% less cost, and has the capacity to expand its work load. The first major application of the system is to operate the customer order and inventory control systems for three of BFG's largest division. The system enables the company to directly tie in its chemical division computer center in Independence, Ohio, with the corporate Data Center here in Akron.

Key units in the system are an IBM 370/155 and a Univac 418 III. The IBM 370 is the central storage system. The Univac 418 III controls the administrative communications network (called the Private Wire Telegraph System) that interconnects approximately 125 locations and 13,000 miles of telegraph wire throughout the United States. The Akron-built coupler sets up a direct channel for instant input and retrieval of data. The Univac will call on the IBM only for specific information needed in inventory control. It does not store operating data itself.

The system processes data for various company functions and also is available on a time-sharing basis through a hookup with remote consoles in various geographical locations. The combination of computers operates several divisions' inventory control programs that involve processing customer order entries, allocating inventory, creating the shipping documents necessary to fill orders and transmitting these documents to warehouse and shipping points.

Several other industrial companies have inquired about the coupler and BFG is planning to make it and the related software available in the near future.

EDUCATION NEWS

"OPERATION BOOKSTRAP" IS HELPING JOHNNY TO READ

H. J. Peters Bell Laboratories Holmdel, N.J.

"Operation Bookstrap" is an experimental project designed to give beginning readers an opportunity to use a TOUCH-TONE^R telephone to call a "computer" when they need reading help. Principal participants in the project include first and second grade students at the Mechanic Street School in Red Bank, N. J.

The Bell Labs project helps beginning readers overcome what educators term "decoding" problems by offering them the capability of requesting pronunciations, via the special telephone, whenever they see a difficult word. (Decoding is the intellectual process of making a match between the written code for a word and a word already in a student's understanding vocabulary). Particia Keaveney, the project's "computer", (who gives assistance to the students who call) will be replaced by an experimental "talking" computer as the project continues.

Each word a student cannot pronounce, he spells out on a TOUCH-TONE keyboard. As he keys in a word, its numerical counterpart appears on a flat, TV-like display screen in front of Miss Keaveney at Holmdel. For example, "cat" would appear as the sequence "228". Miss Keaveney interprets these numbers from a list of of numerical sequences corresponding to each word in a first and second grade vocabulary list. She then responds to the student by spelling the word orally, sounding it out phonetically, and pronouncing it. This response is designed to encourage students to work out pronunciations for themselves in the same manner.

Students in the project are evaluated by comparing their reading progress on the keyboard telephone with the progress they achieve in normal reading activities. To date, overall improvements for participating students are about the same in both conditions.

These early results of "Operation Bookstrap" show that it may one day be possible to assign students work on the telephone at home to supplement special reading classes after school. Also in the future, it may be possible for individuals to benefit from "computer assisted instruction" in many different subjects via the TOUCH-TONE telephone or something no more complicated than this device.

EDUCATIONAL TELEVISION TRANSMISSION SYSTEM CONNECTS UNIVERSITIES AND INDUSTRIES

J. P. Shanks GTE Sylvania Inc. Sylvania Technical Systems, Inc. Waltham, Mass. 02154

Completion of a 400-mile educational television transmission system is making it possible for industrial employees throughout Oklahoma to earn college degrees without leaving their business locations. The microwave network transmits courses from university campuses to industries and other universities. The system allows individuals to pursue education with high-quality instruction and minimal transportation. Students receive the televised program

at inplant classrooms and can ask questions and participate in discussions during the course of instructions. Sylvania Technical Systems, Inc., of Waltham, Mass., performed the installation under a \$756,000 contract from the Oklahoma State Regents.

GTE Lenkurt Incorporated produced the system's microwave radio, multiplex, and fault-alarm equipment which provides two one-way color video and two two-way audio channels. Both companies are GTE subsidiaries. The microwave network was installed by GTE Sylvania Incorporated.

The system utilizes 17 microwave stations to connect the cities of Ardmore, Duncan, Enid, Muskogee, Oklahoma City, Ponce City, Stillwater, and Tulsa.

AIR-POLLUTION GAME TO DEAL WITH ENVIRONMENTAL PROBLEMS

Prof. Matthew J. Reilly Carnegie-Mellon University Schenley Park Pittsburgh, Pa. 15213

Faculty members and students at Carnegie-Mellon University are designing a computer-based air pollution game to aid a variety of undergraduate programs in U.S. colleges and universities. The game will be applicable to undergraduate courses dealing with environmental problems. Students from many disciplines will be able to use the game to solve simulated air pollution problems. It will serve as a supplement to classroom instruction and visits by professionals from air pollution control agencies and related industries. The game will be made available to schools around the nation. Funding for the project is part of a total \$100,000 award by Esso to four major universities for the improvement of undergraduate education in the U.S.

NEW PRODUCTS

COLOR MATCHING BY COMPUTER CREATES A NEW BUSINESS

J. Mark Raiteri Compucolor Division Asystanco Corp. Box 12012 Research Triangle Park, N.C. 27709

Use of a Honeywell minicomputer to match colors scientifically and provide "least-cost" dye color formulas for the textile industry has created a new business. What started as a service project for a large textile firm has resulted in anationwide campaign to market the computerized system to textile, paint, cosmetics, paper and plastics firms.

The computer-based CCS 2200 system was developed over the past four years as part of the data processing and color-control work performed for Beaunit Corp., the parent firm, also based here. The system computes and prints out least-cost dye formulas to match any existing color, so that the new color looks the same to all observers under all light conditions. It is fully automatic, and all of the programs have been tested and proved with our parent company. Textile firms and textile dye houses can realize an annual savings of from 30% to 35% in dyestuff costs. Beaunit already has saved an estimated \$500,000 annually.

The CCS 2200 system includes an automatic spectrophotometer, a Honeywell 316 minicomputer, two cartridge-style magnetic tape units and a typewriter-like console. Special computer programs developed by Compucolor are leased with the system for 99 years to insure Compucolor's exclusive rights to them. The system and programs may be purchased or leased

INDUSTRIAL ROBOT WILL AUTOMATICALLY SELECT AND MATCH ACTIONS TO CHANGING JOB REQUIREMENTS

Michael M. Meyers c/o Unimation, Inc. Shelter Rock Lane Danbury, Conn. 06810

An industrial robot now can be provided with a random program selection accessory which increases the flexibility of new or existing industrial robots. The robot, through use of the accessory, can rapidly and automatically select any one of six programs that is appropriate for a specific, randomly occurring job. The new accessory may be added to existing Unimate robots in the field or purchased with a new robot

A typical application is in spot welding automobile bodies on a line in which there are intermixed body styles. Upon receipt of a signal from a sensing switch, the robot selects from its memory the appropriate welding program for the particular body style. Additional applications include: sequentially loading and unloading a rotary hearth furnace, and sorting work-pieces in a grading operation.

