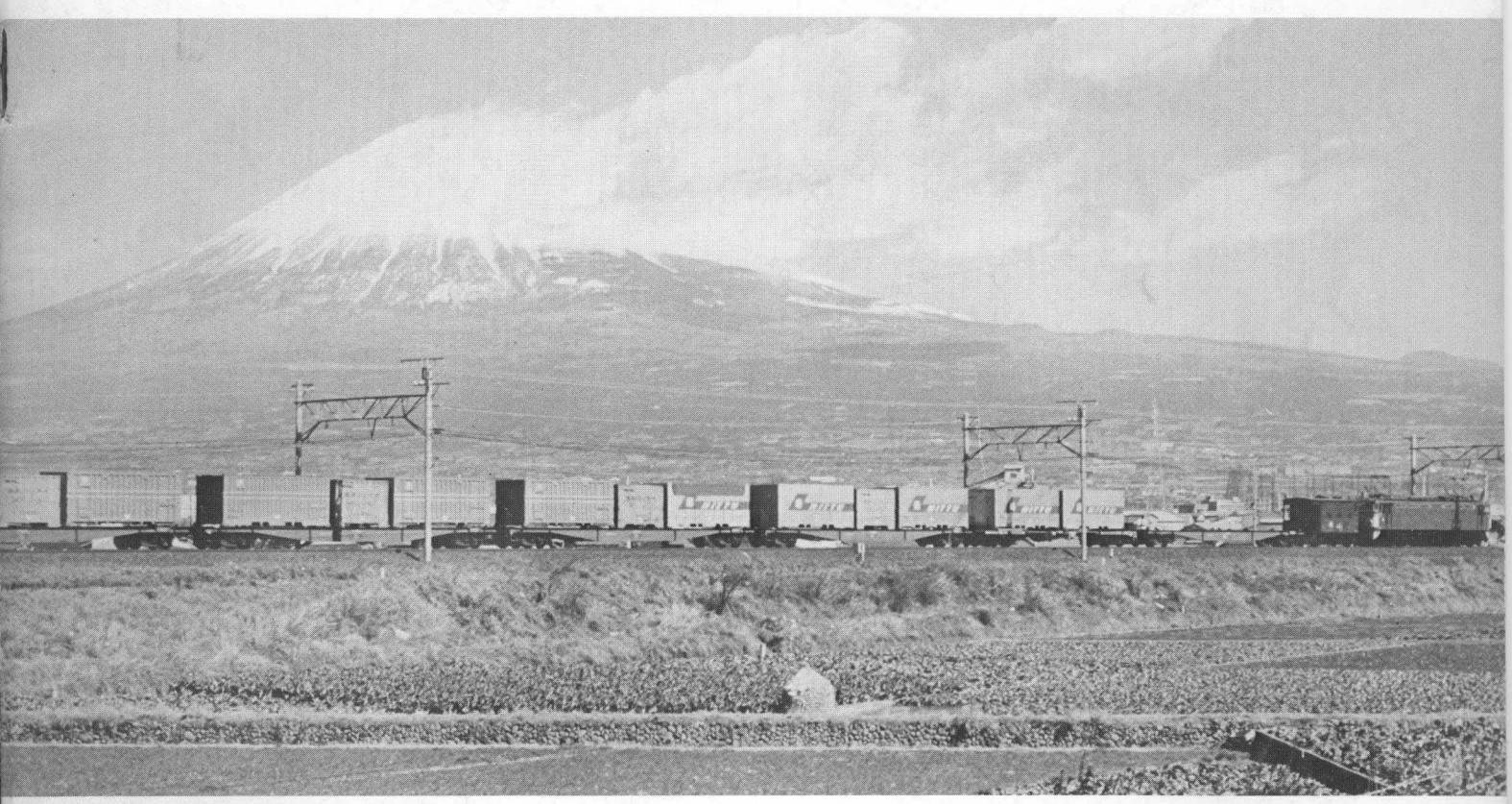
SCIENCE & TECHNOLOGY
September, 1973
Vol. 22, No. 9

computers and automation

and people



RAILWAY FREIGHT EXPRESS

INVENTORY OF THE 36 ISSUES OF — TITLES AND SUMMARIES

THE NOTEBOOK ON COMMON SENSE, FIRST YEAR

VOLUME 1

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

VOLUME 2

31. Adding Years to your Life Through Common Sense
    A person who desires to live long and stay well needs to understand some 20 principles, including how to test all the health advice he receives for its common sense, and how to develop habits of health practices which fit him.
32. The Number of Answers to a Problem
    Problems may have many answers, one answer, or no answer ... and answers that are good at one time may be bad at another.
33. "Stupidity has a Knack of Getting Its Way"
    "... as we should see if we were not always so much wrapped up in ourselves."
    — *Albert Camus*
34. Time, Sense, and Wisdom — Some Notes
    The supply of time, the quantity of time, the kinds of time, and the conversion of time. ... A great deal of the time in a man's life is regularly, systematically, and irretrievably wasted. This is a serious mistake.
35. Time, Sense, and Wisdom — Some Proverbs and Maxims
    56 quotations and remarks by dozens of great men.
36. Wisdom — An Operational Definition
    "A wise person takes things as they are and, knowing the conditions, proceeds to deal with them in such a manner as to achieve the desired result."
    — *Somerset Maugham*

EXCITING: Q: Is the Notebook exciting?
A: Some of the issues, like "Falling 1800 Feet Down a Mountain" and "Doomsday in St. Pierre, Martinique", are among the most exciting true stories we know.

USEFUL: Q: Is the Notebook useful?
A: It ought to be useful to anybody — as useful as common sense. There exists no textbook on common sense; the Notebook tries to be a good beginning to common sense, science, and wisdom.

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

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

WE WANT ONLY HAPPY AND SATISFIED SUBSCRIBERS.

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

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

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

( ) I enclose _____ ( ) Please bill me.

( ) Please bill my organization.

Name _____ Title _____

Organization _____

Address _____

Signature _____ Purch. Order No. _____

INVENTORY OF THE FIRST 20 ISSUES OF — TITLES AND SUMMARIES

THE NOTEBOOK ON COMMON SENSE, SECOND YEAR

37. The Evening Star and the Princess
    A story about how useless it is to solve the wrong problem, and how hard it is to identify the right problem.
38. The Concepts of Feedback and Feedback Control
    A dozen everyday examples of this important idea; its definition; and a clear nontechnical summary of how to apply it.
39. Seventy Excuses for a Closed Mind
    70 ways in which people often express resistance to change.
40. The Concept of a Model
    Several examples of a "model", a definition, and a dozen principles.
41. Preventing Mistakes from Unforeseen Hazards
    How to be prepared to deal sensibly with risks that you have never thought of.
42. The First Climbing of the Highest Mountain in the World — A Classic of Problem Solving
    The ascent of Mt. Everest in 1953: how it was organized and how it succeeded.
43. Poor Richard's Almanac
    An amusing excerpt from Benjamin Franklin's writing, discussing pride, waste, idleness, debt, industry, prudence, and charity.
44. Benjamin Franklin as a Youth — Five Anecdotes
45. Key Unlocking Information
    How to separate the wheat from the chaff in any field of knowledge.
46. The Concept of a Black Box
    Definition and examples; and how to use the idea.
47. Studying by Yourself
    When "the spirit is willing but the flesh is weak" the approach here outlined may lead to success.
48. Hannibal Mouse and the Other End of the World
    An entertaining parable about the development of common sense in a young person.
49. Preventing Mistakes from Placidity
    How to prevent mistakes due to calmness and inertia in the face of danger signals.
50. The Six Blind Men of Nepal
    Their encounter with the "mythical" creature, the elephant; and how, in their subsequent conference, believability outvoted turth.
51, 52. The Concept of Evolution, and the Concept of Niche.
    Two concepts that have much wider applicability than just biological evolution of living species.
53. Slowly Harmful Processes
    How to protect oneself against both known and unknown varieties.
54. A Principle Regarding Observation
    "The act of observation may alter the thing observed", and some significant examples.
55. Curiosity and Wonder — Some Notes
    "What a man knows is not to be compared with what he does not know." — Chang Tsze, c. 400 B.C.
56. Semmelweis and Antiseptic Practices
    Semmelweis discovered in 1844 that the sterilizing of hands and instruments greatly reduced death rates in maternity wards; but his discovery was disbelieved, ridiculed, and disregarded.

Some Comments from Subscribers

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

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

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

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

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

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

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

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

WE WANT ONLY HAPPY AND SATISFIED SUBSCRIBERS.

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

To: Computers and Automation and People
815 Washington St., R3, Newtonville, Mass. 02160

( ) YES, I would like to renew the "Notebook on Common Sense, Elementary and Advanced". Please renew my subscription at $12 a year, 24 issues, newsletter style, and many extras.

( ) I enclose _____

( ) Please bill my organization.

Name _____ Title _____

Organization _____

Address _____

Signature _____ Purch. Order No. _____

Vol. 22, No. 9
September, 1973

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

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

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

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

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

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

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

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

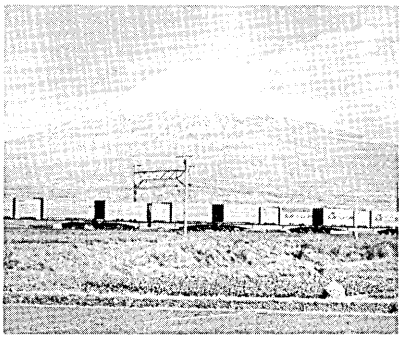
computers and automation and people

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

The Profession of Information Engineer and the Pursuit of Truth

Computers, Science, Common Sense, and Wisdom

Computers, Games, Aptitude Tests, and Puzzles



Front Cover Picture

The Japanese National Railway (JNR) is competing with the trucking industry through computerization of its freight services. For information about JNR's Freight Information System, see page 22.

Departments

Key

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

NOTICE

Effective October 20, the subscription rate of *Computers and Automation* will be:

United States, $11.50 for one year, $22.00 for two years.

Canada, $12.50 for one year, $24.00 for two years.

Foreign, $17.50 for one year, $34.00 for two years.

The above rates do not include *The Computer Directory and Buyers' Guide.* If you elect to receive *The Computer Directory and Buyers' Guide,* please add $12.00 per year to your subscription rate in U.S. and Canada, and $15.00 per year elsewhere.

No discounts are allowed to any subscription agencies for the first 40 subscriptions to *Computers and Automation* received in any calendar year. After the first 40 subscriptions to *Computers and Automation,* the maximum discount allowed is 10%.

The price of a back copy is $2.00 for 1971 to date and $3.00 for 1970 and earlier. *The Computer Directory and Buyers' Guide* is $6.00 for 1971 and earlier, and $18.50 for 1972 and 1973.

Our second publication, *The C&A Notebook on Common Sense, Elementary and Advanced,* will remain at $12.00 per year for the first year (24 or more issues); any person subscribing to both publications at the same time, may deduct $2.00 per year from the total cost.

No discounts are allowed to any subscription agencies for subscriptions to *The C&A Notebook on Common Sense, Elementary and Advanced.*

Establishments and Truth

According to the dictionary, an establishment is

- something that has been established (made firm or stable, instituted permanently by enactment or agreement such as a law)
- a settled arrangement
- an established church (a church recognized by law as the official church of a nation and supported by civil authority)
- a permanent civil or military organization
- a public or private institution
- the social, economic, and political leaders of such an order.

There are also some more definitions which do not concern us at the moment.

There is no doubt that the United States has a great number of establishments, big and little. In the recent hearings in the Senate under Senator Sam Ervin on the Watergate crimes, we have been witnessing the coming apart of an establishment centered in the administration of President Richard M. Nixon and the Republican Committee to Reelect the President. Person after person of high government rank, including two former attorney generals and many former presidential assistants, are being found to have committed crimes, or to have been associated with crimes or with covering them up, concealing the truth. This is not trivial or private truth – but public truth of top importance to the people of the United States, affecting the outcome of elections, the spending of millions of dollars of public money, the waging or non-waging of war, etc.

In the course of my life I think I have encountered well over 100 establishments, including:

- the family I was born into
- the schools I attended, local, preparatory, and college
- two large life insurance company home offices
- the United States Navy, in which I served from 1942 to 1946, in four locations
- a public school system in the Boston area in which I sought to persuade the school committee to adopt objective (not relative) measures of education produced (actual, not "credits"), and so I found out about many educational establishments
- at least twenty establishments in the field of computers and data processing
- at least a dozen establishments in the medical field
- at least a dozen establishments in the publishing field and more besides.

By "encounter" I mean that I have had enough to do with them so that I have seen to some extent how they operate, both favorably to me and unfavorably to me. I have "learned the ropes". I have communicated via "the grapevine". I have discovered the ways to "keep my neck in". And I think I have developed a very healthy respect for the mule-like kicks that establishments can deliver.

For example, about twenty years ago Berkeley Enterprises, the publisher of *Computers and Automation,* developed a kit called "Letters for Fun". With this kit parents themselves could help teach their children how to read phonically, because schools were using the Look-Say Method instead of the Phonic Method, and it seemed that well over 80% of children were not learning to read. We applied to advertise the kit in *Parents Magazine.* But we were not permitted to advertise the kit in that magazine, for before they would accept our advertisement, we had to give them a testimonial from a member of the educational establishment, a Ph.D. in Education, apparently, that the kit was "sound". And of course the kit was not "sound" because it advocated two heresies: that parents could actually help teach their own children to read (which contradicted "teacher knows best" and "reading readiness" nonsense); and the Phonic Method (which contradicted the Look-Say Method).

From my study of and experience with establishments, I believe the following natural laws apply:

- Because an establishment develops to perform a function, usually at the outset it performs the function very well, and so it derives a great deal of its strength from its belief in the "obvious" importance and worthwhileness of its function.
- As an establishment ages over the years, it tends to become more and more blind and bureaucratic in its behavior.
- An establishment develops fashions, fads, and mythology (examples: the "national security" blanket; the "peace with honor" hoax; etc.).
- An establishment will not willingly tolerate truth that puts it in an unfavorable light.
- An establishment is a kind of system, and therefore should be made subject to all the laws for the proper functioning of systems, including feedback control.

In other words, for nearly all the years that an establishment is in existence, the correction and modification of that establishment by applying truth to it is vitally necessary.

Here is another reason why those persons, who are now called "computer professionals," and in days to come ought to be called "information engineers," need to concern themselves with truth, in great variety and on many levels. Information processing is really important only if you are dealing with the truth.

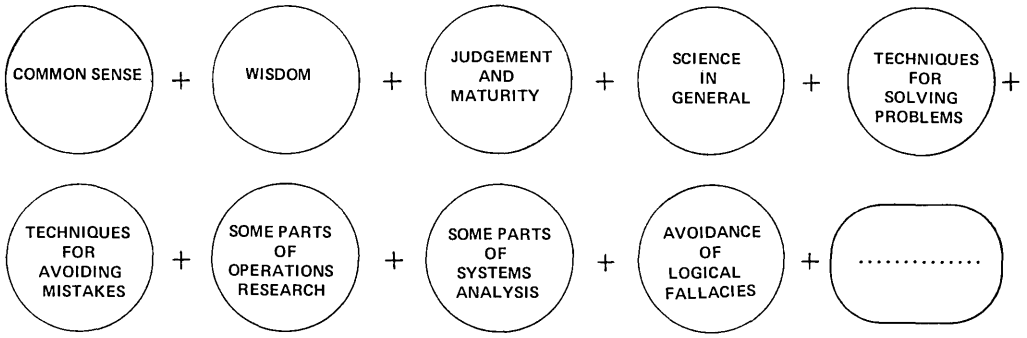
Edmund C. Berkeley

Edmund C. Berkeley
Editor

The Notebook on
COMMON SENSE, ELEMENTARY AND ADVANCED

is devoted to development, exposition, and illustration of what may be the most important of all fields of knowledge:

WHAT IS GENERALLY TRUE AND IMPORTANT =



PURPOSES:

to help you avoid pitfalls
to prevent mistakes before they happen
to display new paths around old obstacles
to point out new solutions to old problems
to stimulate your resourcefulness
to increase your accomplishments
to improve your capacities
to help you solve problems
to give you more tools to think with
. . . . .

Topic:
THE SYSTEMATIC PREVENTION OF MISTAKES

Already Published

Preventing Mistakes from:
- Failure to Understand
- Forgetting
- Unforeseen Hazards
- Placidity

To Come

Preventing Mistakes from:
- Bias
- Camouflage
- Interpretation
- Distraction
- Gullibility
- Failure to Observe
- Failure to Inspect
- Prejudice

. . . .

Topic:
SYSTEMATIC EXAMINATION OF GENERAL CONCEPTS

Already Published

The Concept of:
- Expert
- Rationalizing
- Feedback
- Model
- Black Box
- Evolution
- Niche

To Come
- Strategy
- Understanding
- Teachable Moment
- Indeterminacy
- System
- Operational Definition

. . . .

For the inventory of 56 titles and summaries so far published — see pages 2 and 3 of this issue.

8 REASONS TO BE INTERESTED IN THE FIELD OF COMMON SENSE, WISDOM, AND GENERAL SCIENCE

COMPUTERS are important —
But the computer field is over 25 years old. Here is a new field where you can get in on the ground floor to make your mark.

MATHEMATICS is important —
But this field is more important than mathematics, because common sense, wisdom, and general science have more applications.

WISDOM is important —
This field can be reasonably called "the engineering of wisdom".

COMMON SENSE is important —
This field includes the systematic study and development of common sense.

SCIENCE is important —
This field includes what is common to all the sciences, what is generally true and important in the sciences.

MISTAKES are costly and to be AVOIDED —
This field includes the systematic study of the prevention of mistakes.

MONEY is important —
The systematic prevention of mistakes in your organization might save 10 to 20% of its expenses per year.

OPPORTUNITY is important —
If you enter or renew your subscription to both *Computers and Automation* and the *Notebook on Common Sense* at the same time, direct to us, — you may take off $2.00 per year from the total cost.

(may be copied on any piece of paper)

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

( ) Yes, please enter my subscription to *The Notebook on Common Sense, Elementary and Advanced* at $12 a year (24 issues), plus extras. I understand that you always begin at the beginning and so I shall not miss any issues.

( ) Please send me as free premiums for subscribing:

1. Right Answers — A Short Guide to Obtaining 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

( ) I enclose $_____ ( ) Please bill my organization

RETURNABLE IN 7 DAYS FOR FULL REFUND IF NOT SATISFACTORY
HOW CAN YOU LOSE?

Name_____ Title_____

Organization_____

Address (including zip)_____

Signature_____ Purchase Order No._____

Remote Terminal Systems for Computers — Part 1

Lee W. Wagenhals, Captain, USAF
Jon F. Reynolds, Captain, USAF
Edward J. Fisher, Lt. Col., USAF
Air University
Air Force Institute of Technology
Wright-Patterson AFB, Ohio 45433

"The problem can be likened to the decision of what type of car to buy."

The use of centralized large-scale computers with timeshared remote terminals has become one of the most cost-effective means of providing automated data processing capabilities to many users. The electronics industry offers an extensive and impressive menu of terminal hardware and communications options to be used at the remote sites. Moreover, timesharing vendors can supply a wide variety of computational and business services, special programming languages, software, and information system support services. It is hard, therefore, to select from this "embarrassment of riches" the best terminal system configuration to satisfy the data processing requirements of the remote site at an economical cost.

Difficulties in Terminal System Selection

Normally, many terminal configurations will get the job done; but intuitively it would seem that only one would be best from a cost-effectiveness point of view. In any acquisition decision, cost is one of the most significant factors, and this is certainly true for selecting a remote terminal system. Costs should first be examined at the outset to determine if a terminal system is worthwhile by comparing terminal system costs with the improved service or savings which result from the system. Cost is also a central factor in comparing different terminal system configurations, once it is decided to procure a terminal system. For example, a terminal may be installed with a full-time leased communications line when the data processing workload indicates that a dial-up arrangement would be cheaper.

However, there are other factors which will also heavily influence the terminal system choice. Such factors include ease of use, compatibility with communications, and the degree of interaction between the terminal and the central processor and between the user and the terminal. Typical of problems that can arise in this area is that of having the terminal keyboard arranged as a conventional typewriter while most of the terminal users cannot type and would find an alphabetical key layout much more convenient. Thus in many cases the designers and purchasers of data processing equipment may fail to take fully into account the user's requirements.

Furthermore, users are generally not familiar with the language of system designers. This problem has been increasingly compounded by a growing vocabulary of technical jargon foreign to the terminal user, making it difficult for him to communicate his data processing needs to the systems designer. Often the problem can be likened to the decision of what type of car to buy. Customers are confronted with horsepower, transmissions, color, fuel economy, and huge lists of options when basically purchasing a means of transportation from one point to another. Consequently, a systematic technique is needed for clearly specifying the user's requirements and translating them into the characteristics of the available products and services.

Complicating the selection of a computer remote terminal system one step further is the fact that various products and services may not be compatible. Some terminals may simply not work with certain communications options. Or, perhaps, a terminal which is highly desirable for its layout,ease of use, and portability is just not capable of transmitting data at the speeds required. Also, it could happen that a prospective timesharing vendor cannot handle the volume of data needed for certain application programs or for projected data processing utilization rates. Therefore, in addition to all cost limitations and user requirements, consideration must be given to compatibility constraints among the components of the terminal system.

An Approach to the Problem of Terminal System Selection

What we propose to do in this technical report is to provide a methodology for the specification and selection of a computer remote terminal system. The methodology, in general terms, consists of systematically identifying and classifying the user's job requirements, and then applying a step-by-step system selection technique to match the user's needs with available hardware and services. Through a process of evaluation and selection from the various combinations of terminal devices, communications services. and timeshared computing capabilities, an appropriate selection technique determines which of these combinations are feasible and effective and best meet the user's needs at near-optimal cost.