COMPUTER NOW RIDES UP FRONT IN POLICE CRUISERS

Chuck Gillam, General Manager Data Communications Div. Kustom Electronics, Inc. 1010 West Chestnut Chanute, Kan. 66720

Law enforcement has become more sophisticated and safer with the introduction of a device which practically puts the police department computer in the front seat of the cruiser. This unit, called the "Mobile Communications Terminal" (MCT), allows the police officer to communicate directly with the department computer by merely keying into the MCT keyboard his information request. The answer comes back instantaneously from the computer and is displayed on an implosion-proof, solid-state screen, which resembles a television screen.

The MCT may be used for a variety of patrol messages such as vehicle and driver identification, want/warrant checks and emergency signaling. The police officer can do this in the safety of his cruiser, without tying up the voice communications channel for routine requests. Because of a special electronic technique, incoming messages can be "held" in the MCT-10 before display in the event the unit is being used by the patrolman.

The Kustom MCT unit is small in size and weighs 10 pounds. It can be moved from cruiser to cruiser, requires minimal operating instructions and can be installed easily in any car having a 12-volt battery. The unit operates on the same channel as the police two-way radio.

CALENDAR OF COMING EVENTS

- Feb. 1-3, 1972: First International CAD/CAM Conference and Exhibits, Royal Coach Motor Hotel, Atlanta, Ga. / contact: Society of Manufacturing Engineers, Public Relations Dept., 20501 Ford Rd., Dearborn, Mich. 48128
- Feb. 2-4, 1972: 1972 San Diego Biomedical Symposium, Sheraton Hotel, Harbor Island, San Diego, Calif. / contact: Norman R. Silverman, M.D., San Diego Biomedical Symposium, P.O. Box 965, San Diego, Calif. 92112
- Mar. 6-8, 1972: 18th Annual Systems Management Conference, Americana Hotel, New York City, N. Y. / contact: Miss G. De Sapio, Conference Information Coordinator, American Management Association, Inc., AMA Bldg., 135 West 50th St., New York, N. Y. 10020
- Mar. 7-10, 1972: Computer Graphics in Medicine, ACM SIGGRAPH Symposium, Point Park College, Pittsburgh, Pa. / contact: Dr. John D. Canter, Chmn., Point Park College, 201 Wood St., Pittsburgh, Pa. 15222
- Mar. 8-9, 1972: Annual Spring Conference of the Association for Systems Management (Toronto Chapter), Royal York Hotel, Toronto, Ontario, Canada / contact: Mr. Donald T. Laughton, North American Life Assurance Co., 105 Adelaid St. West, Toronto 1, Ontario, Canada
- Mar. 8-10, 1972: Fifth Annual Simulation Symposium, Tampa, Fla. / contact: Annual Simulation Symposium, P.O. Box 1155, Tampa, Fla. 33601
- Mar. 20-23, 1972: IEEE International Convention & Exhibition, Coliseum & N. Y. Hilton Hotel, New York, N. Y. / contact: IEEE Head-quarters, 345 E. 47th St., New York, N. Y. 10017
- Mar. 26-29, 1972: IEEE International Convention, Coliseum & N. Y. Hilton Hotel, New York, N. Y. / contact: J. H. Schumacher, IEEE, 345 E. 475th St., New York, N. Y. 10017
- April 5-8, 1972: "Teaching Systems '72", International Congress, Berlin Congress Hall, Berlin, Germany / contact: AMK Berlin, Ausstellungs-Messe-Kongress-GmbH, Abt. Presse and Public Relations, D 1000 Berlin 19, Messedamm 22, Germany
- April 17-19, 1972: Ninth Annual Meeting and Technical Conference of the Numerical Control Society, Palmer House, Chicago, Ill. / contact: William H. White, Numerical Control Society, 44 Nassau St., Princeton, N. J. 08540
- April 25-28, 1972: Conference on Computer Aided Design, Univ. of Southampton, Southampton, England / contact: IEE Office, Savoy Place, London W.C. 2, England
- May 15-18, 1972: 5th Australian Computer Conference, Brisbane, Queensland, Australia / contact: A. W. Goldsworthy, Chmn., Australian Computer Society, Inc., Computer Center, Australian National Univ., P.O. Box 4, Canberra, A.C.T. 2600
- May 15-18, 1972: Spring Joint Computer Conference, Convention Ctr., Atlantic City, N. J. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N. J. 07645
- May 16-17, 1972: IIT Research Institute Second International Symposium on Industrial Robots, Chicago, III. / contact: K. G. Johnson, Symposium Chairman, IIT Research Institute, 10 West 35 St., Chicago, III. 60616
- May 21-24, 1972: 7th Annual Mass Retailers' Convention and Product Exposition, Marriott Motor Hotel, Atlanta, Ga. / contact: MRI Headquarters, 570 Seventh Ave., New York, N. Y. 10018
- May 23-25, 1972: Annual Society for Information Display International Symposium. Jack Tar Hotel, San Francisco, Calif. / contact: Mr. J. L. Simonds, Eastman Kodak Co., Rochester, N. Y. 14650
- May 24-26, 1972: Second Annual Regulatory Information Systems Conference, Chase-Park Plaza Hotel, St. Louis, Mo. / contact: William R. Clark, Missouri Public Service Commission, Jefferson City, Mo. 65101
- June 12-14, 1972: Conference on Computers in the Undergraduate Curricula, Sheraton-Biltmore Hotel and Georgia Institute of Technology, Atlanta, Ga. / contact: Computer Sciences Project, Southern Regional Education Board, 130 Sixth St., N.W., Atlanta, Ga. 30313
- June 12-14, 1972: International Conference on Communications, Sheraton Hotel, Philadelphia, Pa. / contact: Stanley Zebrowitz, Philco-Ford Corp., 4700 Wissahickon Ave., Philadelphia, Pa. 19144

- June 19-21, 1972: International Symposium on Fault-Tolerant Computing, Boston, Mass. / contact: John Kirkley, IEEE Computer Society, 8949 Reseda Blvd., Suite 202, Northridge, Calif. 91324
- June 19-21, 1972: Ninth Annual Design Automation Workshop, Statler Hilton Hotel, Dallas, Tex. / contact: R. B. Hitchcock, IBM Watson Research Center, P.O. Box 218, Yorktown Heights, N. Y. 10598
- June 27-30, 1972: DPMA 1972 International Data Processing Conference & Business Exposition, New York Hilton at Rockefeller Center, New York, N. Y. / contact: Richard H. Torp, (conference director), or Thomas W. Waters (exposition manager), Data Processing Management Association, 505 Busse Hwy., Park Ridge, III. 60068
- July 3-6, 1972: First Conference on Management Science and Computer Applications in Developing Countries, Cairo Hilton, Cairo, U.A.R. / contact: Dr. Mostafa El Agizy or Dr. William H. Evers, IBM Corporation, Armonk, N. Y. 10504
- Sept. 19-22, 1972: Western Electronic Show & Convention (WESCON), Los Angeles Convention Ctr., Los Angeles, Calif. / contact: WES-CON, 3600 Wilshire Blvd., Los Angeles, Calif. 90005
- Oct. 8-11, 1972: International Conference on Systems, Man and Cybernetics, Shoreham Hotel, Washington, D.C. / contact: K. S. Nurendra, Yale Univ., 10 Hill House, New Haven, Conn. 06520
- Nov. 1-3, 1972: Northeast Electronics Research & Engineering Meeting (NEREM), Boston, Mass. / contact: IEEE Boston Office, 31 Channing St., Newton, Mass. 02158
- Nov. 9-10, 1972: Canadian Symposium on Communications, Queen Elizabeth Hotel, Montreal, Quebec, Canada / contact: IEEE Head-quarters, Technical Conference Svcs., 345 E. 47th St., New York, N. Y. 10017
- Nov. 13-16, 1972: Fall Joint Computer Conference, Convention Center, Las Vegas, Nev. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N. J. 07645