Because a prerequisite to the successful application of the selection technique is a careful specification of the user's job requirements, the importance of the user's job requirements specification cannot be overemphasized. Further, the development of a comprehensive job specification is based upon

and is stated in terms of the terminal system component characteristics. This in turn necessitates a substantive knowledge and understanding of the nature and types of services and equipment characteristics. Here, therefore, we focus upon the major remote terminal system components and their characteristics, with the objective of describing and showing how comparative listings of system component characteristics can be developed. These characteristics will then become an input into a suitable selection technique.

To provide a clearer common framework for our discussion, we have chosen to limit the scope of our attention to available, off-the-shelf, equipment and services. The kinds of terminals we shall consider are restricted to the smaller general purpose terminals without graphics capabilities; and these can generally be classified as standard teleprinter keyboard terminals, alphanumeric cathode ray tubes (CRT's) with keyboard input, or small portable "attache case" units with keyboards. Consequently it is assumed that terminal site preparation costs are negligible because the equipment is of the small "desk-top" variety. These devices operate on existing power supplies and do not require strict temperature and humidity control. Furthermore, we shall assume that the remote terminal is connected to a central data processing computer site in some kind of a timeshared arrangement.

Major Components of the Remote Terminal System and their Characteristics

A typical computer remote terminal system can be most simply represented from the user's point of view as depicted in Figure 1. Here can be seen the three primary components of a remote terminal system: the central site computer, the communications channel, and the remote terminal itself. In addition,

Figure 1

Computer Remote Terminal System

there is also shown a fourth component of interest to the user, the modem (an acronym for MOdulator-DEModulator) which is the interfacing device connecting the terminal to the communications channel. Each of these components and their main characteristics will be briefly described.

Timesharing Computing Sites

Timesharing services are marketed throughout the country by a number of firms offering a wide variety of computing capabilities and services. And it is through the economies of scale provided by having many users tied into very large centrally-sited computers that a small user can avail himself of rather sophisticated computational features and power at an economical cost. Moreover, because of the very nature of the timesharing of these large central processors through multiprocessing and multiprogramming, the individual user's response time for his remote terminal is generally so short that he is hardly aware of all the other users' demands on the central processor.

However, because timesharing vendor firms do differ in the services offered, there are a number of factors which the potential user will wish to consider for his remote terminal system. Some of the principal factors involved include the following ones.

1. Software and Languages. Most timesharing vendors have the capability for handling several different programming languages, especially the most common ones, COBOL and FORTRAN. However, the opportunity of using some of the other well-known languages such as BASIC, ALGOL, JOVIAL, PL/I, and APL may be very desirable as a means of providing the greatest convenience to a broad range of users. Moreover, the use of more specialized languages for simulations or for other particular applications may cause SIMSCRIPT, GASP, GPSS, or the Biomedical Statistical Program Series to be attractive additional features.

2. Application Packages and Customer Data Base Support. For many types of businesses, elaborate standardized programs and application packages already exist which can save the small to medium sized user a great deal of time, effort, and programming costs. In the fields of banking, statistical analysis, education, engineering, and accounting, to name just a few, excellent application packages are often available from the timesharing vendor. In addition, the timesharing vendor can not only provide and maintain large-scale data bases, but may also permit access to large commercial data bases, such as name lists for direct mailings, industry-wide statistics, credit ratings and so forth.

3. Terminal Support Capability. Of crucial interest to the remote terminal user is the type of terminals which the central site can service. While the remote terminal user may be primarily concerned with whether the vendor can support teleprinters and cathode ray tube (CRT) terminals and of different makes and models, the use of other types of input devices such as badge readers or optical character readers may also be important.

4. General Data System Service. Several factors may be grouped together under the broad heading of data system service. Here the user may be concerned with the number of other users, the amount of storage available for his programs, response times, operating hours, file security arrangements, and back-up mode contingency options.

5. Usage Charge Schedules and Fees. The timesharing vendor's usage charge method in combination with the nature of the user's remote terminal utilization can have a varying effect on total usage costs. Often the user may be able to take advantage of lower processing rates during evening or weekend hours. Depending upon whether the vendor charges a flat connect-time fee, a rate based upon CPU time used, or some combination of these, the user can sometimes effect considerable dollar savings through an analysis of his utilization structure and then shopping among vendors for the lowest overall costs.

Communications Services

Practically all communications services used with remote terminals would be provided by common carriers. The two major common carriers are the telepone company and Western Union. Communications lines fall into one of three categories of speed:

1. Narrow-Band: Lines designed for telegraph and similar low speed devices transmitting at speeds ranging from 45 to 150 bits per second.

2. Voice-Band: Telephone channels which transmit at medium speeds usually from 600 to 10,800 bits per second.

3. Wideband: Lines giving speeds much higher than voice channels, i.e., speeds from 19,200 to 500,000 bits per second. Since wideband circuits would not be used with single, general purpose remote terminals, they will not be discussed any further. As was mentioned earlier, communications lines can be either public or private. Public lines are sometimes called switched lines because the caller dials the number he is calling and the line connection is made by switching the call through various public exchanges. Private lines are sometimes called leased or dedicated lines since they are permanently connected between the two ends.

Within the categories listed above there are many possible communications selections for use with remote terminals. Some of the most common ones are:

Common User Telegraph Service: These are switched services with the two main services being TWX, pronounced "twix" (AT&T) and TELEX (Western Union). These systems are generally used for teletypewriter-to-teletypewriter transfer of information.

Common User Telephone Service: This system is essentially the same as the Direct Distance Dial (DDD) system used by the standard household telephone. It is a switched system and operates at voice band speeds. With this service the phone company may also provide the modem which they call the DATASET which also contains a telephone hand set and dial for dialing the distant end. This communications line and service is called Dataphone.

WATS (Wide Area Telephone Service): With this service a flat rate is charged each month for each WATS line regardless of the number of calls which are placed within one or more of six progressively larger geographic areas with the sixth covering the 48 continental United States. Another type of WATS provides for a fixed rate for up to 10 hours of calling per month with charges for each additional hour of use. Each call uses the switched public telephone system. Intrastate WATS covers calls within the user's home state. Inward WATS allows callers to call the WATS customer for free. The WATS service is designed for customers who originate or receive large volumes of calls to or from a wide geographic area.

Leased Telegraph Channels: These services are point-to-point channels which operate at narrow band speeds without switching or dialing provisions.

Leased Voice-band Channels: These services are similar to leased telegraph channels with no switching or dialing provisions.

Modems

The modem provides the essential interface between the terminal and the communications system. It provides the transformation between the digital signals the terminal uses and the analog signals transmitted on the communications lines. The digital to analog conversion is done by modulation and the analog to digital conversion by demodulation. A modem then is a MOdulator-DEModulator.

In order for a modem to successfully interface with a system, four conditions must exist. First, the data rate of the terminal and modem, the operating mode, and the line conditioning must be comparable. Second, the physical connections between the modem and terminal must be compatible. Third, communication leads must be compatible with modem connectors, and fourth, the modem at the remote terminal must be compatible with the modem at the computer site. The operating mode of the modem could be simplex, half duplex, or full duplex. The connection to the communications line could be either two-wire or four-wire.

Prior to 1969, non-Bell Telephone Company modems could be used only on leased lines. Data transmission over the public telephone network was accomplished via Bell-provided DATASET's (modems). In 1969 Tariff 263 came into being which allowed competitive source modems to be connected to the public telephone system. However, the user must lease with the line a data access arrangement (DAA) which interfaces the user's modem with the telephone line. The DAA acts like a normal household telephone and is used to dial the connection. But unlike a regular telephone it has a switch which when pushed connects the line to the modem. There are various types of DAA's available. Some are very fancy and are capable of automatically originating or answering calls.

Handshaking

In addition to modulating and demodulating, modems perform another important function called "handshaking". Handshaking is an operation whereby the modems at each end of the line establish and maintain the connection. For example, if a terminal in half duplex mode wishes to send to a computer, the terminal modem sends a signal to the computer modem which provides this information. The computer modem then sends a signal to the computer telling the computer that the terminal wishes to send. When the computer is ready to receive, it sends a "Data Terminal Ready" signal to its modem. The computer modem then sends a tone to the terminal modem. Upon receiving this tone the terminal modem returns a tone back to the computer modem and then sends a "Clear to Send" signal to the terminal. At the same time the computer modem sends a "Clear to Send" signal to the computer and the data connection is completed. Each time the direction of data flow changes, a similar operation takes place.

While all modems are used for the same purpose, they accomplish this purpose in different ways. The primary points of comparison are line conditioning requirements, modulation method, sychronization, figure or merit, speed, and error performance.

Line conditioning. Some modems will operate on unconditioned lines, some will operate on either conditioned or unconditioned lines. The public (DDD) network is unconditioned. Thus, if the DDD is the communications channel used, then a modem designed for this mode must be selected. Modems which can operate on either conditioned or unconditioned lines usually operate at a higher rate on conditioned lines. For example, the Western Electric 202 DATASET can operate at 1200 bits per second on dial-up lines but can run at 1800 bits per second on conditioned lines.

Modulation method. There are many different modulation methods employed by modem manufacturers. All are basic expansions of amplitude modulation, frequency modulation, or phase modulation. The modulation method is important because data speed, error rate, and bandwidth requirements are related to it. In addition, the modulation method affects modem compatibility.

Synchronization. Modems can operate either synchronously or asynchronously. Some modems can op-

erate with only one or the other type of synchonization, others can be operated with either.

Figure of merit. The figure of merit indicates how efficiently a modem uses the available bandwidth. The figure of merit is defined as m bits per second per cycle of bandwidth. For example, if m, the figure of merit, is one and 2400 Hertz of bandwidth are available, then the modem can operate at 2400 bits per second. If m is two, then the modem can operate at 4800 bits per second at 2400 Hertz bandwidth. The higher m, the higher the modem speed over the communications channel. On the other hand, as m increases, so does cost and susceptibility to errors.

Error performance. Systematic and fortuitous noise on the communications channel can cause errors. As the figure of merit increases so does the expected number of errors and the requirement for conditioned communications lines. Most modem manufacturers quote the error rate as ten to a minus power. An error rate of 10^{-5} means that on the average, the modem will make one bit error for every 100,000 bits transmitted. Similarly, an error rate of 10^{-6} means one bit error in 1,000,000 bits. The most common error rates are 10^{-5}, 10^{-6}, or 10^{-7}. There are literally hundreds of modems available that can be used with small general purpose remote terminals. They come from two major sources: the telephone company and commercial electronics firms. Telephone company modems are called DATASET's and are rated by series. Since the communications lines are normally provided by the telephone company, using a Dataset may be the easiest method of obtaining a modem provided the computer site modem is compatible with the Dataset. However, with the keen competition in the modem industry, it might be more cost effective to purchase a commercially made modem.

Remote Terminals: Teleprinters

Teleprinters are terminal devices with keyboards which produce hard page copies and can transmit to and receive digital information from remote components. Most teleprinters bear a strong resemblance to electric typewriters. This can lead to the misconception they all have the same characteristics as typewriters and that the primary criteria for selection is cost and speed. This is not true. There are scores of teleprinters currently on the market. Each has its own features and characteristics and the prices range from $500 to over $12,000. Rational selection should be based on the evaluation of all these features, otherwise a terminal may be selected which is not capable of performing all the functions that would be useful to the user.

Teleprinters have four main functions as shown in Figure 2.

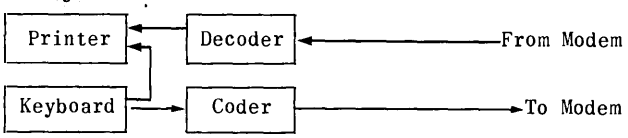


Figure 2
Functions of a Teleprinter

In operation, information is transferred from the teleprinter to the communications line by typing on the keyboard. The mechanical action of keystroking is transformed into digital electrical signals which are transferred to the modem for transmission on the communications circuit. Data received from the modem is in digital form. The decoder transforms this into the necessary mechanical form for use by the printing mechanism. The printing mechanism then prints the characters on the paper. In some systems, what is typed on the keyboard is transferred to both the printer and the coder. In others the characters are transferred to the coder only.

Compatibility between terminals and modems is an important consideration in discussing operational concepts. Fortunately nearly all teleprinters use the 8-level ASCII code or a subset of it which incures compatibility between terminals. In addition, electrical interface between teleprinters and modems has also been standardized. The Electronics Industries Association (EIA) RS-232B interface standard is widely used, thereby minimizing teleprinter-modem compatibility problems.

Perhaps the most distinguishing feature of teleprinters is that they provide a hard page copy of the transaction between the terminal user and the distant end. This fact is one of the major factors used in determining whether or not to select a teleprinter over another type of terminal such as a cathod ray tube. With a hard page copy, a terminal user can examine what he did 20 minutes ago or even last week. This is not possible with a cathode ray tube terminal.

Aside from the functions and characters which are common to all teleprinters, there are several factors which should be analyzed in the evaluation of teleprinter selection. Some of the more important of these are:

1. Cost: In most acquisition decisions, cost is one of the most important factors. As was mentioned above, teleprinter costs range from $500 to over $12,000. However, it is by no means the sole criteria.

2. Speed: Teleprinter speed is usually measured in characters per second (CPS) or words per minute (WPM). This is normally the maximum rate at which the teleprinter can receive and print information. The most common rate is 100 WPM (10 CPS) although 150 and 300 WPM are commonplace. With recent developments a few teleprinters are now available with speeds of 1200 WPM. Speed is generally more important for receiving rather than transmitting data since the transmission rate depends on the rate at which the operator can type. On the other hand, the rate at which a computer can send data to the teleprinter is limited only by the speed of the modem, communications lines, and the teleprinter itself. Evaluation of speed is then primarily based on the amount of receive traffic and amount of time required to receive that traffic.

3. Half or Full Duplex: Some teleprinters operate only in half duplex mode in which data flows in one direction at a time. Others can operate in either mode. With half duplex mode, usually the printer prints both the characters transmitted via the keyboard and the characters received since the characters flow in one direction at a time. In full duplex operation, data can flow in both directions simultaneously which is its main advantage over half duplex. On the other hand, it is possible to make a copy of only one direction's traffic since there is only one printer. Selection of a teleprinter based on its half of full duplex capabilities depends on the application for which it is to be used. If it is to be used interactively with a computer in a query-response type of operation, half duplex is probably the best mode since transmitting and receiving will not normally be done simultaneously. It must be pointed out that full duplex equipment

can operate in half duplex mode but the reverse is not true. Thus, for flexibility, full duplex machines are probably the best consideration.

4. The Keyboard: Keyboards vary in both layout and ease of use. The most common layout is like the standard typewriter which offers the advantage of making it easier for an operator with typing ability to use. Some have moved the numeral keys into a separate cluster like that of a simple adding machine to ease the keying of numbers. In some, the machine function keys, such as carriage return, line feed, vertical and horizontal tab clear and set buttons, have been clustered separately. Many keyboards are easier to operate than others. The IBM 2741 terminal has the feel, performance, and operating characteristics of an IBM Selectric Typewriter, making it very easy for even a novice to use. On the other hand, Teletype Corporation's Model 28, 33, 35, etc., take some getting used to in that their feel is different from the standard electric typewriter.

The type of keyboard can be an important factor in terminal selection especially if the terminal requires a lot of use. A poorly designed keyboard from a human engineering standpoint can cause fatigue, errors, and an overall reduction in efficiency.

5. Platens and Paper: This characteristic requires careful consideration. Teleprinters come with a variety of platen sizes which affect the type of paper they can accommodate as well as the format of the output. Platen widths also affect the maximum number of characters that can be printed on one line. Some teleprinters will print less than 70 characters per line while some go as high as 156. Some platens are friction feed while others are pin feed. Not all printers have the option of using single sheets of paper, multiple sheets with carbons, "ditto" masters, mimeograph stencils, folded paper (fan fold), roll paper, etc. The ease of changing paper varies greatly. In addition, some teleprinters require specially treated paper because of the method of printing. Before selecting a teleprinter, the paper requirements should be carefully examined. If a variety of forms and paper widths are going to be used, then the printer must be able to accommodate them. Otherwise the terminal will not be used to its full potential.

6. Printing Characteristics: Various teleprinters have varying degrees of sophistication in printing characteristics. Many print only upper case characters while others print in both upper and lower case and in two colors with multi-colored ribbon. In some, the type font can be easily changed and special characters added or deleted. Some teleprinters such as the Teletype Corporation Model 33 have an annoying characteristic delay between striking a key on the keyboard and the printing of the character on the page. Formatting capabilities vary greatly. Some printers have no tab stops and always space the same distance horizontally. With others, the paper can be clicked up or down either full or half space, and there is a variety of horizontal and vertical tab stops. Some machines can be backspaced and others cannot. It is not possible with some teleprinters to tell where on the page or at what position relative to the margin (i.e., what column number) the next character will be typed. Depending on the intended application of the terminal these factors may or may not be significant.

7. Physical Characteristics: Teleprinters come in all shapes and sizes. Several physical attributes should be considered before making a selection. Some teleprinters are the desk top variety and others come with their own floor-mounted stand. Some have smooth corners and others sharp edges which can catch clothing or gash door jams. If a model has its own stand it may or may not have room for the mounting of the modem.

One of the important physical characteristics is portability. In many applications it may be desirable to be able to move the terminal from office to office. Some companies have developed teleprinters which are so portable they can be carried in an attache case. These models come complete with their own modified modem called an acoustic coupler. An acoustic coupler allows the teleprinter to have access to the switched telephone lines simply by placing any standard telephone handset into the cradle provided in the acoustic coupler. An acoustic coupler contains a speaker which sends analog tones into the phone's mouthpiece and a microphone which receives the analog tones from the distant computer. Teleprinters so equipped offer the ultimate in portability.

8. Options: Some teleprinters have the flexibility of adding options for present or future expansion. One option becoming popular is an add-on magnetic tape cassette or cartridge. Typical cassettes or cartridges can store up to 50,000 characters at the remote site. With this option it is possible to store a day's worth of source input data which then can be transmitted at full terminal speed over dial-up communications lines thus reducing total connection time. If requirements allow, the transmittal can be done at night when communications charges are lowest. They can also receive data at night for local print out in the morning.

Paper Tape

A similar feature which has been used with teleprinters for years is the paper tape reader and punch. These devices punch the characters in a code in paper tape that is about one inch wide. The paper tape, like magnetic tape, can then be read at a later time. The main disadvantage of paper tape is that it is bulky and can only be used a few times before it wears out. On the other hand, paper tape can be imprinted so it can be read by people, making it easier to find a specific record. With magnetic tape, unless a specific record can be identified by some unique code and then printed out, the record can only be found by printing the tape from the beginning until the record is found. This can be time-consuming. At ten characters per second it would take nearly 2 hours to read an entire cartridge that has 50,000 characters on it.

Off-line

Most teleprinters can be operated in off-line (not connected to the communications line) mode as well as in on-line mode. With teleprinters with the correct platen, keyboard, and printing characteristics, this means the terminal can be used as an office electric typewriter when it is not being used as a terminal. However, if the terminal only prints in upper case or cannot handle single sheets of paper, the off-line mode feature does not afford this advantage.

Unattended

Some teleprinters can be left unattended while the terminal is set in a standby status. When it is called by the computer (for example, at night) the terminal automatically turns itself on, receives the

(please turn to page 50)

NCR and the Computer Industry

W. S. Anderson, President
The National Cash Register Co.
Dayton, Ohio 45409

"Ever since the departure from the computer industry of two mainframe manufacturers, the rest of the companies have been living under a shadow — which would be next to cash in its chips?"

I would like to begin with some general comments about our company. I do this because as an NCR user, you and your organization have an important stake in NCR's future. The more successful we are, the better you — our customers — will be served.

Greater Change than Ever Before

In the past year, NCR has undergone greater change than in any single year in its history. And I am speaking of change in almost every direction — new products, new manufacturing techniques, new management, and new management philosophies.

This transition did not of course occur overnight. It has been coming for a long time. For the past 10 years, in fact, NCR has been a company with a somewhat split corporate personality — in part a producer of free-standing mechanical business machines, and in part a producer of electronic data processing systems. Now that distinction is vanishing. We have become a computer systems company. Virtually everything we make in the future will either be a computer or capable of being linked to a computer, either directly as an on-line device or indirectly through cassettes or some other media. As a computer systems company we intend to provide our customers with total systems, from the original entry — that is, transaction recording devices — to the final computer reports at the end of the data processing cycle. As a matter of fact, every product we have introduced in the past two years has been electronic, and there are no mechanical products in the pipelines. Thus, an old era has ended and a new era has begun.

Not Under a Shadow

Ever since the departure from the computer industry of two mainframe manufacturers in the last few years, the rest of the companies have been living under a shadow. Which would be next to cash in its chips? Obviously, we at NCR cannot speak for other companies. But insofar as our own company is concerned, it should be obvious that it is no longer a question of whether NCR will stay in the EDP business. Today, EDP is our business — not only because computers are the fastest-growing segment of our business, but because the integration of computers with new types of data terminals has become the major thrust of the entire business equipment industry.

As we move into this new phase of the electronic revolution, NCR is in an exceptionally fortunate position. We are the only mainframe manufacturer with a very broad range of data terminals for business applications — in financial institutions, in retail stores of all types, and in the other major markets we serve. In short, we have an exceptional opportunity to play a major role in what will be the fastest-growing segment of the computer industry during the remainder of the 1970's.

Based on remarks delivered before the Federation of NCR Users, San Diego, Calif., May 14, 1973.