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NEW CONTRACTS

<u>TO</u>	FROM	FOR	AMOUNT
Honeywell Information Systems, Wellesley Hills, Mass.	U. S. Department of Defense	Nine Series 6000 systems, with an option for 26 more, for the Worldwide Military Command and Control System	\$51.3 million
Univac Division of Sperry Rand Corp., Blue Bell, Pa.	Naval Air Systems Command	Production of UNIVAC 1830A avionics com- puter for use as primary data processor in Navy's P-3C Orion (land-based anti-subma- rine patrol aircraft) in sensory, fire control and supporting subsystems	\$11.4 million
Computer Communications, Inc., Culver City, Calif. Univac Division of Sperry Rand	Hale Bros. Assoc., Inc. (HBA), San Francisco, Calif. Daimaru Department Store,	Purchase of CCI equipment for lease to end- users of CCI products A UNIVAC 1106 for use as center of Manage-	\$5 million (approximate) \$1.8 million
Corp., Blue Bell, Pa.	Osaka, Japan	ment Information System (MIS); will link all of company's branch stores	(approximate)
Sanders Associates, Inc. Nashua, N.H.	U.S. Navy	Design and development of an electro-optic system; award expected to total in excess of \$2.2 million	\$1.1 million
Control Data Corp., Minneapolis, Minn.	Ralph M. Parsons Co., Los Angeles, Calif.	A CYBER 70 model 73 system for use in com- mercial and scientific data processing; also will provide computer capacity for overseas facilities	\$1 million+
COMTEN, Inc., formerly COMCET, Inc., Rockville, Md.	U.S. Government, Washington, D.C.	Installation of a computer data switching system; includes hardware, software and maintenance	\$650,000+
Computer Technology Inc., a subsidiary of University Com- puting Co., Dallas, Texas	Michigan Automobile Insurance Placement Facility	Processing all information and materials related to a computerized installment payment program developed for MAIFF by CT under an earlier agreement	\$500,000 (approximate)
Philco-Ford Corp., Willow Grove, Pa.	Litton Industries, Van Nuys, Calif.	Providing information display shipsets and shore equipment for the nine U.S. Navy de- stroyers funded to date by Congress	\$495,871
Computer Sciences Corp., Los Angeles, Calif.	U.S. Department of Interior Bureau of Mines	Development of a new tool (a comprehensive mathematical model of a bituminous coal mine system) for simulation and evaluation of underground coal mining operations	\$300,000
PRC Information Sciences Co., Los Angeles, Calif.	U.S. Department of Labor	An occupational safety and health manage- ment information system; it will provide communication channels between Secretary of Labor, regional and area offices	\$203,000
Informatics Inc., Canoga Park, Calif.	Department of Health, Educa- tion and Welfare	Designing both interim and long-range automatic data processing systems for Na- tional Centerfor Toxicological Research (NCTR)	\$193,000
Interdata, Inc., Oceanport, N.J.	Customer Service Division Ford Marketing Corp.	Model 70 minicomputer, a turnkey software package and three disc drives for support of 9 CRT stations and 2 remote printers for on-line data entry and retrieval	\$170,000
Infodata Systems Inc., Webster, N.Y.	Benefit Group Administrators (BGA), Arlington, Va.	A computerized group insurance system cover- ing three year period; includes lease of system, consulting and computer services	\$110,000+
Informatics Inc., Canoga Park, Calif.	Department of Health, Educa- tion and Welfare	Design of a system to replace present manu- al procedures relating to drug status in- formation; and to strengthen management and coordination of drug applications, inves- tigations and experimentation	\$100,000
Public Safety Systems, Inc., subsidiary of General Research Corp., Santa Barbara, Calif.	Philadelphia Fire Dept. Philadelphia, Pa.	Preliminary design of computer-based com- mand and control system	\$24,000
Documentor Sciences Corp., Santa Ana, Calif.	Gino's, Inc.	"Documentors", electronic point-of-sale and accounting systems; will provide communica- tion with headquarters computer center	
TRW Controls, Houston, Texas	General Public Utilities Corp., New York, N.Y.	An 18-computer control system to generate and transmit electricity more economically and use transmission network more efficiently during times of emergency.	
Ferranti-Packard, Toronto, Ontario, Canada	Arkansas Power and Light Co.	Wall displays for six different Transmis- sion Dispatch Centers	
Ferranti-Packard, Toronto, Ontario, Canada	Chicago Mercantile Exchange	Two display boards (with total of 5040 characters) for showing commodity prices	
Ferranti-Packard, Toronto, Ontario, Canada	Sao Paulo Stock Exchange, Brazil	A computer-controlled display system con- sisting of one major stock display board, and a 240-character section for statistics and message data	
American Regitel Corp., San Carlos, Calif.	Bullock's Palo Alto, Calif.	An electronic cash register system; auto- matically "reads" merchandise price tickets and performs all calculations required by sales transactions, and captures data for accounting operations	***************************************
International Computer Systems, Inc. (ICSI) West Los Angeles, Calif.	Shell Internationale Petro- leum Maatschappij, N.V., The Hague, The Netherlands	Installation of computer program "DUAL" (Dynamic Universal Assembly Language) a software program for creating user languages	<u>—</u>

NEW INSTALLATIONS

<u>OF</u>	<u>AT</u>	FOR
Control Data 3200 system	New York State University College of Forestry, Syracuse, N.Y.	Student training and forestry research; also for its administrative data processing needs
Control Data 6400 system	French Poste and Telecom Ministry (PTT), Northern France (5 systems, includes CDC 1700s)	Joint operation of 6400's by the Ministry and its subsidiary, Telesysteme, for business, marketing and engineering applications as well as for telephone subscriber service and management of communications; three 1700's will be used as data converters, high-speed remote batch terminals and later on as message concentrators
	University of Texas, Austin Texas	Linking with a previously installed CDC 6600 sys- tem; able to handle over a million programs per year on teaching activities and research
Control Data 7600 system	University of Manchester, England	First stage of a plan to make vast amounts of computing capability available through regional centers in Manchester, London and Edinburgh (System valued at \$5.1 million)
Honeywell Model 115 system	Computers and Labels, Mt. Kisco, N.Y. Harris Gould, Milan, Ohio	Subscription-fulfillment data processing in di- rect-mail advertising programs Production reporting, inventory control and finan- cial management data processing related to rubber
Honeywell Model 316 system	Royal Aircraft Establishment, Bedford, England (2 systems)	manufacturing operations Performing on-line computations and displaying parameters of a test as it proceeds; replaces data-hand-ling instrumentation at the 8-by-8 foot subsonic and supersonic tunnel (System valued at \$188,600.)
Honeywell Model 6050 system	Societe Nationale des Chemins de Fer Francais (SNCF), Paris, France (and 40 Model 316 systems)	Stock inventory and control; scheduling rolling stock, passenger reservations, message management, civil engineering calculations, and controlling SNCF commodities traffic
ICL System 4-52	Allied Building Society, South Africa (2 systems)	On-line statement and inquiry service enabling cli- ents to receive information in any part of Republic
IBM System/3 Model 10	Preferred General Agency, Anchorage, Alaska	General accounting, statements and loss records, management and profile reports
IBM System/7	American Motors, Toledo, Ohio	Exhaust emission control program; computers will be linked to sensing instruments that test performance of vehicles picked at random as they come off the production lines
IBM System/370 Model 135	National Bank of Alaska, Anchorage, Alaska	Serving remote branches across the state; will replace time consuming air service
IBM System/370 Model 145	Elgin National Industries, New York	Expansion of all its applications, ranging from inventory forecasting to customer service
IBM System/370 Model 155	Life and Casualty Insurance Co., of Tennessee, Nashville, Tenn.	Expediting the issuance of new business and handling individual policies (System valued at \$1 million)
	Sisco (Singer Information Services Company), Wayne, N.J. and Sunnyvale, Calif. (2 systems)	On-line and remote-job processing to retail and manufacturing organizations
NCR Century 100 System	Garden National Bank, Gardner City, Kan.	Processing up to 14,000 items a day; also data processing work for other area firms
NCR Century 200 system	The Cathedral of Tomorrow, Akron, Ohio	Church mailings, providing receipts for contribu- tions, and producing statistical information and management reports
	Clydesdale Bank, Glasglow, Scotland (2 systems)	Updating electronic data processing operations; will replace three medium-scale systems
	Wiggins Teape, Croydon, England	Linking all of firm's 16 branches and manufacturing plants on-line to the Croydon data center; also for accounting applications and management reports
UNIVAC 418-III system	Landsbond Der Kristelijke Mutual- iteiten, Brussels, Belgium	A variety of administrative tasks, including stor- ing membership information, settling claims, sta- tistics, and for hospital and medical applications (system valued at \$2.1 million)
UNIVAC 1106 system	The Gas Service Company, Kansas City, Mo.	Customer telephone inquiries, customer billing and payments as well as payroll processing, and general and plant accounting activities
UNIVAC 9200 system	City of Astoria and Clatsop	(system valued at about \$1.6 million) Handling tax assessments for approximately 20,000
UNIVAC 9200-II system	County, Ore. Paceco Div. of Fruehauf, Alameda,	Job costing and progress reports, engineering re-
UNIVAC 9400 system	Calif. Henrico County, Richmond, Va.	ports, work in progress, sales analysis, and payroll A variety of administrative and business functions; will also handle scheduling, grades and attendance reporting, and census reports for students as well as provide "hand-on" experience for data processing students in the county schools
	Medical Data Services, Richmond, Va.	Handling all types of accounting functions and pay- roll processing for approximately 15 hospitals lo- cated in the southeast United States

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 digit-al computers manufactured and installed, or to be manufactured and on 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

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 $% \left(1\right) =\left(1\right) \left(1\right$
- -- 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 DECEMBER 15, 1971

NAME OF	NAME OF	DATE OF	AVERAGE OR RANGE OF MONTHLY RENTAL		NUMBER OF INSTALLATIONS			NUMBER OF
NAME OF MANUFACTURER	NAME OF COMPUTER	FIRST INSTALLATION	OF MONTHLY REN \$(000)	IAL	In U.S.A.	Outside U.S.A.	In World	UNFILLED ORDERS
art 1. United States Manufacturers	COLUTER	INSTABLATION	\$(000)		0.3.A.	0.5.A.	WOIIU	OKDERS
art 1. United States Manufacturers	RECOMP II	11/58	2.5		30	0	30	Х
Anaheim, Calif. (R) (1/69)	RECOMP III	6/61	1.5		6	ŏ	6	X
ailey Meter Co.	Bailey 750	6/60	40-250	(S)	32	3	35	0
Wickliffe, Ohio	Bailey 755	11/61	200-600	(S)	6	0	6	0
(A) (8/71)	Bailey 756	2/65	60-400	(s)	16	6	22	2
()	Bailey 855/15	-	50-400	(S)	0	0	0	2
	Bailey 855/25	4/68	100-1000	(S)	11	0	11	3
	bailey 855/50	_	100-1000	(S)	0	0	0	12
unker-Ramo Corp.	BR-130	10/61	2.0		160	-	-	X
Westlake Village, Calif.	BR-133	5/64	2.4		79	-	-	X
(A)	BR-230	8/63	2.7		15	-	-	X
(12/71)	BR-300	3/59	3.0		18	-	-	Х
	BR-330	12/60	4.0		19	-	-	X
	BR-340	12/63	7.0	4-5	19	-	-	X
	BR-1018	6/71	23.0	(S)		-		
urroughs	205	1/54	4.6		25-38	2	27-40	X
Detroit, Mich.	220 P100 /P500	10/58	14.0 2.8-9.0		28-31	2	30-33	Х
(N) (1/69-5/69)	B100/B500 B2500	7/65 2/67	2.8-9.0 4.0		- 52 - 57	12	- 64-49	117
(1/69-5/69)		2/67 5/67	14.0		52 - 57 44	18	62	190
	B 3500 B 5500	3/63	23.5		65 - 74	7	72-81	190
	B6500	2/68	33.0		4	/	4	60
	B7500	4/69	44.0		-	_	-	13
	B8500	8/67	200.0		1	_	1	5
omputer Automation, Inc.	108/208/808	6/68	5.0	(S)	165	10	175	110
Newport Beach, Calif. (A) (6/71)	116/216/816	3/69	8.0	(s)	215	20	235	225
ontrol Data Corp.	G15	7/55	1.6		_	_	295	Х
Minneapolis, Minn.	G20	4/61	15.5		-	-	20	X
(R)	LGP-21	12/62	0.7		-	-	165	X
(7/71)	LGP-30	9/56	1.3		-	-	322	X
	RPC4000	1/61	1.9		-	-	75	X
	636/136/046 Series		-		_	-	29	-
	160/8090 Series	5/60	2.1-14.0		-	-	610	X
	924/924 - A	8/61	11.0		-	-	29	X
	1604/A/B	1/60	45.0		-	-	59	X
	1700/SC	5/66	3.8		-	-	400-450	0
	3100/3150	5/64	10-16		-	-	83-110	C
	3200	5/64	13.0		-	-	55-60	C
	3300	9/65	20-38		-	-	200	C C
	3400	11/64	18.0		-	-	20	
	3500 3600	8/68	25.0		-	-	15 40	C C
	3800	6/23 2/66	52.0 53.0		-	-	20	C
	6400/6500	2/66 8/64	58.0		-	-	105	C
	6600	8/64	115.0		-	_	85	C
	6700	6/67	130.9		_	_	5	C
	7600	12/68	235.0		_	_	5	C
	7000	12,00	233.0		-		3	Total:
								160 E
Oata General Corp.	NOVA	2/69	8.0	(S)			921	-
Southboro, Mass.	SUPERNOVA	5/70	9.6	(S)	_	_	173	_
(A) (10/71)	NOVA 1200	12/71	5.4	(s)	_	-	729	-
(11) (10) (11)	NOVA 800	3/71	6.9	(s)	_	_	91	_
	SUPERNOVA SC	6/71	11.9	(s)	-		15	-
Oatacraft Corp.	6024/1	5/69	54-300	(S)	12	0	12	3
Ft. Lauderdale, Fla.	6024/3	2/70	33-200	(S)	42	6	48	46
(A) (6/71)	6024/5	12/71	16-50	(S)	0	0	0	5
Digiac Corp.	Digiac 3060	1/70	9,0	(S)	45	_		7
	Digiac 3080	12/64	19.5	(S)	16	-	_	0
	Digiac 3000	12/04						
Plainview, N.Y. (A) (7/71)	Digiac 3080C	10/67	25.0	(s)	8			1_
Plainview, N.Y.					8 260 5	54 0	314 5	1 420 169