Opportunity

Now what do we plan to do with this opportunity? We see our mission as one of steadily broadening responsibility. It is to provide our customers with not just hardware, not just software, and not just support personnel. Instead, it is to provide you with more comprehensive solutions to your data processing problems, more sophisticated approaches than were possible before the advent of today's new special-purpose data terminals and improved communications capabilities. We know that if we can do this, you will be satisfied customers, and that is the key to any company's long-term success.

To this end, we are reshaping and reorganizing virtually every aspect of NCR's operations in order to better serve the specific needs of your industry. This has necessitated some very basic changes in research and development directions and methods, as well as in manufacturing, in marketing, and in supporting services. Our research and development programs and our manufacturing operations worldwide have already been reorganized to reflect this greater emphasis on integrated systems, dedicated to the specific lines of business which NCR serves. In the near future I shall be announcing a similar reorganization of our marketing and support groups. I believe you will find this reorganization to be one of the most significant steps NCR has yet taken to improve interface with you, our customers. It will greatly improve our capabilities at the field level. It will mean that in addition to viewing you as a valued computer user, we shall also be able to serve the expanded needs you will have in future years in such areas as terminals, more sophisticated communications networks, and more comprehensive software support.

Now I should like to report to you on several recent developments which will be of special interest to each of you as an NCR user. Let's begin with hardware, because that is basic to any successful installation.

Performance of Hardware

We have been gratified with the performance of the first Century 300, Century 251 and Century 101 installations. NCR has been producing computer systems for more than a decade, and in all that time we have never experienced better results with initial installations of new systems. The 101's, 251's

and the 300's are being brought up in exceptionally short times. Their uptimes are phenomenally high. Preventive maintenance is quick, easy and effective. These results are due to many factors, including improved architectural design and better discipline and control in the manufacturing process. Above all else, they indicate that our users are now benefiting from the high level of maturity which NCR has achieved in computer design, manufacture, installation, and service.

Computer Peripherals Inc.

The past year has also brought us into a new and productive era from the standpoint of peripheral development and manufacturing. This month marks the first anniversary of our joint venture with Control Data Corporation. As you know, this program included the establishment of a jointly-owned, separate company. Its sole purpose is to engineer and manufacture printers, magnetic-tape handlers and punched-card equipment for the two parent companies.

This new company, Computer Peripherals, Inc., in the span of 12 months has grown from a paper organization into one of the world's largest computer peripheral manufacturers. This year CPI will deliver over 100 million dollars' worth of high-quality peripherals to NCR and CDC.

CPI's Printer Products Division now has 1,050 employees, with plants in Rochester, Michigan; Campton, Kentucky, and Nashville, Tennessee. Its Tape and Card Product Division has 725 employees and is located in Valley Forge, Pennsylvania. The combined employment of CPI, currently at 1800 employees, will increase to 2300 by the end of this year as production continues to accelerate.

The CPI product line already includes a highly successful high-speed printer (1200 lines per minute) as well as low-speed (150-300 lines per minute) and medium-speed (600 lines per minute) printers. Currently under development are low-cost printers of low and medium speeds. CPI is also now producing both single and dual-speed card punch and a medium-speed read/punch. Through the economies of greater volume, and through the sharing of research and development costs, both NCR and CDC are achieving signficant savings. An additional advantage is that this arrangement is permitting both companies to focus their assets and efforts on mainframe, communications and data terminal developments.

Compatibility between Systems

We are also making encouraging progress toward achieving compatibility between future NCR systems and future CDC systems so that both partners can offer a full range of computing power.

Speaking of mainframe development, let me also say that the next-generation family of Century computers is very much on schedule. For obvious competitive reasons we prefer not to disclose at this time the philosophy, architecture and features of the Century II Series, but I assure you that it will more than maintain the reputation which the Century Series has established in the industry for superior cost/performance.

NCR is committed to a gradual evolution into substantially larger systems that we have brought to the market to date. This course is essential to our objective of winning a larger share of the total computer market. We also feel it is a part of our obligation to those present NCR users whose requirements will eventually outgrow our current range of hardware.

Japan

I happen to be particularly sensitive to this need because of my experience in Japan. There we are already seeing evidence of the large computer networks of the future in the Japanese banking industry. Today, for example, the 87 major banks in Japan — encompassing thousands of branches — have the capability of transferring money to any other branch instantaneously through on-line interconnection. I am happy to say that NCR Japan has been a leader in this trend through its installation at Sumitomo Bank, which is Japan's largest financial institution. The NCR on-line system at Sumitomo is the world's largest on-line banking network.

The further expansion of our new family of satellite computers, the 399 Series, plus the release of additional data terminals and essential components for establishing other types of turnkey data networks will become widespread in the latter part of this decade.

Software

We are well aware that the ambitious goals we have set for NCR in the EDP industry are highly software-dependent. Because of this I have become personally involved in NCR's software development efforts since becoming the company's chief operating officer. One of my primary objectives is the strengthening of our currently available software and the achievement of improved methodology and better control over all future software development programs. To this end, I have recently established a new General and Applications Software Development Division, which will have corporate-wide responsibility for all general and applications software as well as improvements to existing software. I have given this new organization full divisional status. It will have direct access to my office and I shall personally monitor its activities. We are determined that when our future systems are released they will be highly competitive in the total sense, and not in the hardware sense alone.

Our overall software effort is continuing to grow. In the scientific area, we are emphasizing a different approach which reflects the special requirements of users in different industries who have need for a wide range of scientific software. No computer manufacturer can justify creating large libraries of scientific and technical programs, only a few of which would apply to large numbers of users. Our approach in the scientific area, therefore, will be to augment NCR-supported scientific languages and programs by reaching agreement with leading outside software firms to make available to our scientific users the excellent programs and services available from these experienced sources. You can help us in that endeavor by determining specific priorities and making these known to us, so that we can channel our funds most effectively.

Software Packages

In other software areas, NCR will be announcing in the near future a considerable number of important new packages, many of which are true management tools as contrasted with conventional applications. In manufacturing, for example, we have already released a new bill-of-materials module and an inventory-control module. A requirements planning module will be released in the near future. These are designed for larger systems. In the wholesale distribution area we shall be releasing improved packages for order billing and inventory control. For financial institutions a Central Information File package for larger banks, a new savings and loan on-line package, and additional inquiry features are

in the offing. For hospitals a number of on-line communications and data collection systems are under development. We also are carrying forward very active programs in various fields of retailing including food distribution, in the educational field, and in government applications. Scheduled for release this summer is our new 8-B version of the Century software, which will greatly improve performance for medium to large Century users.

When we recently launched a corporate-wide program to reduce costs and improve NCR's profitability, I know a number of you were concerned about the impact this might have on the support you would receive from the NCR Systems Services Division. Our personnel reductions in this area were kept at a minimum. However, in view of the large volume of equipment NCR will be installing this year, plus the upgrading plans of many current users, I realize that even with these minimum reductions, this is an area which we must continue to monitor carefully. We intend to see that qualified Systems Services personnel are available at every NCR branch in sufficient quantity to meet your future requirements. Thus, we anticipate a resumption of growth in the Systems Services organization, in addition to achieving more efficient use of the present staff as a result of the reorganization plans to which I referred earlier.

Good hardware, supported by good software and capable Systems Services personnel, represent three of the cornerstones on which we intend to build NCR's future in EDP. But there is a fourth cornerstone which is equally important and this is equipment service.

Equipment Service

Like most other operations at NCR, the Technical Services Division is undergoing basic reorganization. Here are some of the steps which have been taken to date:

— We now have established special EDP expertise in each of our regional offices. These are computer specialists who have had in-depth training and experience on Century and 315 products. They are on call by any branch in their region — at any time. In effect, they are the first-line backup when you experience a problem which cannot be quickly solved by your NCR branch office.

— Second, we have relocated our Technical Service field support groups for Century and 315 equipment from Dayton to Rancho Bernardo where they are in direct contact with the engineers and production people at the Data Processing Division. This will enable them to provide direct input into future product development efforts — to improve equipment reliability and serviceability. Equally important, they are a second line of customer backup support who can interface directly with the engineer or job specialist needed to solve a user's problem without delay. Comparable field support technicians have been reassigned to the four plants operated by Computer Peripherals, Inc.; to the NCR Retail Systems Division in Cambridge, Ohio; to the Financial Systems Division in Dayton, and to the Accounting Computer Division in Wichita.

— Third, we are building in Atlanta a new worldwide parts distribution center which will be in operation this fall. This will enable us to supply any part, for any NCR computer, in less than eight hours on an emergency basis, regardless of where the equipment is located or what the requirement is.

— Fourth, we have just established in Kenilworth, New Jersey, a special EDP Technical Services office which will be the forerunner of many such facilities in future years. This office is staffed exclusively with EDP servicemen, operating under a first-line field technical manager. This new pilot facility is serving the four-city area of Newark, Patterson, New Brunswick and Camden where we have a heavy concentration of Century users.

You will be interested to know that NCR now has 1,850 highly trained EDP servicemen in the United States. During 1973, our training program for Century technicians alone will total 8,970 man weeks.

Finally, we have been building throughout the NCR organization in recent months what I like to define as a new sense of discipline — a discipline which recognizes that first and foremost, we are in business to help you more effectively in your business.

The computer industry has come of age. It is a maturing industry. The differences between hardware and software are becoming less pronounced. I think the implications of this are clear. In the future, it will be systems capability, orientation toward the customer's needs, and new directions in support and services which will be decisive in the marketplace.

Competition with the Industry's Giant

There has been much talk about the impregnable position of the industry's giant. However, we at NCR are convinced that the EDP market is big enough — and broad enough in its requirements — to support several companies who know what they are doing and where they want to go.

NCR has competed successfully with IBM in accounting machines for over 40 years. We started with 0% of that market and eventually became one of the world's major suppliers of accounting systems. We also started with 0% of the computer market. Since then — and primarily in competition with IBM — we have developed a small but solid share of that market, approximately 3,000 sites in the United States alone. We are grateful to organizations like yours, which were willing to forego "playing it safe" in order to achieve a better return on your data processing investment.

We think we can substantially enlarge our share of the computer market in the years ahead. I am not suggesting, of course, that Snow White is about to be dethroned by NCR, or any of the other dwarfs. But I do suggest that our company, and several others as well, can lead happy lives and make some money in the process if they hang in there and do a job for their customers.

Profitability in Computers?

I have been asked frequently how close we are to being profitable in computers. Because our computer business is so interrelated with other aspects of our operations, it is difficult to quantify the exact contribution which computers are making to our overall profitability. However, if we include all of the computer-related equipment and services which are associated with the mainframe business — data terminals, optical-font and magnetic-character peripherals and the like, plus our data center network and services and supplies — the answer is a defi-

(please turn to page 48)

How IBM Computerized its Control System for More than Two Million Machine Parts

Fred Groppuso
IBM, General Products Div.
San Jose, Calif. 95114

"The information was often known but stored in such an inaccessible fashion as to be lost."

For multiplant producers of machine products, the cost of failure to communicate significant new parts information is literally not calculable. Examples of duplication and time lost in round-about searching are often discovered only by accident, "after the fact," but evidence indicates:

1. A machine designer frequently develops his own special-purpose component, because he either has no awareness of an existing duplicate, time does not permit a search of available files, or he lacks confidence in the accuracy of the parts control system.

2. A purchasing agent sometimes orders uneconomically small quantities of a given part because he cannot identify all its uses, or he procures a part having limited reliability because he cannot retrieve information on the history of its use. The information is often "known" but stored in such an inaccessible fashion as to be lost.

Corporate Central File

The means developed in recent years by International Business Machines Corporation for providing information on the 2 to 2½ million parts used in the IBM product line for use by over a dozen development laboratories and 50 U.S. and World Trade manufacturing plants is called Corporate Central File (CCF).

Many IBM parts have multiple uses, and CCF allows each to be traced to a particular location, which is responsible for supplying it to all other locations that need it. The supplying location is responsible whether it makes the part or purchases it from a supplier.

Each location that uses the file submits pertinent data on each part it is responsible for. This data is updated continuously. An average of 17 update tapes from engineering and manufacturing locations is teleprocessed into IBM San Jose, a central clearing-house in the system, and an equal number go out to the user locations each working day.

The Old Manual System

During the period preceding establishment of CCF, from 1953 through 1968, the only means available to a machine designer for obtaining information on previously released parts was a parts-book and microfilm file system, compiled manually by a parts standards department at one IBM location. This "Engineering Standards Location" compiled the data necessary to provide parts information in three forms: a 16 mm microfilm numerical master parts list of all released part numbers; a 16 mm microfilm part print file; and four volumes, two listing mechanical parts and two listing electrical parts. The master list provided basic engineering data, such as part number, basic name, lab of control, character code, status code, engineering change level, engineering change data, and some manufacturing use data. The four volumes listed mechanical and electrical parts that had high potential reuse. They were supported by the part print file, which illustrated each of the parts listed in the four volumes.

Data collection for this system was entirely manual. Changes, additions and deletions of parts for IBM products were communicated from engineering development areas to manufacturing facilities as part of an "engineering change" activity. The Engineering Standards Location received all engineering changes released throughout the company in white print or blueprint form. Drawings shown on the prints were sorted according to potential reuse. This sorting was done according to the IBM Data Classification System (DCS) of five-digit codes that establishes like families under a series of type code numbers (see Figure 1). Those drawings that were not to be coded were discarded. Drawings to be coded were sorted into approximately 200 categories of mechanical parts and 200 categories of electrical parts.

An Example

Let's look at an example, screws and bolts, eye. The DCS code for this part is 1-9031. Within 1-9031 there are three types, each identified by a type number (see Figure 2). After the initial sorting and discarding, the stack of prints for the part would be sorted again manually by type number. They were transcribed from the print to a keypunch coding sheet by parameters shown on the code sheet for 1-9031. Such items as overall length, thread size, head size, and length of thread would be recorded from the print onto the keypunch coding sheet. Once all the prints were coded, the information was keypunched so that it was data processable and transferred to magnetic tape. Through simple routines, it was then sorted by pertinent parameters within each type in ascending order from smaller to larger physical divisions (see Figure 3). All proofing of the processed data was done manually. After these manual sorts and audits were accomplished, multiple copies of the data were printed and mailed to various individual designers and centralized access points.

The 16mm microfilm master parts list was generated from this same data base. Manufacturing use data

REVISION NO. 03

CAT CEH
SUBJECT 00106
SUFFIX 000

19102 PINS, THREADED TAPER
CYLINDRICAL TAPER PINS HAVING A TAPER OF 1-4 INCH PER FOOT WITH A THREADED TENON ON ONE END OF THE PIN.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

19103 PINS - GROOVE, ROLL AND SPIROL
PIN TYPE FASTENERS OF BASIC CYLINDRICAL FORM. THE PIN IS FIXED IN AN ASSEMBLY BY FRICTION, SPRING ACTION OR SET GROOVES. THE SPRING TYPE INCLUDES THOSE PINS KNOWN COMMERCIALLY AS ROLL PINS, SPRING PINS & SPIRAL PINS. THE GROOVE TYPE ARE COMMERCIALLY KNOWN AS GROOVE PINS.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

19104 PINS, DOWEL
PINS USED EITHER TO RETAIN PARTS IN A FIXED POSITION OR TO PRESERVE ALIGNMENT. THEY ARE ALWAYS HARDENED AND GROUND OR UNHARDENED AND GROUND.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

19125 KEYS, SHAFT
SQUARE RECTANGULAR OR WOODRUFF KEYS USED IN KEYWAY OF SHAFT & GEAR OR SHAFT & PULLEY.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

19130 CLIPS, RETAINING & RING
RINGS, OPEN OR CLOSED, WHOSE FUNCTION IS TO LIMIT AXIAL DISPLACEMENT IN AN ASSEMBLY BY CREATING A SHOULDER OR ZONE OF INTERFERENCE BETWEEN THE REFERENCE MEMBER & THE MEMBER TO BE AXIALLY FIXED.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

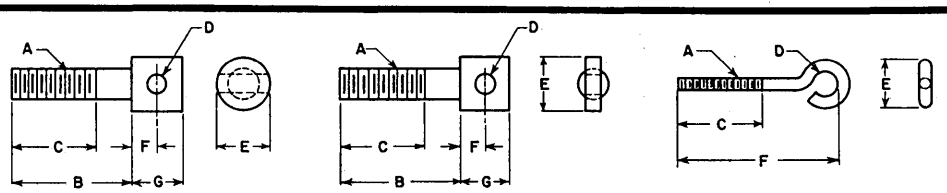
19135 CLAMPS - CABLE, TUBING AND CAPACITOR
PARTS THAT CONFINE IN A FIXED POSITION ITEMS SUCH AS CABLES, TUBING, PIPE & CAPACITORS. IN CASES WHERE AN ASSEMBLY IS USED AS A FUNCTIONAL COMPLETE PART, BOTH THE ASSEMBLY AND ITS MAJOR DETAIL PART ARE INCLUDED. SCREWS, WASHERS, INSULATING TAPE, SLEEVES ARE NOT TO BE INCLUDED.
** WARRANTY PERIOD - 12 MO **
*** PART PARAMETERS REQUIRED ***

Figure 1: Data Classification System

IBM Parts Parameters Identification

SCREWS AND BOLTS
EYE

I-9031
DCS CODE



TYPICAL TYPES

NOTES

A - Milled flats on head
B - Special head configuration
C - Hole eccentric
D - Tenon grooved
E - L.H. thread

EXAMPLE OF INPUT FORM TO CORPORATE CENTRAL FILE

PARTS PARAMETER DATA

MUST ALWAYS BE FILLED IN

LAB RPTG	DAY	MO	YEAR	PART NUMBER	MATERIAL	FINISH	TYPE	PARAMETERS A	B	C	D	E	F	G	NOTE
1 2 3 4	5 6	7 8	9 10	11 12 13 14 15 16 17	18 19 20	21 22 23	24 25	26 27 28	29 30	31 32 33 34 35	36 37 38	39 40 41	42 43 44	45 46 47	48 49 50	51 52 53	54 55 56	57 58 59	60 61 62	63 64 65	66 67 68	69 70 71	72 73 74	75 76 77	78 79 80
7																									
7																									
7																									
7																									
7																									

Figure 2: Example of Input to Corporate Central File

TYPE	A	B	C	D	E	F	G	MAT'L	FINISH	NOTES	LOC CTL	TECH USE	PART NO
AA	3-48	281	250	070	188	079	188	BR			RCCH	N	0180741
AA	3-48	406	313	070	188	079	188	BR			RCCH	N	0180742
AA	3-48	547	250	070	188	078	188	03300	BD300		POK	A	0013383
AA	3-48	656	313	070	188	079	188	BR			RCCH	N	0180743
AA	3-48	781	313	070	188	079	188	BR			RCCH	N	0180744
AA	3-48	906	313	070	188	079	188	BR			RCCH	N	0180745
AA	3-48	1031	313	070	188	079	188	BR			RCCH	N	0180746
AA	4-40	094	014	063	125	062		07140	IM35C		END	A	0752117
AA	4-40	250	250	040	18	09		03300			RAL	A	5994135
AA	4-40	580	290	4-40	344	160	320	ST	ZN		LEX		1159010
AA	5-40	563	250	159	250	125	250	06970	NI 20		POK	A	0021410
AA	6-32	422	297	5-72	275	141	281	C6981	CD 50		LEX		1123751

Figure 3: Parts Parameter Information

was manually collected and added and after a series of tape sorts, the data was printed out on what we called "hard copy," meaning 11 x 14 fanfold paper. The hard copy for a single output would fill 8 to 10 boxes of the fanfold paper. These 8 to 10 boxes would be sent to a photo house, which would feed the paper through a camera one sheet at a time to generate a silver master, 16mm microfilm. The microfilm master would be duplicated into the various sets required to complete a unit. The same drawings that were used to transcribe data for the hard copy parts listings or manuals were then photographed and mounted in aperture cards, and the cards were photographed again onto 16mm microfilm.

Selected centralized offices at user locations received mailed copies of the microfilm files. All requestors received the four-volume listing. Mechanical and electrical designers used the volumes to find existing parts that could be used in new applications. The 16mm print file showed them a print of selected parts. The 16mm master provided engineering and manufacturing use information about a selected part, along with engineering status and where it could be procurred.

Manual System Outdistanced

This system served a useful purpose for many years, but as the corporation expanded and work schedules tightened, the time needed to process the data and make it available to designers increased to the point of impracticality. Since processing and audit time inevitably increased as the number of new parts increased, the role of the standards function department consumed more and more time. By the time a drawing was coded and made available to a designer, many things could have happened. Engineering changes might have occurred. The status of the part might have gone from active to obsolete. Technical usage might have changed from approved to failed as a result of additional testing. However, the manual system had no means of speeding up communication. On the average, the data supplied to the designer was 4 to 6 months old.

Meanwhile, techniques of processing the engineering changes released to manufacturing were improving. The time consumed by design, release and manufacture of parts was decreasing. It became obvious that a new system was needed to provide data on previously developed parts. By the time such a system was considered, the company had expanded to multiple locations, the product line had been greatly increased, and new technologies were evolving rapidly.

New System Builds on Old

Procedures standardized under the previous system as a matter of business policy played a large part in making the new system a success. Each engineering development location had as its records function a computerized storage system for engineering documentation called "EXPRESS". This was used as the base for the new system. Existing manual data bases and established programs for stripping data from this record program at each location provided the foundations for an automatic tape input to the new data base at San Jose which we called "Corporate Central File". Each time a location processed engineering changes or released new parts data, their records update function was modified to strip out all additions or changes automatically. Different tapes that recorded additions, deletions and revisions were generated and transmitted by a teleprocessing data system to CCF each time a location updated its file. Since locations update their record systems at various times, there was a steady flow of update tapes to CCF.