NAME OF	NAME OF	DATE OF	AVERAGE OR RAI			BER OF INSTALL		NUMBER OF	
MANUFACTURER	COMPUTER	FIRST INSTALLATION	OF MONTHLY RENTAL \$(000)		In U.S.A.	Outside U.S.A.	In World	UNFILLED ORDERS	
Digital Equipment Corp. Maynard, Mass.	PDP-1 PDP-4	11/60 8/62	3.4 1.7		48 40	2 5	50 45	X X	
(A) (2/71)	PDP-5	9/63	0.9		90	10	100	X	
PDP-711/64.3£60X	PDP-6 PDP-7	10/64 11/64	10.0 0.4		C C	C C	23 160	X X	
PDP-8	PDP-8 PDP-8/1	4/65 3/68	0.3 0.4		C C	C C	1440 3698	C C	
	PDP-8/S	9/66	0.3		C	С	1024	С	
	PDP-8/L PDP-9	11/68 12/66	- 1.1		C C	C C	3902 436	C C	
	PDP-9L	11/68	-		С	С	48	С	
	PDP-10 PDP-11	12/67 3/70	8.0 10.5	(S)	C C	C C	145 546	C C	
	PDP-12	9/69	-	• •	С	С	475	С	
	PDP-15 LINC-8	2/61 9/66	17.0		6 C	C C	15 142	C C	
								Total: 1350 E	
Electronic Associates Inc.	640	4/67	1.2		105	60	165	6	
Long Branch, N.J. (12/71) EMR Computer	8400 EMR 6020	7/67 4/65	12.0 5.4		21 C	<u>6</u>	27	2 C	
Minneapolis, Minn.	EMR 6040	7/65	6.6		C	-	-	С	
(A) (2/71)	EMR 6050 EMR 6070	2/66 10/66	9.0 15.0		C C	-	-	C C	
	EMR 6130 EMR 6135	8/67 -	5.0 2.6		C -	- -	-	С	
	EMR 6155	=	-		_	_	-	_	
								Total: 1350 E	
General Automation, Inc.	SPC-12	1/68			-		945		
Anaheim, Calif. (A) (12/71)	SPC-16 System 18/30	5/70 7/69	- -		-	-	145 100	-	
General Electric	GE-PAC 3010	5/70	2.0		3	0	3	22	
West Lynn, Mass. (Process Control Computers)	GE-PAC 4010 GE-PAC 4020	10/70 2/67	6.0 6.0		12 191	1 57	13 248	30 37	
(A) (12/71)	GE-PAC 4040 GE-PAC 4050	8/64	3.0		45	20	65	X	
	GE-PAC 4060	12/66 6/65	7.0 2.0		23 18	2 2	25 20	1 X	
Hewlett Packard Cupertino, Calif.	2114A, 2114B 2115A	10/68 11/67	0.25 0.41		_	_	1182 333	-	
(A) (8/71)	2116A, 2116B, 21	L6C 11/66	0.6			<u>-</u>	1171		
Honeywell Information Systems Wellesley Hills, Mass.	G58 G105A	5/70 6/69	1.0 1.3		-	-	-	-	
(A) (2/71)	G105B	6/69	1.4		-	-	-	-	
	G105RTS G115	7/69 4/66	1.2 2.2		200-400	- 420-680	- 620 - 1080	-	
	G120 G130	3/69 12/68	2.9 4.5		-	-	- -	-	
	G205	6/64	2.9		11	0	_ 11	_	
	G210 G215	7/60 9/63	16.0 6.0		35 15	0 1	35 16	-	
	G225	4/61	8.0		145	15	160	-	
	G235 G245	4/64 11/68	12.0 13.0		40-60 3	17	57 – 77 3	-	
	G255 T/S	10/67	17.0		15-20	-	15-20	-	
	G265 T/S G275 T/S	10/65 11/68	20.0 23.0		45 – 60 –	15-30	60-90 10	-	
	G405 G410 T/S	2/68 11/69	6.8 1.0		10-40	5	15-45	-	
	G415	5/64	7.3		- 70-100	- 240-400	240-400	_	
	G425 G430 T/S	6/64 6/69	9.6 17.0		50 – 100	20-30	70-130 -	- -	
	G435	9/65	14.0		20	6	26	-	
	G440 T/S G615	7/69 3/68	25.0 32.0		-	_	<u>-</u>	-	
	G625	4/65	43.0		23	3	26	-	
	G635 G655	5/65 12/70	47.0 80.0		20-40	3 -	23 - 43 -	_	
	н-110 н-115	868 6/70	2-7 3.5		180	7 -	255	0	
	H-120	1/66	4.8		30 800	160	30 960	-	
	н-125 н-200	12/67 3/64	7.0 7.5		150 800	220 275	370	-	
	H-400	12/61	10.5		46	40	1075 86	- X	
	H-800 H-1200	12/60 2/66	30.0 9.8		58 230	15 90	73 320	X	
	H-1250	7/68	12.0		130	55	185	<u>-</u> :	
	н-1400 н-1800	1/64 1/64	14.0 50.0		4 15	6 5	10 20	X X	
	H-2200 H-3200	1/66	18.0		125	60	185	-	
	H-4200	2/70 8/68	24.0 32.5		20 18	2 2	22 20	-	
	H-8200 DDP-24	12/68 5/63	50.0		10	3	13	-	
	DDP-116	4/65	2.65 0.9		-		90 250	x -	
	DDP-124 DDP-224	3/66 3/65	2.2 3.5		-	<u>-</u>	250	-	
	DDP-316	6/69	0.6		-	-	60 450		
	DDP-416 DDP-516	- 9/66	1.2		-	-	350 900	<u>-</u>	
	H112	10/69	-		-	<u>-</u>	75	-	
	Н632 Н1602	12/68 -	3.2			-	12	-	
	H1642	-	-		-	-	-	-	
	H1644	-			-	-	-	٠ ــ	