Elimination of the mailing of hard copy white prints to a central coding point increased throughput speed. Transmission of update tapes replaced the mailing. Under the old system, all the data provided in the 16mm microfilm master parts list, the parts volumes and the print film was taken by coding personnel from original prints. Replacing this with stripping of data from EXPRESS at the time it was generated made changes available to designers as quickly as they could be transmitted. We now had an automatic means of providing engineering data which shows part numbers, basic name, character codes, status code, DCS code and a multiplicity of housekeeping records.

A means was still needed to obtain physical parameters. A manual of instruction for DCS coding was prepared, and classes were conducted at all the locations in the proper method of classifying a part and transcribing it to a keypunch sheet so that it could be transmitted to CCF. Additions were made to the DCS manual to indicate those particular DCS codes that required submission of a parameter record to Central File. The responsibility for classifying a particular part was assigned either to the designer or to specialty groups within the drafting and electrical analysis laboratories. At the time a print was completed, it was assigned a five-digit DCS code number which identified its specific classification. The identification audit of the five-digit code was included in the audit of the data.

Disks Replace Tape

Central File was started as a tape file system but rapidly developed into a disk file system. Changes are still transmitted to San Jose from user locations via the tape teleprocessing system. However, we added terminal inquiry to an IBM 2314 Direct Access Storage Facility, operating with an IBM System/360 Model 40, to replace the tape-oriented approach that operated with an IBM 1410 Data Processing System. Transferring the tape updates to a resident data base of disks gave us the speed of direct rather than sequential access and greatly reduced inquiry time. Under the tape system, requests for parts data from user locations were sent to San Jose via phone, company telegram or mail and usually answered a day after they were received. Inquiries are now transmitted via an IBM 2741 Communication Terminal at each location directly to the 2314 disk data base. A sample inquiry is shown in Figure 4.

(please turn to page 24)

```
ENTER DCS: 19120
ENTER TYPE:
ENTER A :EO     048
ENTER B :EO     095
ENTER C :EO     037
ENTER D :GO
 PART    S CT  T AAAAAAABBBBBBBCCCCCCCDDDDDDDEEEEEEEEFFFFFFFFGGGGGGG TY NO MATERIAL FINISH   ENG CHG YRMODA
2557515 A 006 A      048     095     037     067     011                    BP        SP037    711512  680906

PRINTED 03-13-73 14:20
```

Figure 4: DCS/Parameter Inquiry Via IBM 2741 Communication Terminal to Corporate Central File

Indexing Technique for IBM's Computerized Parts Control System

Erik A. Andersen
Thomas M. Atkinson
IBM, General Products Div.
San Jose, Calif. 95114

"No existing technique satisfied our needs, and so a new indexed processing technique was developed."

Many programs for maintaining large collections of data are tape oriented. For applications requiring rapid access to information for reading or updating, the limitations imposed by the sequential characteristic of accessing to tape becomes a problem. Updating, reports, and inquiries must pass through unwanted data until either the desired data or the end of the data is reached.

Records on Two Million Parts

This article will describe the indexed processing technique used by IBM as part of a conversion from a tape-oriented control system for machine parts to a direct-access system. At the time of the conversion in January 1969, information was being stored on 1.35 million parts. The control systems, known as Corporate Central File (CCF), now comprises records on more than 2 million parts.

The data includes status codes, characteristic codes, nomenclature, dimensional information, usage status and manufacturing codes. This information is updated daily after inputs are collected from throughout the company. As a result of updating, selected information is disseminated weekly to the contributing groups. On a monthly basis the entire file is processed to generate microfilm copies for corporate distribution. These microfilms provide useful information on every part as the need arises.

The decision was made to convert to data storage on an IBM 2314 Direct Access Storage Facility in order to meet the following objectives:

1. Data organization which would allow sequential, direct and terminal processing for a variable number of differing fixed-length records.
2. Daily updating of the data within time requirements of 1,500 transactions per minute.
3. Allowance for acceptable backup procedures in software or hardware failures.
4. Use of standard access methods.
5. Addition of new, and presently undefined, record types at a later date.
6. Selection of a storage device with a large capacity and rapid retrieval capabilities for handling approximately 235,000,000 characters.

New Technique for Indexed Processing

To incorporate the new needs and to improve efficiency, a study was undertaken to investigate various techniques of storage arrangement. No existing technique satisfied our needs and so, a new indexed processing technique was developed.

This technique makes use of two data sets which contain four elements: an index, a content area, an extended content area, and a set of pointers. See Figure 1 for the index-to-data relationship.

Index

The first element, the index, is a data set which contains 4114 tracks. Each track is composed of 2431 three-byte entries. There is a total of 10,000,000 entries, one entry for each possible part number. The location for an entry of a part is computable, because the part number corresponds to the relative index entry. The index entry, which points to a place in the content area, consists of 24 bits as follows:

Bits	Definition
0-14	relative block number in content data set
15-21	header entry number in block
22	indicator bit for weekly processing
23	used for accounting purposes

The remaining elements (content area, extended content area, and the set of pointers) reside in the content data set. The second element, the content area, holds the data as it is loaded initially in a sequential, packed manner. A track in the content area is composed of 7294 bytes, where the first byte is the displacement to the beginning of the first record type on the track. The remainder is packed with data composed of the following three types:

Type	Length	Description
01	72	header entry
02	72	dimension entry
03	18	usage entry

The third element is the extended data area. It has the same format as the content area and allows for expansion of data. The fourth element is a set of pointers. Each pointer is a three-byte entry in the same format as the index entry. The first pointer is dynamic and indicates the location for placing the next extended data element. The second pointer is static, indicating the beginning of the extended data area, and implies direct processing.

The IBM 2314 Direct Access Storage Facility was chosen for storing the data, because it meets the design objectives of large storage capacity and rapid retrieval. The full track mode of operation was used for maximum storage utilization. This allowed more data to be placed in the available space because key, count, interrecord gap, and other sys-

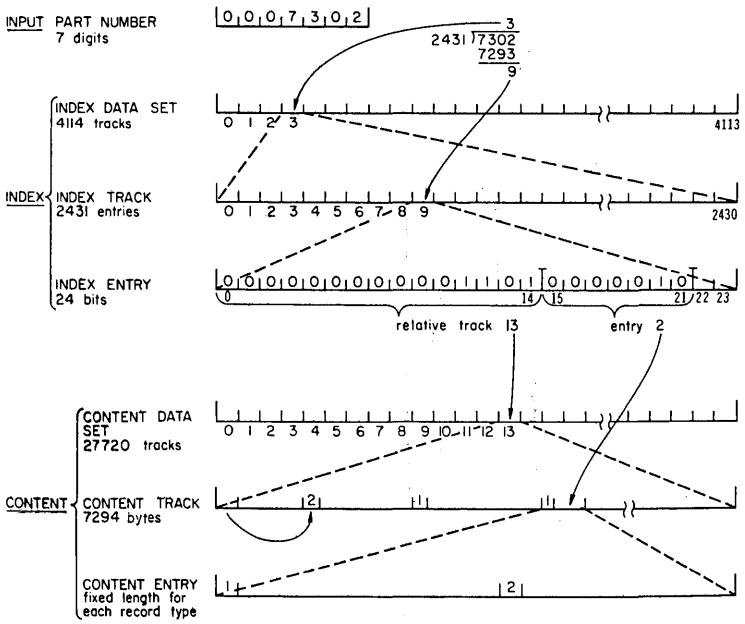


Figure 1
Index-to-data relationship

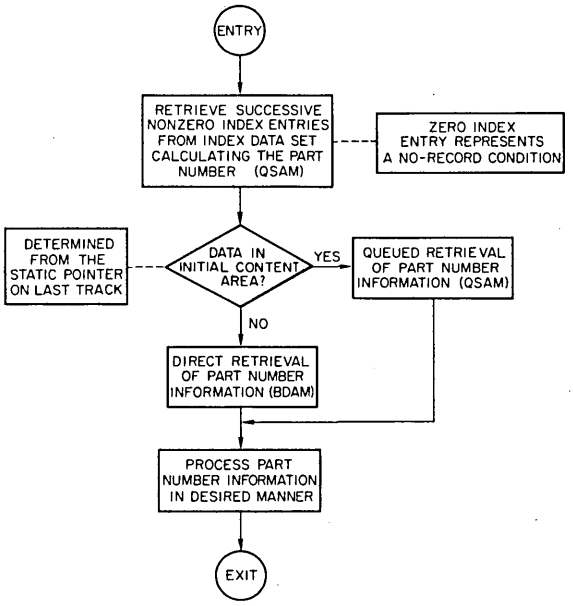


Figure 2
Full sequential processing

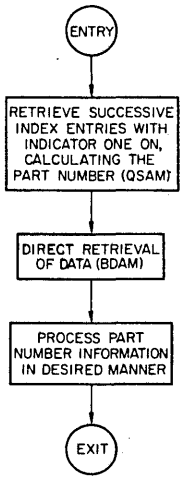


Figure 3
Selected sequential processing

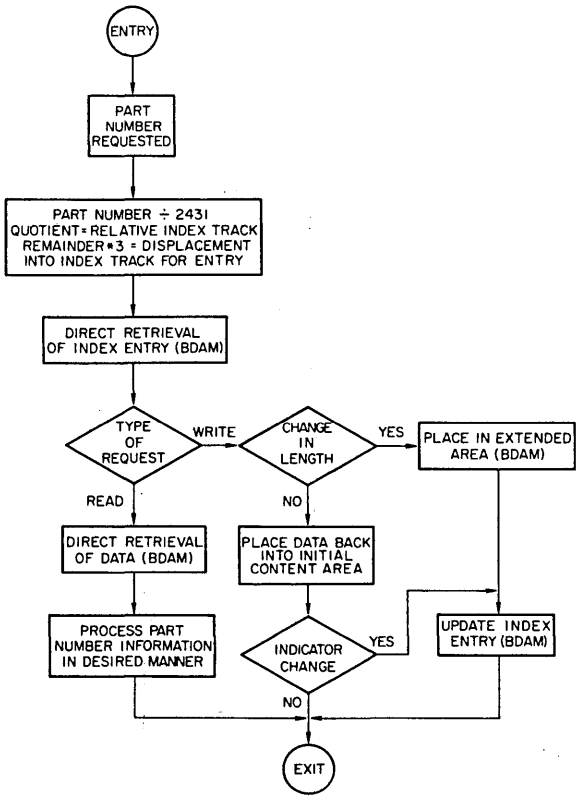


Figure 4
Update processing

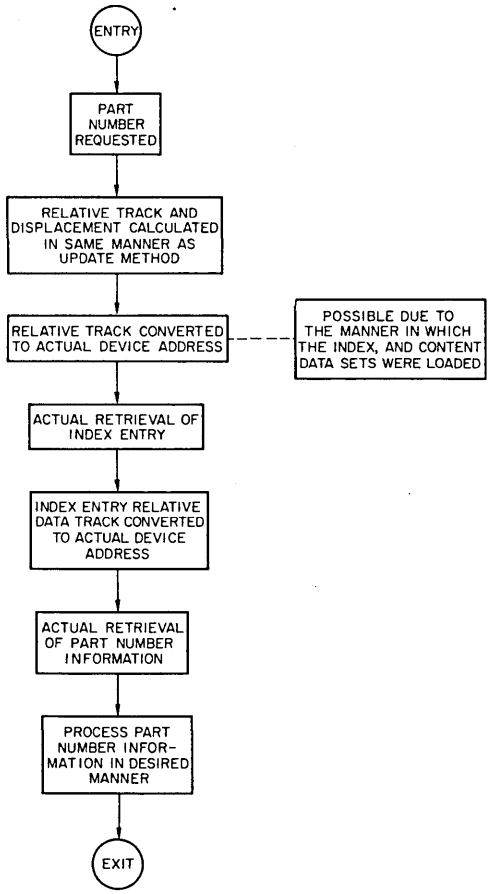


Figure 5
Terminal inquiry

tem control information is carried only once per track.

Direct interface programs which retrieve and store the data for the 2314 were written in assembly language and are driven by COBOL programs. All accessing is done in either QSAM, BSAM, or BDAM, and no channel programs were written. The terminal application requires determination of the hardware address and the issuing of a supervisor call (SVC) for a read operation.

Open Ended Programs

The programs are open ended in the sense that additional record types may be added with minimum change by the inclusion of the record type and its length in internal tables.

Experience with daily updates has shown that data is found in a maximum of two disk reads and often less than two due to the buffered processing of the index and the content data sets. This leads to rapid maintenance of the data.

Backup is accomplished in two ways. First, the data sets are copied directly from disk to tape on a weekly basis. Update data is kept to bring files to the latest level. Should there be a need to recreate data sets, the tapes are copied back onto the 2314 and the necessary updates are then run. The other backup is sequential access to the part number data that creates a checkpoint of the data. This data can be reloaded when reorganization is desired.

Methods of Processing

Sequential retrieval of the data is achieved by processing the successive part number entries from the index. For processing the entire file, queued methods may be used for the index and the data which is in the initial content area. Direct methods must be used to locate data in the extended data region. In processing only selected portions of the file, both the index and data are processed, using direct methods.

Direct processing of data is achieved by using the part number to retrieve the index entry which, in turn, points to the relative block and actual header position of the requested part number. If no index entry exists for the part number, a no-record condition is indicated.

Full Sequential

Full sequential processing takes place when successive index entries are retrieved and the data for every part number represented in the file is accessed (see Figure 2). The part number is not a physical part of the file and is determined by the location of the index entry in the index data set.

The index is accessed in a queued manner. The part number information is retrieved in a queued or direct manner. It is retrieved in queued fashion if the part number information has not been placed in the extended data area; otherwise, it is retrieved in a direct fashion.

Selected Sequential

Selected sequential processing occurs when successive index entries are retrieved. Those entries with the appropriate indicator bit on are used to access the content data. The part number is determined as in the full sequential method of processing.

The index is accessed in a queued manner. The content data is retrieved via the direct method (see Figure 3).

Update (Direct)

Direct updating begins when a read or write request for a part number is accepted. The part number is used for direct retrieval of the index entry which, in turn, is used to access for retrieving or storing the content data for that part number. All processing is done in a direct manner (see Figure 4).

Terminal Inquiry (Non-OS Environment)

Processing begins when the part request is accepted from the terminal (see Figure 5). The part number is computed to a relative track and from there to the actual machine hardware address. The index entry is then retrieved. From the index entry the relative track in the content data is determined. The hardware address of the content data is computed and the content data is accessed. All accessing is done in the mode of the terminal system (DATATEXT) which is not supported by the System/360 Operating System.

Implementation Detail

Multivolume data sets are preallocated, since it is necessary to place the data elements in a predictable location. The non-OS feature required that the index and the content data set be addressable. Controlling initialization and location of the disk packs accomplishes specific hardware locations both for the index and the content in the following manner:

1. Initialization of the 2316 packs so that the entire first cylinder of each pack is allocated to the volume serial number and the volume table of contents.
2. Creating the index data set so that it allocates 206 cylinders, 199 cylinders on the first pack and 7 cylinders on the second pack.
3. Loading the data, beginning on the remainder of the second pack and continuing as extents on each pack, until all the data is loaded. Concurrently, as the data is loaded, the corresponding index entries are written. The remaining space of the last track is then filled to allocate for the extended content area. Finally, the pointer area is written on the last track.

Conclusions

Advantages of the indexed data-based system are:

1. File organization technique allows sequential or direct processing.
2. The controlling element (part number in this case) of the data is not carried explicitly in the system. Rather, it is implicit from the index entry position in the index data set. This represents a considerable savings in storage space, since no key or controlling element (part number) is present in the data sets.
3. Data that has been moved can still be retrieved directly by using the index. This means that all data has direct data track addressability from the index (one level index to data).
4. It takes a maximum of two track reads to get to the beginning of a data element. Reads are done only if the required track is not in core.
5. Implementation with supported access methods (BSAM, BDAM, and QSAM), which allows actual hardware address calculation for index and content and data locations. □

Railway Freight Information System

Romitsu Matsui
Norihisa Nukui
Nippon Univac Kaisha
Tokyo, Japan

"To remedy the situation produced by competitive trucking, the Japanese National Railway has begun streamlining its methods of controlling the flow of freight traffic."

Modernization of Railways

In spite of the spectacular growth of the Japanese economy, railway freight tonnage in that country has leveled off in recent years due to an increase in competitive trucking services. To remedy this situation, the Japanese National Railway (JNR) has embarked on an extensive modernization program to streamline its methods of controlling the flow of freight traffic and to create a total freight information system through computerization. Much of this has been achieved through the use of:

- special purpose commodity cars;
- advanced shipping methods using containers;
- an information system for interblock express shipping.

The latter is designed to provide immediate space-available information for securing sales, automatic printouts, the forwarding of waybills to receiving stations, and, eventually, data on the location and movement of trains.

Marshalling Yard Efficiency

JNR's freight service has long depended upon the practice of assembling cars at marshalling yards, and efforts were made to improve the efficiency of service within this framework. However, the freight capacity of such trains was reduced quantitatively and qualitatively, appreciably limiting expansion. Consequently, new trains were put into service to meet the requirements of consignors and to pave the way for a modern railway freight service.

A geographical grid system was established consisting of 120 blocks, each composed of a dozen or more minor stations with a central switching depot as the focal point.

Reservation applications for freight transportation on interblock express trains are handled at about 700 stations. A single reservation application can involve up to five successive blocks.

The inter-block express train only stops at the main depot — the local stations within a block being connected with the main depot by existing rail service. While the express train is in the depot, the cars originating from or destined for the local stations are switched. One out of several main depots serves as an adjusting station, where freight cars are reordered so that coupling and uncoupling at the stations ahead occurs in an orderly fashion.

Freight Operation Control System

The freight operation control system (FOCS) is the sales backbone for the inter-block express train service. All inter-block express freight applications are fed into the computer the moment they are received. The computer then polls memory for available space on specific trains and the consignor is informed within minutes whether or not his freight can be put on those trains. Space may be pre-assigned for regular customers. But if no application is made by a given time, the reserved space is automatically cancelled and made available to other customers.

First Stage

FOCS came into existence in two different stages. Its first application was to provide sales information, then, forecast advance arrival notices. A Univac 490 processing computer was used until its capacity was reached.

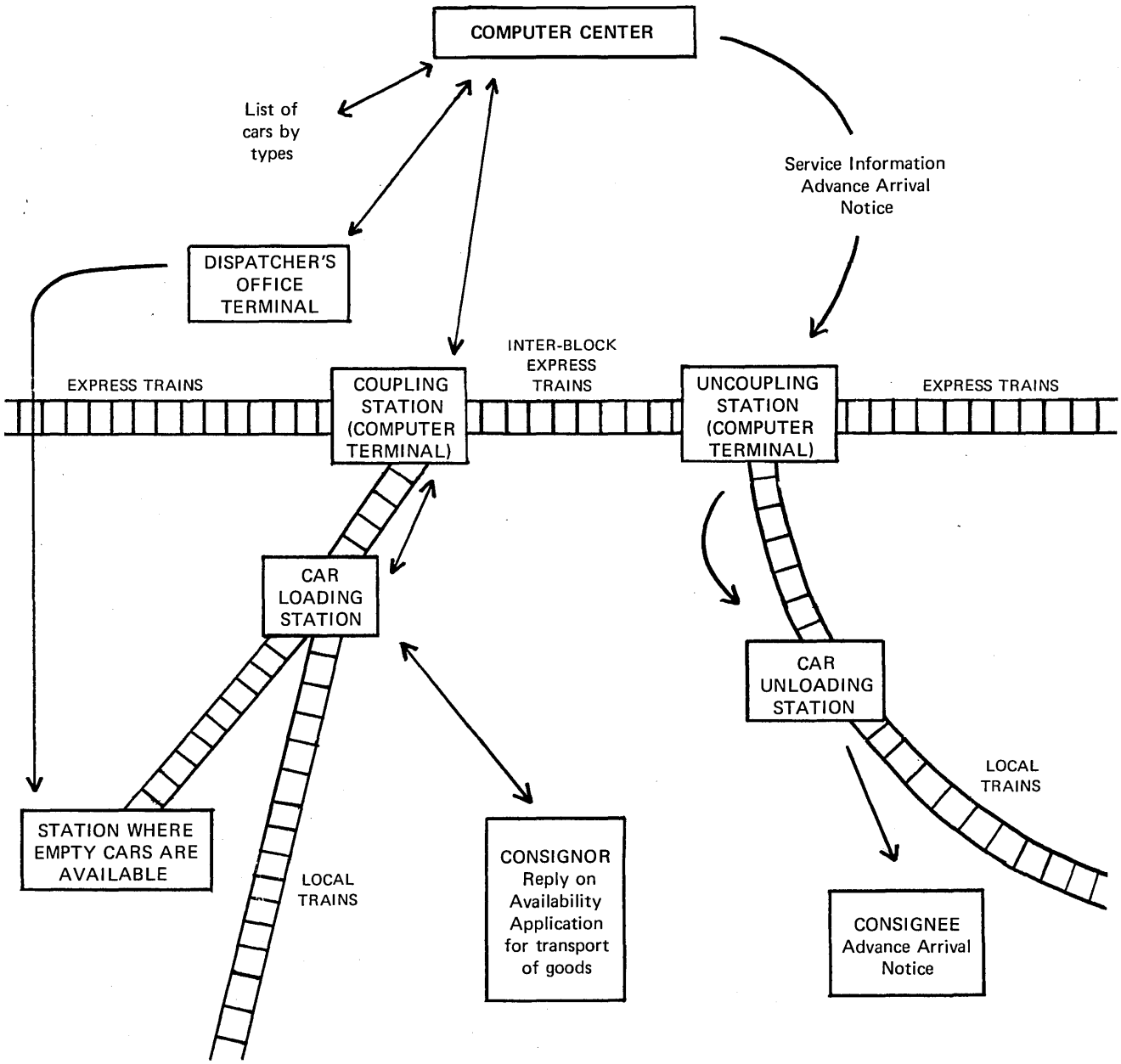
Second Stage

FOCS now consists of processing computers, message switching computers, terminals, and communication lines. Two Univac 490 computers now are used for processing; one is for real-time processing, and the other is for batch processing and back up.