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL \$(000)	In U.S.A.	ER OF INSTALLA Outside U.S.A.	Arions An World	NUMBER OF UNFILLED ORDERS
oneywell (cont'd)	Н1646 Н1648	11/68	12.0	-	- - -	20	-
ВМ	H1648A System/Model 6	3/71	1.0				
White Plains, N.Y. (N) (D)	System/3 Model 10 System/7	1/70 11/71	1.1 0.35 and up	-	-	-	-
(1/69-5/69)	305	12/57	3.6	40	15	55	-
	650 1130	10/67	4.8	50 25 80	18 1227	68 3807	-
	1401	2/66 9/60	1.5 5.4	2580 2210	1836	4046	-
	1401-G	5/64	2.3	420	450	870	-
	1401-H 1410	6/67 11/61	1.3 17.0	180 156	140 116	320 272	-
	1440	4/63	4.1	1690	1174	2864	-
	1460	10/63	10.0	194	63 186	257 471	-
	1620 I, II 1800	9/60 1/66	4.1 5.1	285 415	148	563	_
	7010	10/63	26.0	67	17	84	-
	7030 704	5/61 12/55	160.0 32.0	4 12	1 1	5 13	_
	7040	6/63	25.0	35	27	2	-
	7044 705	6/63 11/55	36.5 38.0	28 18	13 3	41 21	-
	7020, 2	3/60	27.0	10	3	13	_
	7074 7080	3/60	35.0	44 13	26 2	70 15	-
	7090	8/61 11/59	60.0 63.5	4	2	6	_
	7094-I	9/62	75.0	10	4	14	-
	7094 - II 360/20	4/64 12/65	83.0 2.7	6 4690	4 3276	10 7966	-
	360/25	1/68	5.1	0	4	4	-
	360/30 360/40	5/65 4/65	10.3 19.3	4075 1260	3144 498	7219 1758	-
	360/44	7/66	11.8	65	13	78	_
	360/50	8/65	29.1	480	109	589	-
	360/65 360/67	11/65 10/65	57.2 133.8	175 9	31 4	206 13	-
	360/75	2/66	66.9	14	3	17	-
	360/85 360/90	12/69 11/67	150.3 (S)	- 5	-	- 5	-
	370/135	5/72	14.4	- -	_	_	_
	370/145	9/71	23.3	-	-	-	-
	370/155 370/165	2/71 5/71	48.0 98.7	-	_	-	_
	360/195	4/71	232.0	-	-	-	-
nterdata	370/195 Model 1	6/73 12/70	190.0-270.0 3.7	150	50	200	50
Oceanport, N.J.	Model 3	5/67	-	N/A	-	200	X
(A) (10/71)	Model 4	8/68	8.5	260	115	375	40
	Model 5 Model 15	11/70 1/69	10.5 20.0	70 40	20 24	90 64	10 X
	Model 16	5/71	14.7	1	5	6	12
	Model 18 Model 70	6/71 10/71	24.7 6.8	2 0	6 0	8 0	8 60
CR	304	16/60	10.0	10	2	12	X
Dayton, Ohio (A) (6/71)	310 315	5/61 5/62	2.5 7.0	8 425	0 300	8 725	x -
(A) (0/71)	315 RMC	9/65	9.0	125	50	175	-
	390	5/61	0.8	325	500	825	-
	500 Century 50	10/65 2/71	1.0 1.6	1000 10	1700	2700 10	-
	Century 100	9/68	2.6	1400	450	1850	_
	Century 200	6/69 2/72	7.5 20.0	405 0	155	560	-
hilco	Century 300 1000	6/63	7.0	16	0	0	<u>_</u>
Willow Grove, Pa.	200-210,211	10/58	40.0	16	-	_	X
(N) (1/69)	2000-212 301	1/63 2/61	52.0 7.0	12 140-290	100-130	240-420	X
Cherry Hill, N.J.	501	6/59	14.0-18.0	22-50	1 .	23-51	-
(N) (5/69)	601 3301	11/62	14.0-35.0	2 24 – 60	0 1 - 5	2	-
(3/63)	Spectra 70/15	7/64 9/65	17.0-35.0 4.3	90-110	35-60	25-65 125-170	_
	Spectra 70/25	9/65	6.6	68-70	18-25	86-95	-
	Spectra 70/35 Spectra 70/45	1/67 11/65	9.2 22.5	65-100 84-180	20-50 21-55	85-150 105-235	-
	Spectra 70/46	-	33.5	1	0	1	-
aytheon	Spectra 70/55 250	11/66 12/60	34.0	11 115	<u>1</u> 	12 135	<u>-</u>
Santa Ana, Calif.	440	3/64	3.6	20	_	20	X
(A)	520 703	10/65	3.2	26	1	27	X
(7/71)	703 704	10/67 3/70	12.5 (S) 8.0 (S)	172 100	31 35	203 135	2 50
	706	5/69	19.0 (S)	60	14	74	0
cientific Control Corp. Dallas, Texas (A) (10/71)	4700 DCT-132	4/69 5/69	1.8	18 24	0 35	18 59	-
	IC 4000 IC 6000-6000/E	12/68 5/67	9.0	9	0	9	2
tandard Computer Corp.	IC 0000-0000/E	5/67 8/70	16.0 17.0	3 4	0 0	3 4	1
tandard Computer Corp. Los Angeles, Calif. (A) (12/71)	IC 7000						
Los Angeles, Calif. (A) (12/71)	IC-9000	5/71	500.0 (S)	1	0	1	
Los Angeles, Calif. (A) (12/71) ystems Engineering Laboratories	IC-9000 810	5/71 9/65	1.1	24	0	24	X
Los Angeles, Calif. (A) (12/71) ystems Engineering Laboratories Ft. Lauderdale, Fla. (A)	IC-9000	5/71					
Los Angeles, Calif. (A) (12/71) ystems Engineering Laboratories Ft. Lauderdale, Fla.	1C-9000 810 810A 810B 840	5/71 9/65 8/66 9/68 11/65	1.1 0.9 1.2 1.5	24 111 75 3	0 5 1 0	24 216 76 3	X 32 26 X
Los Angeles, Calif. (A) (12/71) ystems Engineering Laboratories Ft. Lauderdale, Fla. (A)	IC-9000 810 810A 810B	5/71 9/65 8/66 9/68	1.1 0.9 1.2	24 111 75	0 5 1	24 216 76	X 32 26

SPOTLIGHT ON McGEORGE BUNDY AND THE WHITE HOUSE SITUATION ROOM , NOVEMBER 22, 1963

Robert B. Cutler Box 1465 Manchester, Mass.