JNR foresees that the main thrust of freight service will soon be containerization. Transportation by freightliner, which is the special express for containers, is one of the services that JNR is emphasizing. There has already been significant growth in this service, but in order to increase it, JNR has to coordinate the flow of containers both on-rail and off-rail by cooperating with the trucking industry. The freight information system will make this coordination possible.

Passenger and Freight Information Integrated

Originally, the computer was used to process data on freight and passenger services. This eventually developed into an integrated passenger and freight information system. However, the goal is to develop



Block diagram of the freight information system. The waybill (ordinary freight) and the reservation application (inter-block express) are sent over data channels to the production (transport) department. The car number corresponding to the freight number on the order sheet is fed into the computer and freight charges calculated.

an order-oriented system in which customers' orders are immediately reflected in the operation of the rail system. Producing services simply because it is the railway's business will be replaced by an attitude of anticipating and fulfilling customers' needs.

Plans

This control over services is not yet manifest in all areas of the country; but FOCS is expanding rapidly to facilitate automatic train formation and to compile information on the condition and location of freight cars. As an up-to-date, instantaneous dispatch system, it will process information in three stages: inquiries to the computer, judgment pertaining to inquiries, and the dispatch of orders. Through these steps, the intended modernization of the railway and the reduction of transportation costs can be achieved.

Future plans include integrating yard automation, train operation, and the rolling stock inspection and repair systems. And, when car distribution is computerized, empty cars can be allocated at the same time a waybill is presented; terminal information can be obtained as well. JNR eventually plans to complete a computer link with transport agents in order to extend on-rail service off the rails and even into the warehouse. The creation of an integrated freight information and service system would then be complete.

Groppuso — *Continued from page 18*

Consolidation and streamlining of procedural steps helped to speed up the system. Soon after CCF was started, designers were assigned to applying the five-digit DCS code as they designed new parts. If the DCS code indicates that physical parameters are required, the designer supplies these along with the print. When the engineering change folder is processed, all the data is keypunched, and the EXPRESS program is updated, thereby creating the CCF input. The parameter data is keypunched and data linked separately. For every part number that has a physical parameter record, an aperture card is also transmitted to CCF by mail.

In structuring the CCF data base, we created four basic records. The first is the engineering header data. The second is the engineering use record which identifies the engineering location and includes codes that designate how the part is being used in the engineering function. The third record is the physical parameter record. This consists of seven fields of seven characters for each parameter, along with the type, part number, material, and finish. The fourth record is a manufacturing use record which shows the manufacturing locations that used the part, how they use it and where and how they procurred it. The 2314 can be interrogated via the terminal inquiry either by part number or by DCS code. All four records or any combination of the four can be accessed.

Data is received at San Jose as header data, manufacturing use data, and parameter data. Each of these records receives a series of audits. Data which passes the audits is put into the resident data base. Data that does not pass is held. Error messages generated from the audits are transmitted via the data link back to the originating location for cleanup and retransmission on the next update. The handling and mailing required by this audit system makes CCF a dynamic data base which contains only absolutely "clean" data.

The various outputs from CCF are basically the same. The 16mm microfilm parts list is recorded on magnetic tape. Instead of being printed out as it was under the old system, it is fed directly to a COM unit, a computer optics microfilming device that transfers it directly to a CRT. The CRT face is photographed with a high-speed camera to produce a 16mm master microfilm that is generated at tape speeds. The master is then duplicated to produce the required number of copies.

New System Keeps Pace

By developing CCF, we reduced the time needed to produce the master parts list from 6 to 8 weeks to 5 working days. Initiating a request for parts information, interrogating the CCF data base, creating the magnetic tape part number list, converting the tape to microfilm master and making and mailing microfilm copies now requires only five days. The list is issued each month to the user, providing designers, purchasing personnel and others who have a need to know the latest from engineering development areas. The hard copy parts manuals and the 16mm print file are generated on a quarterly basis, one volume per quarter. Through a series of comprehensive audits the data base is reviewed for duplication of information, missing data and illegal entries. Output is then matched against the aperture cards that have been accumulating from the originating locations, and the two are mailed to users as a package. The distribution list for the parts catalogs includes many individual designers, while the 16mm microfilm parts listing and the print file are usually mailed to centralized locations. □

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.

NUMBLE 739

```
          D O O R S
        x O P E N      DHR = INT
      T I N R E O
    W H G E S E
  W G P N R I
H H D L N N
= N P E R S H E L O    22413 88704
```

Solution to Numble 738

In Numble 738 in the August issue, the digits 0 through 9 are represented by letters as follows:

A = 0	F = 5
D,H = 1	T = 6
R = 2	B = 7
E = 3	W = 8
O = 4	N = 9

The message is: Better one word before than three afterward.

Our thanks to the following individuals for submitting their solutions — **to Numble 737**: Edward A. Bruno, N. Bergen, N.J.; Virgil DeCarvallo, New York, N.Y.; Ronna Feigenbaum, Cambridge, Mass.; T. P. Finn, Indianapolis, Ind.; Art Owles, Bloomington, Ill.; Abraham Schwartz, Jamaica, N.Y. — **to Numble 736**: Nihan Lloyd-Thurston, S. Nutfield, Surrey, England; D. H. Moss, Paris, France — **to Numble 735**: Thomas M. Kaeji, Sunnerain, Switzerland.

"WHO'S WHO IN COMPUTERS AND DATA PROCESSING"

EDITION 5.2 = 5th EDITION + 2 SUPPLEMENTS ALREADY ISSUED

THE MOST ESSENTIAL COMPONENTS IN COMPUTERS AND DATA PROCESSING ARE PEOPLE

Who are they?

What do they do?

Where do they do it?

Consult

"WHO'S WHO IN COMPUTERS AND DATA PROCESSING" jointly published by Quadrangle Books (a New York Times company) and *Computers and Automation* (Berkeley Enterprises, Inc.)

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

1. The latest Cumulative Edition (the 5th edition published 1971, containing over 15,000 capsule biographies, over 1,000 pages long, 3 volumes, hardbound) **PLUS**
2. Three Updating Supplements per period totaling over 3,000 entries

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

BASED ON continual data gathering from computer professionals carried out by *Computers and Automation*

This reference is particularly useful for:

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

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

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

See samples on page 27.

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

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

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

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

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

( ) $34.50 including the last cumulative edition

OR

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

I understand that for each period of subscription I shall receive three updating supplements, totaling over 3,000 entries.

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

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

Name _____

Title _____

Organization _____

Address _____

City _____ State & Zip _____

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

Who's Who in Computers and Data Processing

Edition 5.3 = Edition 5 + 2 Supplements published + a 3rd Supplement now being prepared

If you wish to be considered for inclusion in the *Who's Who in Computers and Data Processing* — or if you have already been included and your biography should be updated — please complete the following form (which may be copied on any piece of paper), and send it to: Who's Who Editor
Computers and Automation
RFD 1
No. Grosvenordale, CT 06255

Who's Who in Computers and Data Processing is published jointly by Quadrangle Books (a *New York Times* company) and *Computers and Automation.* The Fifth Edition (in hard cover, in three volumes, over 1000 pages) containing over 15,000 capsule biographies was published in the Spring, 1971.

Two supplements, together containing over 2000 entries, have been published, bringing updating through the autumn of 1972.

WHO'S WHO ENTRY FORM

(may be copied on any piece of paper)

1. Name? (Please print)_____

2. Home Address (with Zip)?_____

3. Organization?_____

4. Its Address (with Zip)?_____

5. Your Title?_____

6. Your Main Interests?

Applications	( )	Logic	( )	Other (please specify) ( ) _____
Business	( )	Management	( )	_____
Construction	( )	Mathematics	( )	_____
Design	( )	Programming	( )	
		Sales	( )	
		Systems	( )	

7. Year of Birth?_____ 8. Education and Degrees?_____

9. Year Entered Computer Field?_____ 10. Your Present Occupation?_____

11. Publications, Honors, Memberships, and other Distinctions?_____

_____

(attach paper if needed)

12. Do you have access to a computer? ( ) Yes ( ) No

a. If yes, what kind of computer? Manufacturer?_____ Model?_____

b. Where is it installed: Organization?_____

Address?_____

c. Is your access: Batch? ( ) Time-Shared? ( ) Other? ( ) Please explain_____

d. Any remarks?_____

13. In which volume or volumes of the Who's Who —

	(a) Have you been included?	(b) Do you think you should be included?
Vol. 1 — Systems Analysts and Programmers	( )	( )
Vol. 2 — Data Processing Managers and Directors	( )	( )
Vol. 3 — Other Computer Professionals	( )	( )

14. Do you subscribe to Computers and Automation? ( ) Yes ( ) No — to The New York Times? ( ) Yes ( ) No

15. Associates or colleagues who should be sent Who's Who entry forms?

Name and Address

_____

_____

_____

_____

(attach paper if needed)

When completed, please send promptly to: Who's Who Editor, *Computers and Automation,*
RFD 1, No. Grosvenordale, CT 06255

Here are some recent entrants in

WHO'S WHO IN COMPUTERS AND DATA PROCESSING

Should You Be Included?

ARNETT, Keeton / executive, data processing management / b: 1936 / ed: BA, Colby College / ent: 1959 / m-i: A B Mg Sa Sy / t: vice pres, board director / org: Minuet Man Data Services, Inc, 34 Monument Square, Concord, MA 01742 / pb-h: ASM, AMA, DPMA: pioneered development of OCR application technology / h: 64 Birchward Dr, Holden, MA 01520 / v: 2 / *C 73

BAKER, Jack / director, management information science / b : 1936 / ed: math, Colorado Univ / ent: 1958 / m-i: B Mg Sy / t: director management information science / org: Davis Bros Inc, 501 W 44th Ave, Denver, CO 80217 / pb-h: CDP, RBP, ACM, ASM, DPMA / h: 8622 E Grand, Denver, CO 80237 / v: 2 / *C 72

CHASE, Edward N. / systems analyst / b: 1940 / ed: AB, Harvard / ent: 1963 / m-i: P Sy / t: technical editor / org: GML Corp, 594 Marrett Rd, Lexington, MA 02173 / pb-h: editor The Computer Display Review, Terminals Review / h: Curve St, Carlisle, MA 01741 / v: 1, 3 / *C 73

DAVIS, John S. / director / b: 1923 / ed: BS / ent: 1952 / m-i: A Mg Sy / t: director industrial automation / org: Bunker Ramo Corp, 31717 Lattenda Ave, West Lake, CA 91360 / pb-h: IEEE, Sigma Pi Sigma; 4 publications / h: 1207 Cordova Ave, Glendale, CA 91207 / v: 2 / *C 73

EPSTEIN, Judith A. / systems analyst, programming manager / b: 1945 / ed: Colorado State Univ / ent: 1966 / m-i: A L Mg P Sy / t: programming section supervisor / org: Underwriter's Laboratories, Inc, 333 Pfingsten Rd, Northbrook, IL 60062 / pb-h: AMA / h: 2154D Rugen Rd, Glenview, IL 60025 / v: 1 / *C 73

ISELE, Richard M. / executive director / b: 1940 / ed: Utica College, Tri-State College, Niagara Univ / ent: 1960 / m-i: B Mg P Sy; education / t: director / org: Control Data Institute, 1724 Burrstone Rd, New Hartford, NY 13413 / pb-h: DPMA, SDE / h: RD2, N Gage Rd, Barneveld, NY 13304 / v: 2, 3 / *C 73

KIRGAN, Christopher M. Jr. / vice pres / b: 1932 / ed: NYU, Pace College / ent: 1950 / m-i: Sa / t: vice pres, director of sales / org: Potter Instrument Co Inc, 532 Broad Hollow Rd, Melville, NY 11746 / pb-h: AMA, DPMA / h: 1 Whistlerhill Lane, Huntington, NY 11743 / v: 2 / *C 73

KREIGER, Frederic J. / project manager systems analyst and programmer / b: 1941 / ed: AA, Univ of Maryland / ent: 1961 / m-i: D Mg P Sy / t: computer specialist / org: Industrial College of the Armed Forces, Fort L J McNair, Washington, DC 20315 / pb-h: CDP, ACM, DPMA / h: 1415 Southern Ave, Washington, DC 20032 / v: 1 / *C 73

LEE, Robert E. / systems analyst, software specialist / b: 1931 / ed: - / ent: 1960 / m-i: A B L P Sy / t: systems analyst, software specialist / org: South Bend Community Data Center (City, County & School District), 635 S Main St, South Bend, IN 46623 / pb-h: CDP, IDEA, GMIS AEDS, DPMA / h: 1334 S 30th St, South Bend, IN 46615 / v: 1 / *C 73

MITTAG, Bianca E. / manager systems and programming / b: 1937 / ed: BS, South Africa / ent: 1960 / m-i: A Mg P Sy / t: vice pres / org: Computer Methods Corp, 470 Mamaroneck Ave, White Plains, NY 10605 / pb-h: - / h: 114 Huntley Dr, Ardsley, NY 10502 / v: 2 / *C 73

MORRIS, C. Carson / consulting engineer / b: 1937 / ed: EE, Drexel; computer science, Pennsylvania State / ent: 1958 / m-i: A D Mg Sy; engineering and management consulting / t: teleprocessing systems director / org: Auerbach Corp, 1501 Wilson Blvd, Arlington, VA 22209 / pb-h: IEEE, ACM, NSIA, STWP, Armed Forces Communications-Electronics Assn; 14 papers / h: 4509 Guinea Rd, Annandale, VA 22003 / v: 2 / *C 73

PALLEY, Arnold D. / consultant / b: 1927 / ed: BA, Univ of Chicago / ent: 1957 / m-i: Mg; data processing personnel and training, data processing standards / t: vice pres / org: Brandon Applied Systems, Inc, 1611 N Kent St, Arlington, VA 22209 / pb-h: contributing editor on computers, Van Nostrand Scientific Encyclopedia; "Organizing the Data Processing Activity," IBM / h: 7518 Old Chester Rd, Bethesda, MD 20034 / v: 2 / *C 73

PHINNEY, Arthur F. / manager / b: 1918 / ed: BA, Dakota Wesleyan Univ / ent: 1957 / m-i: Mg / t: senior vice pres / org: Computer Leasing Co, 2001 Jefferson Davis Hwy, Arlington, VA 22202 / pb-h: - / h: 3212 Chichester Lane, Fairfax, VA 22030 / v: 2 / *C 73

SCHIRRIPA, Ronald H. / systems and programming manager / b : 1945 / ed: Hofstra Univ / ent: 1963 / m-i: D Mg / t: systems and programming manager / org: Lybrand, Ross Bros, & Montgomery, 1251 Ave of Americas, New York, NY 10020 / pb-h: ASM, UUA / h: 201 Montauk St, Valley Stream, NY 11580 / v: 2 / *C 73

WOLINSKY, Albert / consultant / b: 1913 / ed: PhD, physics, math / ent: 1955 / m-i: A L Ma P Sy; generation of powerful procedures for use in associative processors / t: owner / org: Computer Information Systems, 13674 Bayliss Rd, Los Angeles, CA 90049 / pb-h: lecturer, associate professor California State Univ, Los Angeles; over 50 papers, 5 patents / h: 13674 Bayliss Rd, Los Angeles, CA 90049 / v: 3 / *C 73

An Invitation

If you entered the field of computers and data processing in 1967 or earlier, we invite your entry.

If you last sent us an entry form in 1971 or earlier, we invite your new updated entry.

See the entry form on the page opposite — which may be copied on any piece of paper.

Resolution of Impeachment of President Nixon

Congressman Robert F. Drinan
U.S. House of Representatives
Washington, D.C. 20515

"Impeachment is a noncriminal and nonpenal proceeding. . . .the term 'removal from office' could be used as a synonym for 'impeachment'."

The House Should Initiate Impeachment Proceedings

Mr. Speaker, with great reluctance I have come to the conclusion that the House of Representatives should initiate impeachment proceedings against the President. My mind has resisted that conclusion for many months. I have now, however, come to the point where I must follow my convictions and my conscience and recommend that the House of Representatives pursue its duty under article 2, section 4 of the Constitution which provides for the impeachment of the President.

Totally Secret Airwar in Cambodia for 14 Months Followed by Nixon's Statement on April 30, 1970 that U.S. had Scrupulously Observed the Neutrality of Cambodia

Before discussing the historical, constitutional, and legal justification for my conclusion I think that it is appropriate to note that the recent revelation which persuaded me that I could no longer be silent on this point was the recent disclosure that President Nixon conducted a totally secret air war in Cambodia for 14 months prior to April 30, 1970. On that day President Nixon announced to the Nation that he had ordered American ground forces to enter Cambodia. The President stated to the Nation that in the 5 years prior to April 30, 1970, the United States had "scrupulously" observed the neutrality of Cambodia. The President made this statement with the full knowledge that he had personally ordered thousands of B-52 air raids over Cambodia during the 14 months prior to America's invasion on the ground of neutral Cambodia.

It is appropriate to discuss the following issues:

First. An impeachment cannot be substituted for either a vote of no confidence or an indictment for criminal offenses.

Second. The activities and omissions of President Nixon add up to conduct which merits impeachment by the House of Representatives.

Third. A hearing on impeachment by the House of Representatives is the only possible way by which the questions of the citizens of America can be answered and their confidence in government restored.

What Activities or Omissions Amount to Impeachable Conduct?

All of the literature concerning the Constitutional Convention demonstrates that there is no evidence that any member of that convention expressed the opinion that impeachment was only intended to cover indictable offenses. That is the conclusion of the learned volume by Prof. Raoul Berger entitled "Impeachment: The Constitutional Problems" — Harvard University Press, 1973. Professor Berger states that —

> One may fairly conclude that indictability was not the test of impeachment....

The same author expands on this by asserting —

> In sum, "high crimes and misdemeanors" without roots in the ordinary criminal law and which, as far as I could discover, had no relation to whether an indictment would lie in the particular circumstances. (Berger, at page 62.)

The Nature of the Offense

The House of Representatives, therefore, should not wait before commencing impeachment proceedings until some clear indictable offense on the part of the President becomes manifest. The Constitution makes it clear that the Founding Fathers separated impeachment from subsequent criminal prosecution. The words "high crimes and misdemeanors" do not presuppose conduct punishable by the general criminal law.

The report of the House Judiciary Committee recommending the impeachment of Judge English in 1926 was clear on this point:

> ...Although frequently debated, and the negative advocated by some high authorities, it is now, we believe, considered that impeachment is not confined alone to acts which are forbidden by the constitution or Federal statutes. The better sustained and modern view is that the provision for impeachment in the constitution applied not only to high crimes and misdemeanors as those words were understood in Common Law but also acts which are not defined as criminal and made subject to indictment, and also to those which affect the public welfare. (H. Rept. 653, 69th Congress, 1st Session, page 9-10.)

Indeed it is uncertain whether the constitutional provisions for impeachment set up a criminal pro-

---

Before election to Congress, Father Robert F. Drinan, S.J., was Dean of the Law School of Boston College, Newton, Mass.

Reprinted from the *Congressional Record*, Vol. 119, No. 123, 93rd Congress, First Session, Tuesday, July 31, 1973.

ceeding at all. To be sure the impeachment provisions seem to point in the direction of criminality because they employ the language of the criminal law. At the same time article 3, section 2(3) of the constitution provides that —

> The trial of all crimes, except in cases of impeachment, shall be by jury.

Similarly article 2, section 2(1) empowers the President to grant "pardon for offenses against the United States, except in cases of impeachment." It is also significant that article 1, section 3(7) distinguishes very clearly removal from office from the subsequent punishment which can be received after indictment.

Impeachment is a Noncriminal and Nonpenal Proceeding

Impeachment, therefore, should not be looked upon or compared with an indictment nor should the role of the House of Representatives in considering the impeachment of a President be deemed to be that of a grand jury. Perhaps the best definition of impeachment is taken from the classic work on jurisprudence of Justice Story. This classical source states that impeachment is —

> ...proceeding purely of a political nature. It is not so much designed to punish an offender as to secure the state against gross official misdemeanors. It touches neither his person nor his property, but simply divests him of his political capacity.

Impeachment is a noncriminal and nonpenal proceeding. Impeachment proceedings do not permit the person subject to them to claim double jeopardy if, in fact, he is tried for a crime subsequent to the impeachment.

Removal from Office EQUALS Impeachment

From my review of virtually every legal and constitutional treatise ever written in American history on impeachment the term "removal from office" could be used as a synonym for "impeachment." Professor Berger notes in his definitive study of impeachment that the framers of the Constitution made clear the noncriminal aspects of the impeachment process but that —

> A thorough-going attempt to clarify the nonpenal aspect of removal would have required the framers to coin a fresh and difficult vocabulary — perhaps an insuperable task in all the circumstances.

Fear of Monarchy

The framers of the Constitution were steeped in English history. They feared that the executive branch of Government might be transformed into a monarchy. At the same time the authors of the Constitution desired to perpetuate the independence of the executive branch of Government. In order to maintain a system of checks against the executive, while not really threatening the independence of that branch of Government, the framers of the Constitution provided for impeachment which, it could be argued, is a narrow exception to the separation of powers.

The history of the Constitutional Convention makes it clear that, in debating impeachment, the framers were almost totally concerned with the powers of the President. The inclusion of the "Vice President and all civil officers," now in the Constitution, was not added until shortly before the convention adjourned.