The condemnation of McGeorge Bundy by Vincent Salandria in his speech of October 23, 1971, reprinted in the December 1971 issue of "Computers and Automation", stems from the following quote:

What was McGeorge Bundy doing on the day the President was dispatched? Theodore H. White in his book, The Making of the President, 1964 (New York, Atheneum, 1965, p 48) tells us that the Presidential party on its flight back to Washington on the afternoon of that fateful day "learned that there was no conspiracy, learned of the identity of Oswald and his arrest ..." This was the very first announcement of Oswald as the lone assassin. ... Who was responsible for that announcement ... (it) came from the White House Situation Room ... under the personal and direct control of McGeorge Bundy.

Prior to crediting Bundy with an important part in the ensuing conflict in Southeast Asia, it is pertinent to pose two questions:

- 1. Was this information available in Dallas prior to the Bundy announcement?
- 2. Could this information have been made available in Washington prior to the Bundy announcement?

In answer to question no. 1, Commission Exhibit No. 709 can be found on page 495 of Volume XVII, Exhibits 392 to 884, "Hearings Before the President's Commission on the Assassination of President Kennedy":

November 22, 1963

Captain W P Gannaway Special Service Bureau

SUBJECT: Lee Harvey Oswald 605 Elsbeth Street

Sir:

On November 22, 1963, at approximately 2:50 pm the undersigned officer met Special Agent James Hosty of the Federal Bureau of Investigation in the basement of the City Hall.

At that time Special Agent Hosty related to this officer that the Subject was a member of the Communist Party, and that he was residing in Dallas.

The Subject was arrested for the murder of Officer J D Tippit and is a prime suspect in the assassination of President Kennedy.

The information regarding the Subject's affiliation with the Communist Party is the first information this officer has received from the Federal Bureau of Investigation regarding same.

Agent Hosty further stated that the Federal Bureau of Investigation was aware of the Subject and that they had information that this Subject was capable of committing the assassination of President Kennedy.

Respectfully submitted (Signature) Jack Revill, Lieutenant Criminal Intelligence Section On page 34 of Volume V of "The Hearings", Lt Reville states that he obtained the information contained in the third paragraph of his statement (CE 709) from a chance meeting of some of the police officers who had participated in Oswald's arrest at 1:50 pm Dallas (Central Standard) Time. One hour later, 2:50 CST (3:50 EST), two minutes after Air Force One took off from Love Field for Washington, the Hosty-Revill interchange took place. At that time it is clear that some members of the Dallas Police Department and at least one agent of the FBI considered Oswald as the possible lone assassin. Forty minutes later, 3:30 pm CST, Capt Gannaway had Lt Revill's report, CE 709, in hand, typed and signed.

Salandria does not pin-point the time of the Bundy announcement but it is clear that the information it contained was available in Dallas some time prior to the Situation Room's Lone-Assassin Statement.

In answer to question No. 2, "Could this information have been made available to Washington prior to the Bundy announcement?", Theodore White's book, Signet Edition, 1966, is helpful:

Chester V. Clifton, military aide to President Kennedy ... though an extremely youthful Major General, had been fashioned by twenty-seven years of Army discipline. Someone must gather the threads, make contact with the national command center in Washington to find out whether this was, indeed, coup or conspiracy. Within minutes Clifton, on his own initiative, had reached the manager of the Southwestern Bell Telephone Company, clearing two lines from the hospital switchboard in Dallas direct to the White House and the Pentagon. ... Within minutes thereafter Clifton had linked the communications and telephone net from the Presidential plane, Air Force One, to the minor-surgery suite (where the next President was waiting). And by 1:20 when Kenneth O'Donnell said to Lyndon Johnson, simply, "He's gone," the new leader was in contact with every ganglion of communication in the entire world. (pp 46-7)

McGeorge Bundy was one of those ganglia and it is inconceivable that he was not connected to the Dallas Police Department.

Jim Bishop's "The Day Kennedy Was Shot" (New York, Funk and Wagnalls, 1968) describes the situation on the Cabinet plane, winging eastward also, but several thousand miles behind Air Force One.

... The State Department had a dossier on one Lee Harvey Oswald. ... Treasury wanted to relay all possible information on this man to the Secret Service. ... The Federal Bureau of Investigation which had a small file on the man ... The Central Intelligence Agency, which sensed international complications asked for copies. Aboard Air Force One the news reached President Lyndon Johnson through Major-General Chester Clifton who was sorting the messages in the communications shack, forward. The President asked for a quick check of the $\,$ Oswald situation to find out if the State Department had erred in permitting this man to return to the United States. (p 341)

In answering these two questions, probing the facts behind the initial "lone assassin — no conspiracy" announcement, it is apparent that Bundy's

role as the arch-villain with foreknowledge fingering the patsy, Oswald, has been over-emphasized by Salandria.

The facts which show how Bundy came by his information, and hence could elucidate on it naturally, tend to belie complicity in the Situation Room's announcement. This is not to excuse his future hawk-

ish actions, but only serves to point out the Army's role of planting the seed in Bundy's mind for relay to the new President.

To those who are content to continually research the facts the "how" is clearly more important than the "why", since the latter is forever fraught with a multitude of multi-faceted opinions. $\hfill \Box$

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APPLICATION OF COMPUTERS TO THE PHOTOGRAPHIC

EVIDENCE, by Richard E. Sprague (May 1970, p. 29)

A reexamination of some of the evidence relating to the assassination of John F. Kennedy — with emphasis on the possibilities and problems of computerized analysis of the photographic evidence.

 $\frac{\text{MAYBE THE COMPUTERS CAN SAVE US AFTER ALL, by Edward Yourdon (May 1971, p. 21)}{}$

A proposal for a privately owned and operated National Information Bureau which would serve as a central source of information for anyone on any subject of reasonable interest. —

"If part of the average citizen's feeling of impotence and disillusionment is caused by a lack of organized and readily-available information, would it not be possible to put such information at his fingertips with a computer?"

THE SCIENCE OF INFORMATION MANAGEMENT, by Col. Carl
J. Weinmeister, III (April 1971, p. 20)
A development of two theses: (1) Information
management systems have failed because of inadequate attention to data base construction;
and (2) A new science of information management
must be developed before really successful,
large management information systems can evolve.

<u>USING THE COMPUTER TO STEAL</u>, by Harvey S. Gellman (April 1971, p. 16)

How computers are being used for fraud and theft.

"The typical computer centre offers an open invitation to the thief or vandal; most computer systems are not presently protected against destruction, or unauthorized access or manipulation."