Adopted from English Law

Studies of the process by which the Constitution was written make clear that the framers furnished to the House of Representatives a norm for impeachment. That norm, adopted from English law, stated that impeachment can arise from a serious failing even though such conduct or failure to act would not be under English law an indictable, common law crime. At the same time the framers of the Constitution withheld from Congress the power to inflict criminal punishment. The framers adopted the words "high crimes and misdemeanors" because they knew that these words had a limited and technical meaning.

The framers of the Constitution clearly understood the potential abuse of the power of impeachment which it conferred on the House of Representatives. They understood that impeachment could become a very partisan weapon and that its existence could threaten Presidential independence. Nonetheless they chose to give to the House of Representatives the power of impeachment as a curb on Presidential conduct which would be less than criminal but more than tolerable.

I have reluctantly come to the conclusion that a hearing on the impeachment of the President is indicated.

Does President Nixon's Conduct Justify Impeachment?

In view of the fact that the Members of the House of Representatives act under the Constitution as the triers of fact in any impeachment proceedings it is not appropriate to set forth circumstances surrounding recent events in a way to suggest that the only possible inference from these circumstances is a conclusion that justifies impeachment. Consequently I raise questions that in my judgment the House should seek to answer. The list of questions is by no means complete or comprehensive. Nor is it appropriate to suggest that these questions will be resolved by the Senate Watergate Committee. Indeed, one can argue, based upon the questions asked by the Senate Watergate Committee, that the members of that panel may well be usurping the right to investigate the possibility of impeachment — a right granted by the Constitution exclusively to the House of Representatives.

The questions to which the House, in an impeachment proceeding, should address itself include the following:

Any Justification for 3630 Air Strikes?

First. Was there any justification for President Nixon authorizing 3,630 air strikes over Cambodia between March 1969 and May 1970? This period of 14 months of intensive bombing cost $140 million. Since the Congress knew nothing of the secret raids in Cambodia was this money obtained from the Congress under "false premises" and spent in an unconstitutional manner?

Was the President, furthermore, truthful with the American people when he stated to them on April 30, 1970, that "for 5 years neither the United States nor South Vietnam has moved against enemy sanctuaries — in Cambodia — because we did not wish to violate the territory of a neutral nation"?

... for Falsification of Military Records?

Did the President, moreover, acquiesce in wrongdoing when the National Security Council, headed by Dr. Henry Kissinger, ordered the falsification of military records in order to prevent disclosure of the clandestine air war on Cambodia?

... for Taping All Conversations in the White House?

Second. Were impeachable offenses committed by the President in connection with the taping of all conversations which he made on the phone and all conversations that took place in various parts of the White House? If Mr. John Ehrlichman is accurate when he stated that he talked with Mr. L. Patrick Gray, then Director of the FBI, from a phone in the President's office it was a clear violation of Federal law since a phone was tapped without the permission of the sender or the receiver of the message.

Once again the answers to those questions with respect to the tapes may or may not be revealed in the Senate Watergate proceedings. But the House of Representatives is nonetheless not absolved from its obligation to investigate this matter insofar as it pertains to the question of impeachment — a subject over which the House has exclusive jurisdiction under the constitution.

... for Impounding Billions Voted by Congress?

Third. Every court that has ruled on the question of impoundment has decided against the administration. Nonetheless the impounding goes on. It was revealed on July 26, 1973 that the Secretary of Health, Education, and Welfare had withheld $1.1 billion over the past year in moneys authorized for major Federal health programs. By what right does a Federal agency refuse to spend more than a fifth of all of the expenditures appropriated by the Congress for the health services budget? Affected by this refusal to spend were Federal mental health programs, the National Heart and Lung Institute, and the National Cancer Institute — the last having been given priority by the President himself.

... for a Super-Secret Police Force Accountable Only to the President?

Fourth. The establishment of a super-secret security force within the White House itself is, of course, unprecedented in all of American history. The assumption by the President of the statutory tasks of the FBI and the CIA raise the most serious questions concerning the impeachment of a Chief Executive who in effect established a national police force accountable only to himself.

There are many other questions that could be raised concerning the legality, the constitutionality and the propriety of action and inaction by President Nixon.

Conclusions and Recommendations

Until the last few days I, like other Members of the House of Representatives, took refuge in the hope that somehow these questions would be resolved either in the courts or in the Senate Watergate Committee hearings. I am persuaded that Members of the House can no longer entertain such hopes. The legality of the conduct of the several dismissed top aides to the President may or may not be fully resolved by the Senate hearings or in the courts. But the question of the impeachment of the President can be resolved in no other place but the House of Representatives.

Almost One Fourth of the American People Believe that the President Should be Removed from Office

It will no longer do for Members of the House of Representatives to suggest that no serious question exists. Reliable national polls indicate that some 70 percent of the American people feel that the President was involved in some way in the coverup of the Watergate scandals. Almost one-fourth of the people in the Nation have expressed the opinion that the President should be removed from office.

The House of Representatives has the Duty to Determine Whether the President has Committed Offenses Requiring Removal from Office

If the House of Representatives is to be truly the House of the people we can no longer tell almost one-fourth of America's citizens that they must expect the Senate or the courts to determine whether or not the President has committed impeachable offenses. The determination of that question is a right and duty which the House may not delegate to any other body in America.

Months ago the House Committee on Banking and Currency had a vote as to whether they would investigate the then emerging scandals related to the Watergate. The committee in a closely divided vote decided not to investigate those activities at that time.

I think that the time has arrived when the Members of the House must seek to think the unthinkable and to search diligently into our convictions and our consciences and decide what is our duty under the constitution as we behold the unprecedented revelations which everyday become more incredible.

Has the House Been Too Timid?

Not a few observers and students of the House of Representatives have stated that they feel that the House has been too timid in asserting its constitutional powers with respect to a declaration of war. Many commentators have also indicated that the House of Representatives has not been vigorous enough in the exercise of its oversight function with respect to Federal regulatory agencies, including the military. Many publicists, furthermore, have given their opinion that the House of Representatives not infrequently allows the Senate to erode the powers of the House.

The Senate, not the House, is the Jury

I raise that central question with regard to the Senate Watergate proceedings. If the President is impeached by the House the Members of the Senate must sit as the jury of the impeachment sent to the Senate by the House. Inevitably, therefore, the Members of the Senate cannot and should not inquire into the existence of impeachable offenses on the part of the President. That role belongs exclusively to the House. I hope that the House of Representatives will overcome its understandable reluctance and confront the unpleasant but unavoidable fact that hearings on the impeachment of the President have now become our constitutional duty.

Finally, Members of the House of Representatives should recognize that under the constitution a proceeding with respect to his impeachment is the only way by which a President can vindicate himself. Col. George Mason made this point when he addressed the Framers of the Constitution meeting in Philadelphia. Colonel Mason recommended that the constitution provide "for the regular punishment of the Executive when his misconduct should deserve it." But Colonel Mason went on to state that the same procedure will provide "for his honorable acquittal when he should be unjustly accused." For Members of both political parties, therefore, the impeachment

(please turn to page 36)

Nixon and the Mafia — Part 1

Jeff Gerth
Contributing Editor
SunDance Magazine
1913 Fillmore St.
San Francisco, Calif. 94115

"Organized crime will put a man in the White House someday, and he won't even know it until they hand him the bill."

— Ralph Salerno

Richard M. Nixon has been a central figure in American politics since the end of World War II. In the last of his three Presidential campaigns he was the best-financed candidate in United States history.

Yet in many ways Nixon remains a profound enigma to us all. Never a man of great personal popularity, he has nevertheless survived an almost endless series of personal crises and defeats to attain the pinnacle of American power.

Nixon's career has been continuously marred by scandal and controversy. From his smear campaigns in the late Forties, to the secret slush fund that led to the Checkers speech in 1952, to the Hughes loan in 1960, to the $400,000 ITT scandal in the spring of 1972, to the Watergate break-in and the $10,000,000 secret Republican war chest last fall in the news, Nixon's ascendancy to power has been surrounded by the stigma of suspicion.

Involvement of Organized Crime

This article has no direct "scandal" to disclose, nor is it a collection of circumstantial evidence designed to pin a specific wrong-doing on Nixon.

It is rather a direct, primary portrait of a man whose financial and political careers have rested on investments and contributions tainted by the involvement of organized crime. Richard Nixon's closest personal, business, and political ties have been with a tightly intertwined circle of men who are directly and indirectly connected with the underworld.

These connections have been unearthed in the course of a six-month investigation of Nixon's career, focusing on his business deals in Florida and the Caribbean since the late Forties.

A number of new facts have been discovered:

- Nixon visited Miami numerous times in the late Forties, contrary to all of his official biographies. While there, he yachted with Richard Danner, Bebe Rebozo, and Tatum "Chubby" Wofford of the syndicate-controlled Wofford Hotel. Danner also had mob connections at that time.
- Nixon has invested in two southern Florida land deals; others involved in both projects have had links with organized crime. Two men in particular — Leonard Bursten and Nathan Ratner — have had business connections with organized crime.
- Nixon concealed his ownership of a Key Biscayne lot for four years until a mortgage held by another Lansky-associate, Arthur Desser, was paid off.
- Nixon's closest friend, Bebe Rebozo, was a war profiteer in the early Forties in the tire recapping business. Three of his associates served on the Dade County tire allocation board, in clear violation of OPA regulation No. 3C-118. At the same time Nixon was working in the legal interpretations unit of the OPA in Washington, D.C.
- Nixon technically concealed his employment with the OPA until he was President.
- Nixon is linked to the "Havana Connection" — a funnel for organized crime and reactionary Cuban politics. Indictees in the Watergate case also figure in this connection.
- Nixon has received campaign contributions from two men who have had direct connections to organized crime.
- Nixon has appointed a number of men, including John Connally, William Rogers, and Will Wilson, who have indirect ties to organized crime.
- The mob-favored Miami National Bank was the chief creditor in a bankruptcy case which led to a $300,000,000 suit, still pending in 1972, against Nixon and other members of his New York law firm for their alleged part in skimming over $5,000,000 of the bankrupt firm's accounts.

Nixon's rise to wealth and power has required the silent loyalty of a wide range of personalities whose names only occasionally surface in the glare of scandal — with good reason. Richard Nixon would not be where he is today were it not for his uncanny ability to thrive on political crisis. As much as anything else it is his self-proclaimed poker-playing instincts — the cautious, calculating, close-mouthed style and the ability to keep a stone face in rough as well as smooth times — that has carried Nixon to the Presidency.

Reprinted with permission from *SunDance Magazine*, November-December, 1972, Volume 1, Number 3, published by and copyright by Running Dog, Inc., 1913 Fillmore St., San Francisco, Calif. 94115.

"A hundred Navy officers will tell you Nix never lost a cent at poker," says a buddy from World War II. "It's a matter of being in the right place at the right time," says Nixon, "and I'm always willing to take a chance ... maybe it's that old poker-playing instinct."

It is in moments of vulnerability that the underworld inevitably makes contact. It is the loan shark who will loan you money when no one else will, and it is the mob that controls the pleasures and vices of escape — narcotics, gambling, pornography.

Accordingly, Nixon's closest contact with organized crime occurred during the most vulnerable periods of his political career — his start in the Forties, and his defeated years out of office in the Sixties.

With its gigantic power and resources, from the heroin traffic to inflated supermarket prices, from military PX frauds to black market currency manipulations, from gambling and prostitution to its long, powerful push into "legitimate" business and politics, organized crime constitutes one of the most powerful and pervasive forces in American life.

The Early Days in Florida

A major base for the wide network of organized crime is the Caribbean, and consequently a major capital is Miami. In the days of the Cuban dictatorship, Miami was the center of the "Havana Connection" — a funnel for money flowing from the Caribbean gambling hotel, prostitution, and drug operations which centered in pre-revolutionary Cuba. The control exercised by organized crime over the city of Miami dates back to the Forties.

As of January 3, 1947, Richard Nixon was a Congressman from southern California. Mr. Nixon and his biographers have always maintained that he never showed up in Florida — the site of so many of his later dealings — until the early Fifties.

But information from two ex-FBI agents not only puts Congressman Nixon in Florida "numerable" times in the Forties, but also in close contact with Bebe Rebozo and other persons closely connected with organized crime.

Keeping Nixon out of Florida in the Forties is essential to the Nixon image, because in 1950 Senator Estes Kefauver opened his celebrated hearings on organized crime in Miami. In 730 pages of testimony Kefauver painted a shattering picture of nationally known gangsters working in harmony with Florida public officials ranging in rank from sheriff to governor.

Among other things Kefauver reported that the underworld took control of three Miami Beach hotels — the Wofford, the Sands, and the Grand — to centralize their gambling and bookkeeping operations. The three hotels were within a block of each other and served as the capitol buildings of the crime empire.

It was into this formidable atmosphere, and into the companionship of Rebozo and the Wofford family, that Richard Nixon was introduced in the Forties. Travel plans were arranged by fellow-Congressman George Smathers and his first campaign manager Richard Danner.

New Friends

According to Danner, a former head of the Miami FBI office, and his FBI partner John Madala, many of

ORGANIZED CRIME: THE GHOST IN THE MACHINE

The predominant characteristic of organized crime today is its shift from the crimes of violence to the business of crime. Images of rough-looking thugs toting machine guns in their suitcases have been replaced by pin-striped executives carrying attache cases stuffed with $1000 bills. A 1971 IRS report disclosed that fully eighty-five percent of the nation's gangsters have investments in legitimate businesses.

Although there may have been a reduction in violence, there has not been a reduction in crime.

Ralph Salerno, an expert on organized crime, explains that "throughout the progression from simple extortion and mayhem to the penetration and control of sophisticated larger businesses, there is never an abandonment of illegal enterprises. In organized crime a man never goes completely 'legit', though he may well move out of direct operation of illegal business."

Thus today, the underworld consists of a shadowy empire held together by mutual arrangements, influence, and money. It uses various fronts — dummy corporations, attorneys, and accountants — to protect itself in a maze of paperwork. This network has led to the creation of the most successful business of all: with yearly revenues of $50 billion, organized crime takes in about two times as much money as General Motors.

With its economic power, international organization, and invisibility, organized crime is in business with everybody. Recently revelations have shown its involvement with the CIA in heroin traffic in Southeast Asia, with high supermarket prices in New York City, and with the billion dollar frauds in U.S. and South Vietnamese military PXs and black market currency manipulations.

Since World War II, organized crime has been one step ahead of the major population shifts in the United States. Post-war Americans flocked to the sun, making California, Arizona, Nevada, Texas, and Florida the five fastest growing states during the last twenty years. Accompanying these changes in population patterns were qualitative shifts in the economy. A decline in real wealth (i.e., equipment and raw materials) was paralleled by an increase in "paper" capital (stocks and finance). Organized crime again has been one step ahead, diversifying its products from the "vices" of gambling, liquor, and narcotics to the "services" of hotels, restaurants, insurance, real estate, and entertainment. The creation of a huge leisure industry, rooted in travel, recreation, entertainment, and escape — has further helped expand the coffers of organized crime.

As Donald Cressey, consultant to the Presidential commission on violence, concluded, "The penetration of business and government by organized crime has been so complete that it is no longer possible to differentiate 'underworld' gangsters from 'upperworld' businessmen and government officials."

Nixon's early Florida excursions found him fishing with Bebe Rebozo, an unknown gas station operator, and Tatum "Chubby" Wofford of the syndicate-controlled Wofford Hotel.

The Wofford was the headquarters for New York syndicate figures Frank Costello, Frank Erickson, and allies like Meyer Lansky. Erickson, described by law enforcement officials as the syndicate's "national betting commissioner," was a partner in the Wofford with the Miamian who managed the hotel and represented the New York interests on the Beach. The Woffords spread the action around and gave a piece of the hotel to John Angersola, a member of the Cleveland syndicate. Angersola and his Cleveland running mate "Big Al" Polizzi also owned large chunks of the Sands and Grand hotels, the other two headquarters for mob activity in Miami.

The manager of the Wofford was the Miami Beach "fund-raiser" for the political campaigns of mob-favored politicians, including Sheriff James Sullivan of Dade County. After the Kefauver hearings, Sullivan was charged on a six-count grand jury indictment with incompetency, corruption, taking bribes and conducting raids on behalf of certain gambling interests, among other charges.

During an hour-and-a-half conversation in early September, Danner recounted for me one of Nixon's Miami visits.

The time was 1948. Nixon was involved in prosecuting the Hiss Case, in which (in Six Crises) Nixon has confessed his "name, reputation, and career" were staked. In the middle of the prosecution Smathers called Danner from Washington to tell him, "Dick is on the verge of a physical breakdown. We're all concerned about him."

Smathers put Nixon on the train and Danner met him at the other end, in Miami. Danner remembers he thought Nixon looked "like a northern hick" coming off the train in his heavy overcoat.

After a week in Vero Beach, where Danner had a car dealership, the two headed for a Miami osteopath. Danner called Rebozo to say "Bebe, get your boat and meet us at the doctor's office." The three then went out on Rebozo's yacht.

From the sunny quiet of Miami Nixon returned to Washington rested and ready to continue his attack on Alger Hiss.

Billy Graham and Mickey Cohen

On other visits in the Forties, Nixon "spent time yachting with Wofford" (according to both Madala and Danner), and he also learned how to play golf. One of his companions on the golf links was evangelist Billy Graham.

In 1949, after his first golf outings with Nixon, Graham became famous by "converting" a convicted perjurer named J. Arthur Vans. Vans was a good friend of West Coast gambler and premier mob bookie Mickey Cohen. Some ten years later, during the course of an income tax evasion case, it was revealed in court papers that Graham and other "businessmen" had made "loans" to Cohen, helping the mobster explain to the IRS some of his unaccountable wealth.

Through the years Graham has tried unsuccessfully to convert Cohen to Christianity. Mickey, however, did feel sufficiently reformed by 1968 to give Nixon $26,000 for his Presidential campaign.

Even so, Cohen's contribution was considerably smaller than the $100,000 that passed through Danner and Rebozo's hands from a Howard Hughes casino that same year. Danner was representing Hughes' Las Vegas casino interests at the time. Not long after Nixon had set himself up at Key Biscayne — with the help of Rebozo — Danner located himself in Nevada to oversee the Hughes empire there. Danner's friendship with former FBI buddy Robert Maheu put him there in the first place, and it was Nixon's influence that kept him safe during Maheu's stormy, well-publicized departure.

Today, couched in his luxurious executive offices at the Sands Hotel, Danner speaks kindly of his "close friend" in the White House.

The Danner Past

Danner's own past is hardly free of scandal. There was his friendship with corrupt officials like Dade County Sheriff James Sullivan during his 1940-46 FBI days and there was his stint in 1946 at the Miami Beach Hotel Owners Association with his friend Abe Allenberg, the association president. Allenberg also happened to be booking manager of the Wofford Hotel and local representative for the New York syndicate.

From 1946-48 Danner was city manager of Miami, and his term of office ended with him caught in the middle of a gangland dispute over control of the city police. In 1948 the city council dismissed Danner, accusing him of "playing both ends against the middle." Furthermore, one council member alleged that two years earlier Danner had accepted $10,000 from gambling interests while managing the first Congressional campaign of George Smathers.

In the early Fifties Danner left Florida to join his friends in Washington. He opened shop as a lawyer and took out membership in the Burning Tree Country Club, where his golfing partners were Smathers and Nixon.

Danner managed to keep out of the public eye until the mid-Sixties, when General Motors used him to coordinate its snooping on Ralph Nader.

You Must Have Been a Beautiful Bebe

Bebe Rebozo is the closest of all Nixon's friends, and probably the most mysterious. The life of this fifty-nine-year-old neatly dressed millionaire — whose face has adorned the cover of Life — has remained by and large a closed book. This doesn't seem to bother the President, for as Life said in 1970, "He's [Rebozo] the only person Nixon really trusts. He can talk to Rebozo, ask him questions. He knows Bebe will give him honest answers. They can talk about anything ... And nothing Nixon says is going to go any further."

A man who knows them both says "Bebe and the President can sit together for hours and say practically nothing to each other."

Today Rebozo owns considerable real estate, has a financial interest in several small firms, and owns the only bank on Key Biscayne — the Key Biscayne Bank. Dubbed the unofficial mayor of the island, Rebozo drives around in his large green Continental with a bumper sticker that reads "The only issue is America."

While an American citizen (born of Cuban parents) Rebozo has close ties to the pre-Castro Cuban political scene. His business associates have included the former Cuban ambassador to Brazil under Batista, Burke Hedges, who was a heavy initial investor in Rebozo's bank, and the former mayor of Havana, Dr. Eduardo Buttari, who ran the "Cubans for Nixon" organization in 1968. Buttari, in 1972, held a plush $25,000 a year job in HEW doing little. According to a reliable source Buttari, a Cuban refugee, had his citizenship papers okayed rather quickly in August, 1971. He claims to have a "great friendship with Nixon and Rebozo."

Other of Rebozo's business associates are linked to organized crime. Dick Fincher, a Florida State Senator who invested in Lummus Island with Rebozo, has been a "character witness" for a number of underworld characters.

Another Rebozo business connection is "Big Al" Polizzi of Cleveland. In 1968 Rebozo chose the Polizzi Construction Company to build a shopping center in the Cuban community in Miami. "Big Al" claims to be a retired gangster, and probably is by now. When he appeared before the Kefauver Committee in 1951, Polizzi also purported to be a retired mobster engaged in "legitimate" business.

Polizzi was convicted in 1943 of black market liquor violations arising from his and the Cleveland syndicate's efforts to smuggle rum from Cuba to Key West — with the help of Cuban President Batista.

Rebozo's friendship with Polizzi precedes their 1968 business transaction, but exactly how far it goes back is unclear. In 1965 Polizzi was one of several Coral Gables residents to sign a petition of behalf of Rebozo with regards to a zoning matter. In 1952 Rebozo's sister-in-law signed a petition used by Polizzi to get a Federal pardon, although she claims now that she doesn't remember signing it.

Polizzi moved to Coral Gables in 1944, putting his illicit cash into over 300 parcels of land there. Rebozo was also buying real estate in Coral Gables at the time, but there is no evidence linking Polizzi, Rebozo, and their Coral Gables purchases.

Among the raw data accumulated by the Miami Police Department is an intelligence report dated Nov. 13, 1963, which lists the testimony of a gangster informant that Bebe Rebozo as owner of a coin laundry operation — Wash Well — out of which he was running a numbers racket, was "fronting in this operation for ex-Vice President Nixon." But this testimony is uncorroborated.

Would You Buy a Used Tire from This Man?

Rebozo's source of capital for his land purchases came from his war-time service station business, and it was his sideline in tires that brings the supposedly unconnected Forties careers of Smathers, Nixon, and Rebozo into curious intersection.

Following Pearl Harbor the Japanese had cut off the vast rubber reserves of Southeast Asia. By 1942 America was minus ninety-five percent of its rubber supply — tires became a scarce commodity.

Before the war had broken out, Rebozo was running a Shell gas station which also served as a hangout for such friends as Smathers and Sloan McCrea, Nixon's 1972 finance chairman. By the end of 1941, with gas rationing already in effect for six months, service stations were not good investments. And, a few weeks after Pearl Harbor, the government banned construction of any new stations.

Nevertheless, just two days after Pearl Harbor, Rebozo purchased the land next to his station to enlarge his facilities.

In Washington, the Office of Price Administration (OPA) was one of two agencies charged with managing the tire scarcity. Since original tires were unavailable to the public, recaps and retreads became precious commodities. Bootleggers, thriving on the scarcity, were to enjoy many years of profit.

In January 1942 Price Administrator Leon Henderson recognized the problem, declaring, "The public must be protected from exploitation ... Profiteering in tires [retreads] already has reached serious proportions, a situation that cannot and will not be allowed to continue."

Meanwhile, in his newly expanded gas station, Rebozo had become South Florida's largest tire recapper. His profits showed up throughout the Forties in numerous real estate purchases.

Charged with enforcing OPA policy on the local level was the tire allocation board of the Dade County Defense Council. The chairman of the council and at least one other key member had direct links with members of organized crime.

Moreover, three men who served on the tire allocation board had ties to Rebozo. Frank Smathers, father of Rebozo's friend and associate George Smathers; Lucien Renuart of Renuart Lumber which had loaned Rebozo the money to expand his service station into the profitable tire recapping business; and C. W. Chase, Jr., of Chase Savings and Loan Association which employed Rebozo's sister Margaret Barker in an executive position (and which was a few years later to provide Rebozo with capital for his real-estate ventures) — all served in clear violation of OPA policy (3C-118) which stated, "Persons connected with the production or distribution of tires and tubes, or with the recapping or retreading of tires should not be selected to serve on the Boards."

In the meantime, the OPA's tire rationing division had hired a few young attorneys to draft the multitude of necessary regulations and to set up regional offices to enforce these regulations. On January 9, 1942, Richard Nixon, just a few years out of Duke Law School, went to work in the interpretations unit of the legal section of the tire rationing branch of the OPA.

For Nixon the position must not have been a memorable one. He concealed his employment at the OPA until he became President. In his official biography in the Congressional Directory for the 80th Congress, he listed his employer from January-August 1942 as the Office of Emergency Management. While this was not technically incorrect, it is the equivalent of an FBI agent saying he works for the Justice Department.

On Jan. 29, 1942, George Smathers was in federal court for the case United States vs. Standard Oil of Kansas, involving U.S. Customs confiscating American-made tires coming into the country from Cuba in an "attempt to circumvent national tire rationing." When Smathers encountered a delay in the case he sought a ruling from the OPA in Washington on the legality of bringing tires in from Cuba.

OPA records in the National Archives reveal that one of Nixon's duties was handling all correspondence involving tire rationing. It was therefore his responsibility to answer Smathers, and it is relevant to know what he said.

Unfortunately, most OPA records were destroyed after the war. The court file for this case is supposed to be in the Atlanta Records Center, but a written request submitted to the clerk of the civil court in Miami on July 6, 1972 has not been honored, despite the usual one week response time. Contradictory excuses for the delay have been given.

Written questions submitted to President Nixon and Bebe Rebozo have also gone unanswered. Among the relevant questions is whether Miami was one of the regional offices Nixon set up. In the context of their later friendship, one is forced to ask just when did Nixon, Rebozo, and Smathers come into contact with each other, and under what circumstances?

War profiteering was the pastime of Nixon's other yachting host, "Chubby" Wofford. Wofford's hotel was one of the two Miami Beach Hotels allowed to remain open during the war. According to Danner, Wofford made "tons of money" through the Navy's use of this hotel, but "that wild man blew it all away".

From Ansan to Watergate

Wofford's attorneys were Hunt, Salley and Roman, who also represented some mysterious Cuban interests — the Ansan group.

The Ansan group was a secretive investment group including Cuban businessmen and political figures, their Miami associates, and members of organized crime. The group had no official name, but will be referred to in this article as the Ansan group, after the name of its primary real estate front — Ansan Corp. The group's holdings in Florida real estate soon amounted to over $50,000,000. Smathers' law firm protected the Ansan group from publicity, while the firm of Hunt, Salley and Roman held off the Internal Revenue Service.

In 1947 Richard Hunt resigned his position as a judge on the circuit court to become legal counselor for the corrupt Dade County Sheriff, Jim Sullivan. William Roman vacated the Miami office of the FBI and another lawyer named George Salley joined to form Hunt, Salley and Roman. According to a Miami Crime Commission memo (it was the Miami Crime Commission that did most of the investigative work for the Kefauver Committee in Miami) Hunt was the "brains for every public utterance made by [Sheriff] Sullivan." The source further alleged that Hunt was involved with Sullivan in taking graft.

Roman also acted as attorney for the Keyes Realty Company. With a top Keyes official he set off a spin-off realty company to transact such deals as procuring a rent-free home for the sheriff. The IRS regarded the Keyes spin-off as a "dummy front for handling sub-rosa deals for Sullivan."

This wasn't the first time Keyes officials were involved in questionable ventures. Keyes himself — in conjunction with the Ansan group — set up a number of real estate fronts for acquiring land on Key Biscayne.

Nor was it the last time. In 1971 a Keyes vice president named Eugenio Martinez helped form a Miami real estate company called Ameritas, which has been used as a cover for the principals of the Watergate break-in. Martinez and his boss at Ameritas — Bernard Barker — are two of the seven men indicted in the espionage case that leads from the White House to the Democratic National Party Headquarters. The offices of Ameritas were originally located one floor below the headquarters for Keyes Realty.

[The indictees in the Watergate case have many other interesting links. The money Barker had with him when arrested was from his account in the Republic National Bank. The first president and father of the owner of Republic National was the former chairman of the syndicate-controlled Miami National Bank.

Republic National's present director is a law partner of George Salley.

And, according to Jack Anderson, it was President Nixon's best friend, Rebozo, who helped Barker arrange for the financing of some of his real estate ventures "as a personal favor."]

Richard Nixon is also quite close to the Keyes associates. Nixon and Rebozo have been close friends and occasional investment partners with the top executives of the Keyes organization. For example, Keyes' successor as president, a man named Allen Morris, joined with Nixon and Rebozo in a land deal brokered by a Keyes realtor. Another top Keyes officer has been a director of Bebe Rebozo's Key Biscayne Bank for the last few years, and it was to the Keyes company that the White House turned to transact some of the business involved in establishing the Presidential compound at Key Biscayne.

The Havana Connection

The President and the principals of the Watergate break-in thus share a number of important links, especially through the Keyes land company. They also share an important link in Cuban politics.

It is not generally known that Nixon played an important role in conceiving the Bay of Pigs invasion, which, to the anger of people like Barker, was politically and strategically aborted by Kennedy in 1961. Nixon, too, was angered, enough so to visit Kennedy for the only time during his Presidency. And, according to recently revealed tapes from the JFK oral history library, it was Nixon's crony Smathers who was at the time advising Kennedy that Fidel Castro be "destroyed". At the same time, Robert Maheu enlisted the aid of notorious West Coast Mafia figure John Roselli with the idea of "eliminating" Fidel. Finally, also in 1961, Meyer Lansky put a $1,000,000 price tag on Castro's head.

The plotters must certainly have been aware of each other's plans as evidenced by a secret Bahamian police report which disclosed that as the CIA-led Cuban exiles went ashore in the ill-fated invasion, the Mafia (in the person of the Florida-based Trafficante family) was waiting in Nassau with a fortune of gold, ready to move into Havana and reopen the casinos.

Those casinos had been frequented by a lot of Americans, including Richard Nixon. On one of those visits, in April 1952, Nixon was accompanied by Richard Danner and Dana Smith, administrator of the as yet unrevealed Checkers slush fund. Smith blew all his cash in the syndicate-run casino. Playing on credit he wrote a check for $4,200 to cover his debts and stopped payment on the check when he returned to the States. The casino threatened to sue, so Smith turned to Senator Nixon to intervene. Nixon wrote a letter on August 21, 1952, in which, according to the State Department, he said he "would appreciate anything the Embassy might be able to do to assist Mr. Smith with his problem." The Embassy acknowledged Sen. Nixon's letter, stating that although it was prohibited by the foreign service regulations from giving legal advice, nevertheless it

"wished to do anything possible to be helpful to Mr. Smith."

On other trips to Cuba, Nixon stopped off to see his friend President Fulgencio Batista. In 1955 Nixon visited Batista at his private palace, toasted the dictator and pinned an award on him. Batista's ambassador to the U.S., Nicholas Arroyo, made sure Cuban interests were well taken care of by keeping Nixon informed. Years later the same Cuban interests, now in exile, continued the relationship through Arroyo's $17,000 contribution to Nixon's 1968 campaign, and through the activities of "Cubans for Nixon" in both 1968 and 1972. The loyal silence of Watergate leader Bernard Barker, himself a former employee of Batista's secret police, also helped the Presidential campaign.

The Miami-based intrigue in the Watergate affair — the secret bank accounts and real estate fronts — is a throwback to the good old days of Cuban politics. All three of Cuba's Presidents between 1940 and 1958 used Florida as a financial depository as well as a political base in exile.

Shortly after Batista took power in a military coup in 1952, Lansky "convinced" the dictator that gambling was the cure for the island's economic ills. Carlos Prio Socorras, who was President from 1948 to 1952, eventually migrated to Miami, his wealth reputed (according to The New York Times) to be in excess of $50,000,000. At this summer's Republican Convention it was Prio who led the Cuban exile demonstrations. Among the early planners for those demonstrations were Watergate indictees Frank Sturgis and Eugenio Martinez. The real estate office of Bernard Barker — the Watergate ringleader — is next door to the offices of Prio Socorras.

(To be continued in the next issue)

Drinan — *Continued from page 30*

process should be looked upon as the one way by which the Executive will be removed from office or by which he will secure that "honorable acquittal" to which he is entitled if he has been "unjustly accused."

The Issue of the Removal of the President from Office Should not be a Partisan Issue

Impeachment should not be a partisan issue. Impeachment should be a question which Members of both political parties in the House of Representatives should be able to discuss. Nothing can be gained by denying the existence of this question and a great deal may be lost.

The one instance in which the House impeached a President — that of President Andrew Johnson in 1868 — was in all probability a gross abuse of the impeachment process and an attempt to penalize the President for differing with the policy of the Congress. If impeachment is to become a real issue within this House every Member should resolve to avoid the excesses which stigmatized the impeachment proceedings a century ago. A decent regard for the design of the Founders of our Constitution suggests that all of the Members of Congress speak rationally, responsibly, and reasonably about those processes which we should discuss and develop if on the one hand we are to avoid the great mistakes which this House made a century ago and, on the other hand, we are to confront without blinking the fact that we alone as Members of the House have under the Constitution the duty to exercise the awesome power to impeach the President. □

Six Parallels of 25 Years Ago

Alger Hiss

For several years — increasingly in recent months — I have had a sense of deja vu. The impression comes from a series of incidents in recent political trials together with disclosures seeping out of the Watergate swamp. I am reminded of parallels with incidents in my Congressional hearings and trials that began 25 years ago next month.

These are my six parallels:

(1) Tapping of telephones and bugging of dwellings. Some weeks before my appearances before the grand jury that indicted me for perjury, my lawyer was told by the FBI agent in charge of the Baltimore office that the FBI had three file drawers full of my telephone conversations. The agent remarked that there had been nothing in the transcripts to support the charges Whittaker Chambers had made. The law at that time did not permit me at my subsequent trial to demand these transcripts, although as early as the Olmstead case Justice Holmes had called wiretapping "dirty business". During my trial and my appeal, my home telephone was tapped and my apartment was bugged. Similarly the home and office telephones of my lawyers were tapped. Tapping of the lawyers continued through the period when they prepared a motion for a new trial. I was then in jail with no telephone to tap. But I have reason to believe that as recently as a year ago my telephone was once again being tapped.

(2) Using as principal witness an unstable informer beholden to the prosecution. In the Berrigan case, the chief prosecution witness was Boyd Douglas, who had a record of imposture ship and tall tales and who, as a Federal prisoner facing additional charges, was under the thumb of the prosecution. In my case Whittaker Chambers had a similar record and as an admitted perjurer could have been indicted at the pleasure of the Department of Justice. A young Congressman, Richard M. Nixon, publicly opposed the indictment of Chambers on the ground that it would destroy the case against me.

(3) Tendentious and prejudicial press stories based on official leaks or statements. In the Berrigan case, prior to the indictment, J. Edgar Hoover, Director of the FBI, testified before a Congressional committee that the FBI had discovered a plot to capture Henry Kissinger and blow up heating tunnels in Washington. Prior to and during my trials there was a barrage of inspired adverse publicity, including the release (before my indictment) by Mr. Nixon of documents Chambers had produced which he claimed to have received from me.

(4) Delay in producing Government records as ordered by the court. In the Ellsberg case this tactic was so manifest that it led to sharp reproof by the judge. In my case the confusion and stress of a lengthy and complex trial led my counsel to discover only after the second trial, when it was too late, that some papers ordered produced had never in fact been forthcoming. An instance of delay that, because of perseverance by my counsel, did not succeed: we had asked for Chambers' passport file. The prosecution contended that it would take two or three weeks to locate it. When we obtained an order, on formal motion, the file was produced that same afternoon.

(5) Forgery by typewriter. In the Ellsberg case, a statement by E. Howard Hunt, a member of the White House "plumbers," disclosed that he had been granted access to State Department files and had forged a telegram from President Kennedy purporting to order the assassination of Diem. I noted that Hunt, unable to get from the FBI the kind of typewriter used by President Kennedy when he was in the White House, regarded his forgery as a poor one because, he said, since the Hiss case typewriting is subject to special scrutiny. In my case it was only after my conviction that my counsel, on consulting a metalurgist, discovered that the Old Woodstock (which after my indictment we had located in a junk shop) had been tampered with to make its typing conform to the typeface irregularities of the machine that, on his retirement from business, my father-in-law had given my wife.

(6) Attempts to influence the trial judge. It came out in the Ellsberg case that Judge Byrne had met with President Nixon at the San Clemente White House during the trial to discuss the possible appointment of the judge as Director of the FBI, a post then vacant because of Hoover's death. In my case, after the first trial had ended with a hung jury there was an immediate widespread attack, led by Congressman Nixon, that the trial judge Samuel Kaufman was partial to the defense. On the day the jury was dismissed, Mr. Nixon called for a Congressional investigation of Judge Kaufman's fitness to serve on the bench. This action, treated by a sector of the press as a demand for impeachment, was calculated to influence whatever judge would preside at the second trial. (Judge Kaufman was not selected to serve at that trial.)

These parallels illustrate Professor Francis A. Allen's point that political trials are "particularly susceptible to unwise and even abusive uses". This susceptibility, the imbalance between the vast power of the Federal Government and the limited resources of an individual defendant, plus the inevitable attraction of the media to such cases, make it of paramount importance that in political trials there be the most faithful adherence to those safeguards of individual rights (of late so patently in jeopardy in our country) that have been a major accomplishment of the centuries-long development of Anglo-American law.

Finally, I note with fresh optimism that the present climate of opinion should facilitate speedy action in the case brought last fall by the American Civil Liberties Union (under the seldom-implemented Freedom of Information Act) for release of all the FBI files in my case — files denied to scholars and to the press until now.

My hopes, as they have always been, are for vindication. I am not interested in seeing the Biter Bitten.

Reprinted from *The Boston Globe*, July 24, 1973.

A Parallel of 1963

Marguerite C. Oswald
Ft. Worth, Texas 76107

November 29, 1963, the then President of the United States, Lyndon B. Johnson, created a commission to evaluate all the facts and circumstances surrounding the assassination of President John F. Kennedy and the subsequent killing of the alleged assassin and to report its findings and conclusions to him.

By his order of November 29, a commission was formed. President Johnson selected Earl Warren, Chief Justice of the United States, as its chairman.

Because I was critical of the commission, I was asked, "Mrs. Oswald, are you implying that the Chief Justice would whitewash evidence or hide information so that the American people, as well as the whole world, would never learn the truth?" I answered yes, that in the name of security, men of integrity and who are the most esteemed, most respected and honored, who have the welfare of our country at heart, would be most likely to do exactly what the White House wanted and thought necessary.

The Watergate affair has followed this pattern. Those we believe are above reproach — those who have reached the pinnacle or are near it — those who are guiding our nation's destiny are found to have manipulated events to accomplish certain things that they think were for the good of our country. Those who have a deep sense of patriotism and loyalty are most likely to twist events to accomplish their purposes.

Ten years ago I went on record before the Warren Commission and on various television programs to this effect. The Watergate affair only strengthens my convictions and proves my theory. The suspect was my son, and seven such respected men branded a dead man who was neither tried nor convicted, Assassin.

Note: The writer of this letter is the mother of Lee Harvey Oswald; for two days he stoutly maintained his innocence of shooting President John F. Kennedy on Nov. 22, 1963; and he was then shot by Jack Ruby on Nov. 24, 1963, who thus silenced whatever Oswald could have said.

Project COMPUTe — Call for Proposals

From Project COMPUTe
Kiewit Computation Center
Dartmouth College
Hanover, N.H. 03755

Financial support available for writing and publication of undergraduate textbooks, monographs, and lab manuals that feature student use of computing

The objective of Project COMPUTe is to help faculty members prepare for publication written course materials that will encourage others to use the computer as an aid to instruction. The author must have previously developed and successfully used his materials in the classroom. COMPUTe cannot support development of new untried applications. It is a writing project, not a programming project.

A variety of disciplines will be considered. Environmental applications are stressed, though proposals are also invited in the physical sciences, biological sciences, social sciences, business, and engineering.

The role of the computer should be to help the student by providing examples and challenging problems in the subject matter concerned. The project is not intended to develop materials for instruction in computer programming.

Royalties will be paid to authors following publication.

Authors are expected to come to Dartmouth College to concentrate their efforts on writing textual material. Programming, secretarial, and editing support are available, as well as access to the Dartmouth Time Sharing System. Though the normal stay is two months in the summer, it is possible to stay for shorter or longer periods or to come at different times of the year.

Normally authors will be notified within 2 months after the proposal is received. Because of the need to arrange suitable housing, authors should plan to allow an additional 2 months before the time they wish to come.

Financial support will consist of salary and travel expenses. In addition, COMPUTe will pay for housing on a no-loss-no-gain basis.

Project COMPUTe is an NSF sponsored project initiated in September 1971. At the time of this writing, COMPUTe can offer support to authors for writing efforts to be completed by September 1974.

For further information and guidelines for proposals, write to: Project COMPUTe, Kiewit Computation Center, Dartmouth College, Hanover, NH 03755.

ZOONAYMAN – A New Game for People and Computers

Edmund C. Berkeley, Editor
Computers and Automation
815 Washington St.
Newtonville, Mass. 02160

"Dice in quantity, instead of just singles or pairs, can provide an exciting 'learn-as-you-play' introduction to probability, statistics, scientific observation, and pictorial reasoning."

In the introduction to the article "Zingo — A New Computer Game" (see page 33 of the February 1972 issue of "Computers and Automation") we said:

> From time to time computer people hunt for games that are fun to investigate, fun to play with another person, and fun to play with a computer, which should be rather easily programmed to play the game.

Such a game (and also a pictorial reasoning test) is Zoonayman. This game has recently been brought to us by a visitor from the country of Langri-Shaan, who also brought the following story with him.

Outline

1. The Problem of King Nashidnezzar
2. Information Engineer Zoomiyie
3. Zoomiyie's Game
4. Nature's Turn
5. Man's Turn
6. Scoring
7. Examples, and Some Comments

1. The Problem of King Nashidnezzar

Once upon a time in the kingdom of Langri-Shaan, there lived a king named Nashidnezzar. In his kingdom people were of many different religions, races, skin-colors, creeds, and cultures; and many persons of very different backgrounds would apply from time to time for employment in His Majesty's service.

Now King Nashidnezzar was a scrupulously fair and nondiscriminating monarch, with a high sense of social responsibility and old-fashioned honor. He wanted to hire good people, no matter what their background might be. He did not want to rely on arithmetical tests, because some of the cultures in his kingdom were weak in arithmetic. He did not want to rely on verbal tests or tests using words because there were many different languages spoken in his kingdom. He decided he wanted to test observation, reasoning, and judgment, and choose those people who scored high on those qualities. And he was puzzled what to do.