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() June	М	-	-	s	() Dec.	_	_	A	s	() May	M	P	A	S
() July	_	P	Α	_	1971					() June	-	P	Α	s
() Aug.	-	-	Α	S	() Jan.	M	P	Α	s	() July		P	A	s
() Sept.	-	P	A	s	() Feb	_	P	A	S	() Aug.	-	-	A	S
() Oct.	M	-	A	S	() Mar.	-	P	A	s	() Sept.	M	-	A	S
	•						•			() Oct.	M	P	A	-

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Monthly Computer Census — Continued from page 56

monthly computer census — continued		DATE OF	AVERAGE OR RANGE	NUMI	ATIONS	NUMBER OF	
NAME OF	NAME OF	FIRST	OF MONTHLY RENTAL	In	Outside	In	UNFILLED
MANUFACTURER	COMPUTER	INSTALLATION	\$(000)	U.S.A.	U.S.A.	World	ORDERS
UNIVAC Div. of Sperry Rand	I & II	3/51 & 11/57	25.0	23		-	X
New York, N.Y.	III	8/62	21.0	25	6	31	X
(A) (2/71)	File Computers	8/56	15.0	13	-	-	X
	Solid-State 80 I						
	90, I, II, & S		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	1501	628	2129	20 E
	1005	4/66	2.4	637	299	936	90 E
	1050	9/63	8.5	138	62	200	10 E
	1100 Series (exc	ept					
	1107, 1108)	12/50	35.0	9	0	9	X
	1107	10/62	57.0	8	3	11	X
	1108	9/65	68.0	87	114	201	75 E
•	9200	6/67	1.5	1051	822	1873	850 E
	9300	9/67	3.4	387	49	436	550 E
	9400	5/69	7.0	8	0	8	60 E
	LARC	5/60	135.0	2	0	2	-
Varian Data Machines	620	11/65	-			75	X
Newport Beach, Calif.	620i	6/67	-	-	-	1300	400
(A) (7/71)	R-260i	4/69	-	_	-	50	30
	520i	10/68	-	-	_	150	330
	520/DC	12/69	_	-	-	25	25
	620/f	11/70	-	0	0	7	125
	620/L	4/71		-		12	250
Xerox Data Systems	XDS-92	4/65	1.5	43	4	47	
El Segundo, Calif.	XDS-910	8/62	2.0	170	7-10	177-180	_
(R)	XDS-920	9/62	2.9	120	5-12	125-132	~
(2/71)	XDS-925	12/64	3.0	10-20	1	10-21	_
	XDS-930	6/64	3.4	159	14	173	_
	XDS-940	4/66	14.0	28-38	3	28-41	-
	XDS-9300	11/64	8.5	25-30	4	25-34	-
	Sigma 2	12/66	1.8	60-110	10-15	70-125	-
	Sigma 3	12/69	2.0	10	0	10	-
	Sigma 5	8/67	6.0	15-40	6-18	21-58	· -
	Sigma 6	6/70	12.0	_	-	_	_
	Sigma 7	12/66	12.0	24-35	5-9	29-44	-
	Sigma 9	•••	35.0	_	_		_

C.a PROBLEM CORNER

Walter Penney, CDP Problem Editor Computers and Automation

PROBLEM 721: A SCHEME OF SORTS

"What are you doing with all those strings of bits?", asked Sam, seeing Tom bent over his desk studying a page full of 1's and 0's.

"Well, they're really binary vectors", replied Tom, "I'm trying to work out a scheme for sorting them so that I can locate any one in the list."

"Why not just put them in numerical order; you can find any vector easily then — that is, if you have the complete set of 2^n ."

"Life is seldom that simple. I have the complete set, all right, but I have to arrange them according to the number of 1's. The all-0 vector first, then all the vectors that contain a single 1, etc."

"You're going to have a lot of vectors in each class except the all-0 and all-1. What secondary sort are you going to use?"

"I've decided to arrange them in numerical order from high to low if they have the same number of 1's", said Tom.

"Looks like you've got your problem licked, then", said Sam. "Why the furrowed brow?"

"Well, I can store them in order the way I've described, but I haven't figured out how to find a particular vector, that is, how to determine where in the list any given vector will occur." "Shouldn't be too tough if you know how long the vectors are."

"Yes, but I have to make this general enough for any length vectors."

How can the position of a given vector in such a list of all n-bit long vectors be determined?

Solution to Problem 7112: Cards Anyone?

Joe should come out ahead, but just barely. The probabilities (x 10!) of having to pay one, two, . . . ten dollars are respectively 362880, 1026576, 1172700, 723680, 269325, 63273, 9450, 870, 45 and 1, i.e., the Stirling numbers for n = 10. The average payment is approximately \$2.93 so that he will make about 7 cents per game.

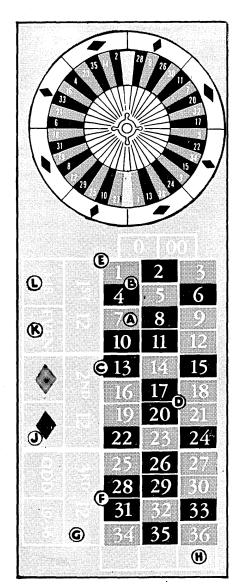
ADVERTISING INDEX

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.

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HATHAWAY INSTRUMENTS, INC., 5250 East Evans Ave., Denver, Colo. 80222 / Page 46 / Waldie and Briggs NATIONAL SYSTEMS CORP., North American School of Systems & Procedures, 4401 Birch St., Newport, Calif. 19660 / Page 51 / Wallace O. Laub, Inc. PROFESSIONAL & TECHNICAL PROGRAMS, INC., 866 Third Ave., New York, N. Y. 10022 / Page 23 / Henderson & Roll, Inc.



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- For use by all types and sizes of data processing installations . . . small-, medium-, and large-scale . . . batch and real-time, on-line systems. Suitable for inclusion in an existing security program, if any.
- More than 360 checkpoints entered on ready-to-use evaluation and rating forms. Rating and weight values are given for each checkpoint. Qualitative and quantitative scoring for all checkpoints, plus a grading system for each of eight classifications (listed below) as well as total EDP security.
- Over 80 checkpoints on physical EDP security give you control over virtually every aspect, including visitor and employee controls, destructive threats, safety, sabotage, alarms, loss control, others.
- Over 80 checkpoints on operational EDP security guide your attention to exposures in data and output handling, system access, operator controls, audit trail and controls, file changes, others.
- Over 70 checkpoints on data, program, and documentation security show you how to cope effectively with vital elements of exposure, including controls for usage, recovery measures, modification controls, protective measures, retention policies, safekeeping methods, forms security controls, others.
- Over 50 checkpoints on personnel security enable you to uncover risks that arise in pre- and
 post-employment procedures, including screening for security, investigative alternatives, sensitive job rules and practices, conditions for employment, signs that indicate high risks, others.
- Over 20 checkpoints on backup for EDP show you how to evaluate critical procedures for data, programs, documentation, testing and system checks, points of vulnerability to loss, emergencies, others.
- Over 30 checkpoints on EDP security program and procedures give you crucial insights to analyze key points in your total security program, including backup and disaster plans, orientation/review, others.
- Over 10 checkpoints on EDP insurance show the features to look for and details on coverage to consider, including property, liability, errors and omissions, business interruptions, bonding, others.
- Over 10 checkpoints on systems development security give you essential control of systems and programming security, including specification control, error/validity logic, testing/debugging, others.



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