2. Information Engineer Zoomiyie

So he sent for his Grand Vizier, whose name was Bundolowitz, and explained the problem to him, and what kind of a selection test he wanted.

The Grand Vizier listened carefully, and then he said: "Your Majesty, I have just the thing. It is a newly created test or game made by one of my bright young Information Engineers, whose name is Zoomiyie. Sire, I will get him and his game at once."

In a few minutes Vizier Bundolowitz and Engineer Zoomiyie came again into the presence of the King, and Zoomiyie opened the case which he had with him. There scattered on a dark cloth background were a very large number of dice.

"Oh," said the King. "A gambling game! I am NOT pleased."

Zoomiyie quickly said: "No, Sire, there are 60 dice here, and it is almost impossible to gamble with 60 dice — what happens when the dice are tossed, though randomized, is rather regular. No, I have here a game of observation, and reasoning, and judgment; and I will explain it."

He explained the game. The King and the Vizier listened and started to play it. The King found the game so fascinating that he canceled his appointments for the next two hours, and played the game with the Vizier, and both were laughing and interested. Zoomiyie watched intently, took notes, and answered questions.

Then the King said to Zoomiyie, "Well done, young man, I am pleased. I think this game will meet my objective. I hereby name the game Zoonayman, and I shall direct the Treasurer of my Kingdom to give you an inventor's award of 1000 gofars."

3. Zoomiyie's Game

And here is Zoomiyie's Game:

Rule 1. There are two players whom we shall call Nature and Man. (But for tests in Langri-shaan they were called the Examiner and the Applicant.) A game consists of a number of rounds in which the two players alternate as Nature and Man. (But in Langri-shaan, the Examiner and the Applicant did not alternate roles.)

4. Nature's Turn

Rule 2. In each round Nature plays first. Nature takes the 60 dice and tosses them, producing a random pattern of random outcomes. During this throw, Man has to shut his eyes and not look.

Rule 3. With Man's eyes still shut, Nature then performs what is called a Definite Systematic Operation which has the following properties:

a. The operation must be performed on all the dice of a definite class, such as "all 3's" or "all central dice".
b. The operation has to be expressible in not more than four words. (Examples: Turn 1's over. Make 2's touch 5's. Etc.)
c. The operation must produce a result that displays some kind of evident, systematic,

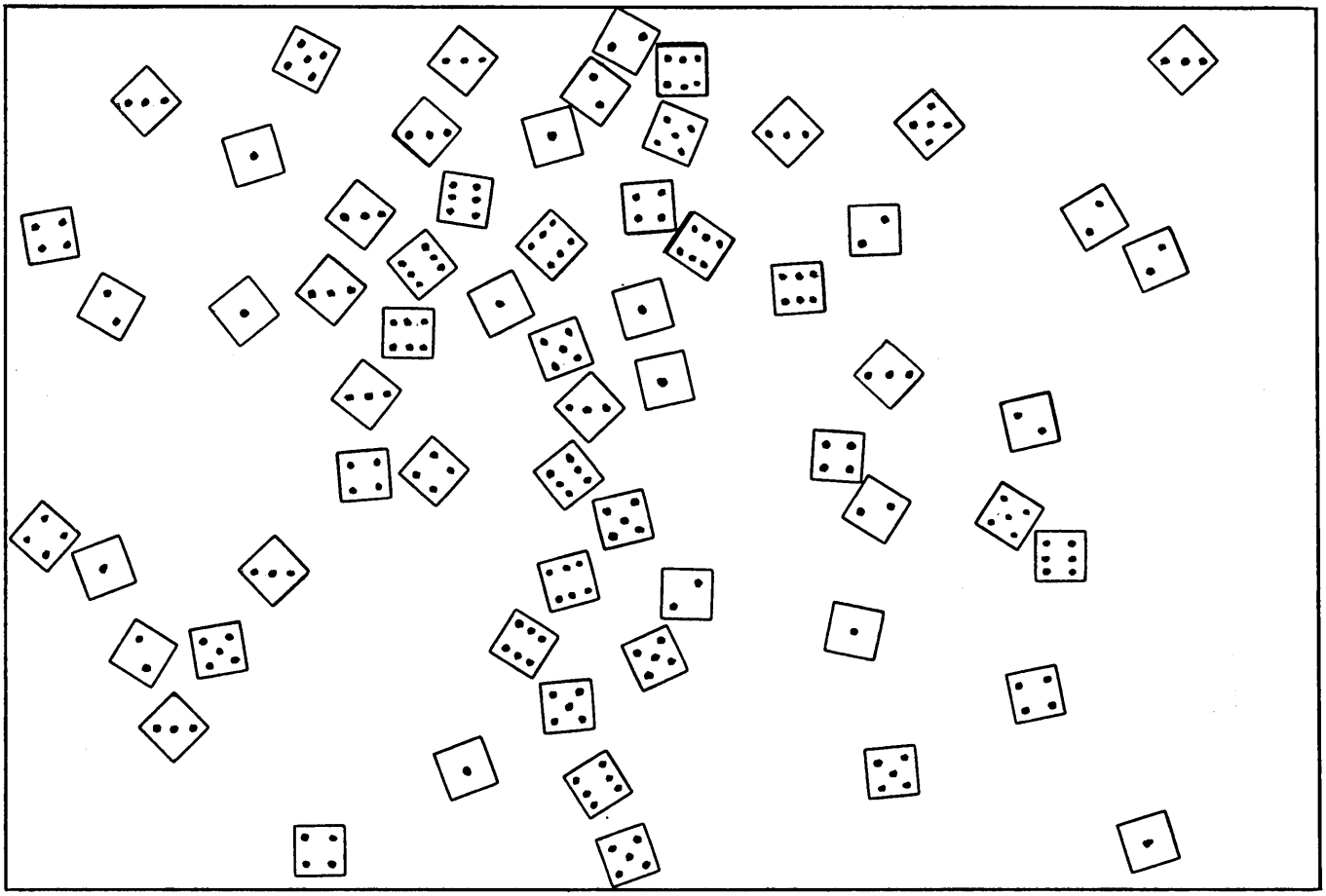


Figure 1 — A throw of dice plus a move by Nature

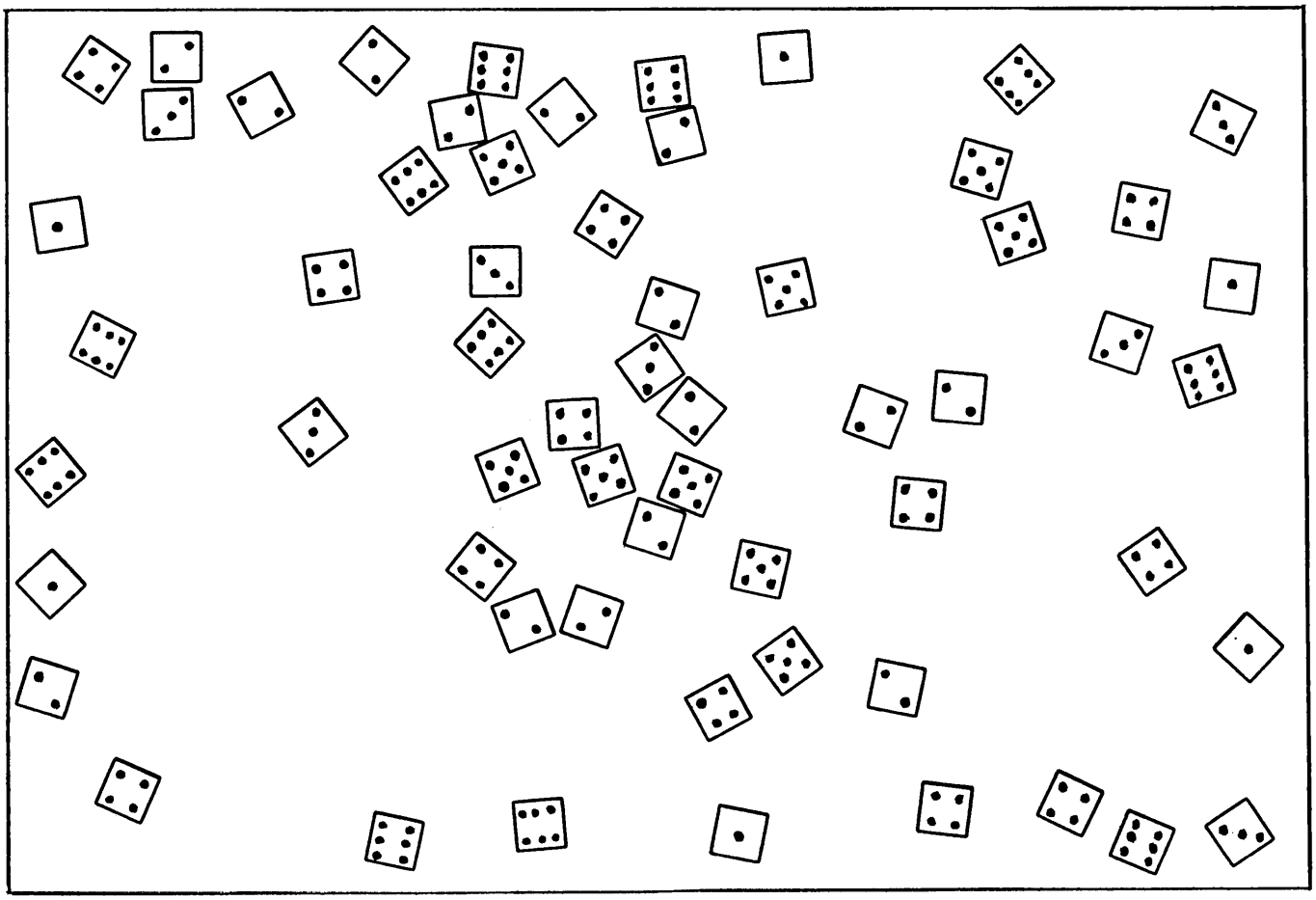


Figure 2 — A throw of dice plus a move by Nature

rational order and completely removes some kind of randomness.

d. The operation must change at least four dice significantly (i.e., not trivially) from their original position or outcome 1 to 6.
e. The position and outcome 1 to 6 of all dice not in that definite class must remain exactly as they fell when they were tossed.

Rule 4. Nature writes this operation on a slip of paper and folds it up so that what Nature wrote cannot be seen.

There is now a cross-classification of interesting possibilities:

(a) The operation that Nature chose may be allowed or not allowed according to the rules.
(b) Nature's description of the operation in words may be correct or not.
(c) Nature's carrying out of the operation may be correct or not.

5. Man's Turn

Rule 5. It is now Man's turn, and Man can open his eyes. Man must figure out what Nature did.

Man studies what he sees in front of him, and asks himself questions, such as: "What is the number of 1's? Is this number usual? Where are they located? Are the locations apparently random? How are they arranged? Is the arrangement apparently random? What is the number of 2's?" and so on.

Finally, Man notices, we suppose, that something is not usual, something is not random, and so he describes what he notices, what appears to be Nature's operation. He writes his rule on a slip of paper; but he does not have to express Nature's operation in four words or less — only Nature has to.

If after a reasonable time, like three to five minutes, depending on agreement, Man cannot decide what Nature did, then he says he gives up — but he does not necessarily score zero because Nature may be penalized for making mistakes.

6. Scoring

Rule 6. Now the two players, Nature and Man, compare the rules which they have written down on slips of paper. There are several cases:

a. If Man figures out what Nature actually did, he scores 2 points.
b. If Man did not figure out what Nature actually did, but he figured out Nature's rule, he scores 2 points.
c. If Nature did not actually do what Nature's rule required, Man scores 1 point as penalty.
d. If what Nature actually did was a disallowed operation, Man scores 1 point as penalty.
e. If Nature's rule described an allowed operation, and what Nature did is in agreement with Nature's rule, and if Man did not figure it out, then Nature scores 2 points, and Man scores 0.

7. Examples, and Some Comments

The following pages show six examples of a throw of 60 dice followed by Nature making a move. We invite our readers to solve the six puzzles. The solutions will be published in the next issue of "Computers and Automation".

For those readers who would like themselves to play the game, we can supply 60 dice for $3.00 (prepayment is necessary): just write us one line

"please send 60 dice," and enclose your name, address, and payment.

Dice in quantity, instead of just singles or pairs, can provide an exciting "learn-as-you-play" introduction to probability, statistics, scientific observation, and pictorial reasoning.

The mathematical advantage of using 60 dice (instead of any fewer) is that complete nonappearance of any single outcome (1, 2, 3, 4, 5, or 6) is so remote as to be negligible. In fact, the expected frequency of any given outcome (such as 1 or 5) is as shown in Table 1. (This is the binomial distribution of $(q + p)^n$ where $q = 5/6$, $p = 1/6$, and $n = 60$.)

This kind of game can easily be programmed on a computer using a pseudo-random number generator. The program should determine the location, the orientation, and the outcome of the die. Then a computer program or a person or both together can make Nature's move. There appear to be some 30 to 40 interesting operations that can be expressed with one English verb; then the remaining three words of Nature's rule can express arguments or modifications for the operation.

Table 1

Binomial Frequency Distribution for $(q + p)^n$, $q = 5/6$, $p = 1/6$, $n = 60$

No. of Outcomes*	Expected Frequency (percent)	Cumulative Expected Frequency (percent)
0	0.002	0.002
1	0.021	0.023
2	0.126	0.149
3	0.486	0.635
4	1.384	2.019
5	3.102	5.121
6	5.687	10.808
7	8.773	19.581
8	11.625	31.206
9	13.433	44.639
10	13.702	58.341
11	12.457	70.798
12	10.173	80.971
13	7.512	88.483
14	5.044	93.527
15	3.094	96.621
16	1.740	98.361
17	0.901	99.262
18	0.430	99.692
19	0.190	99.882
20	0.078	99.960
21	0.030	99.990
22	0.010	100.000

*This is the "number of outcomes" of a given face of a die. For example, in a throw of 60 dice, to obtain nine occurrences of the face 2 (or outcome 2) is to be expected 13.433 percent of the time.

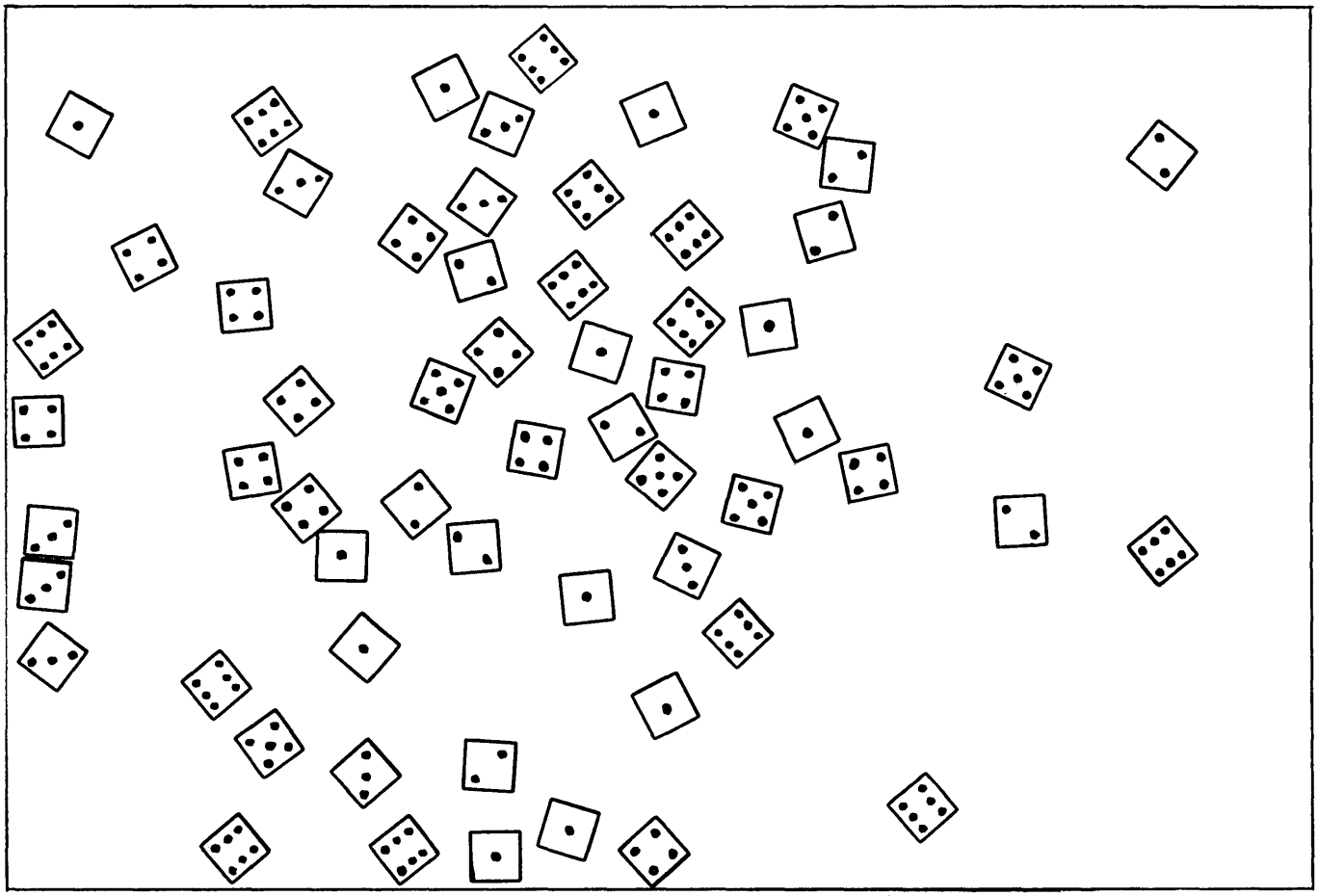


Figure 3 — A throw of dice plus a move by Nature

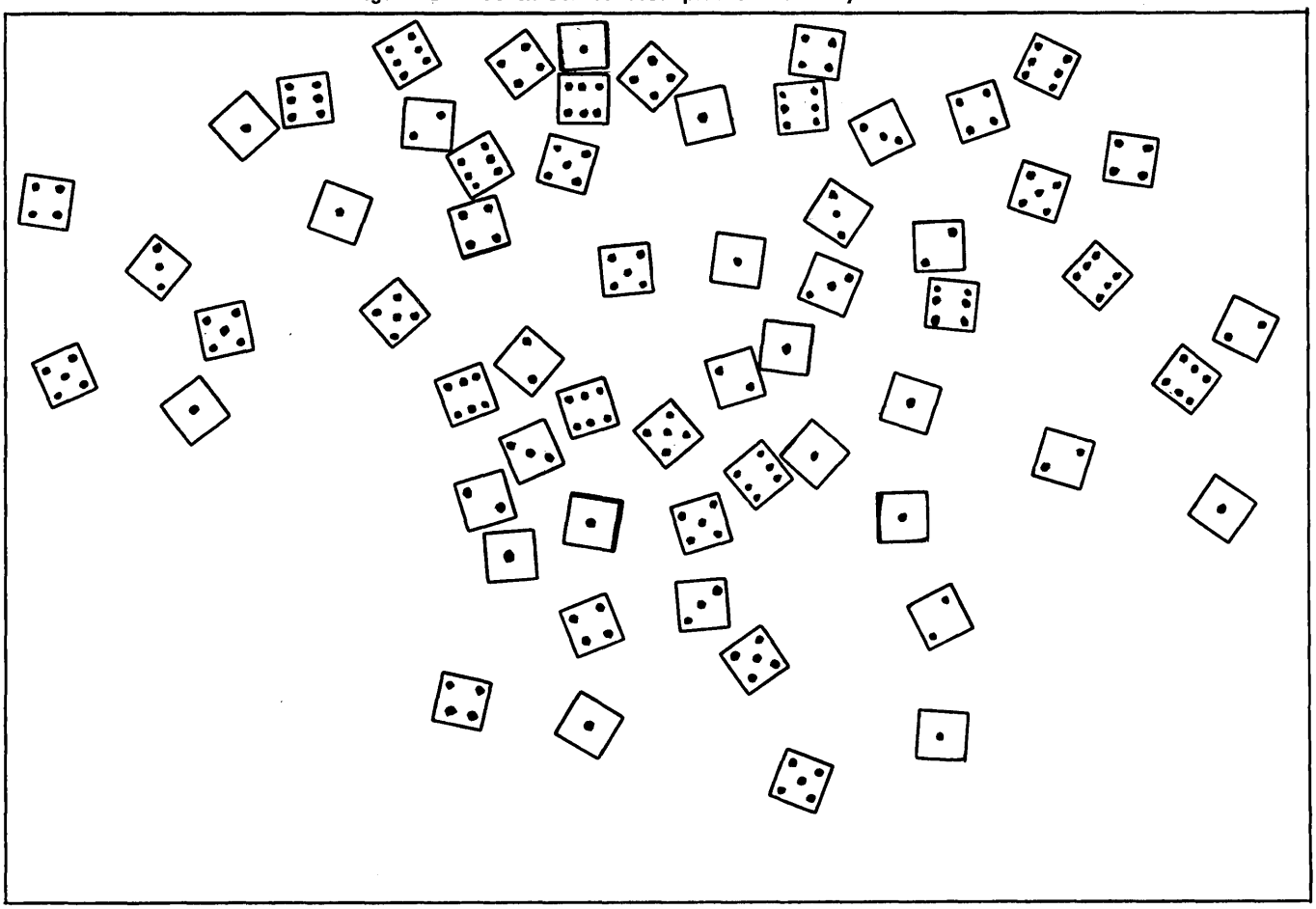


Figure 4 — A throw of dice plus a move by Nature

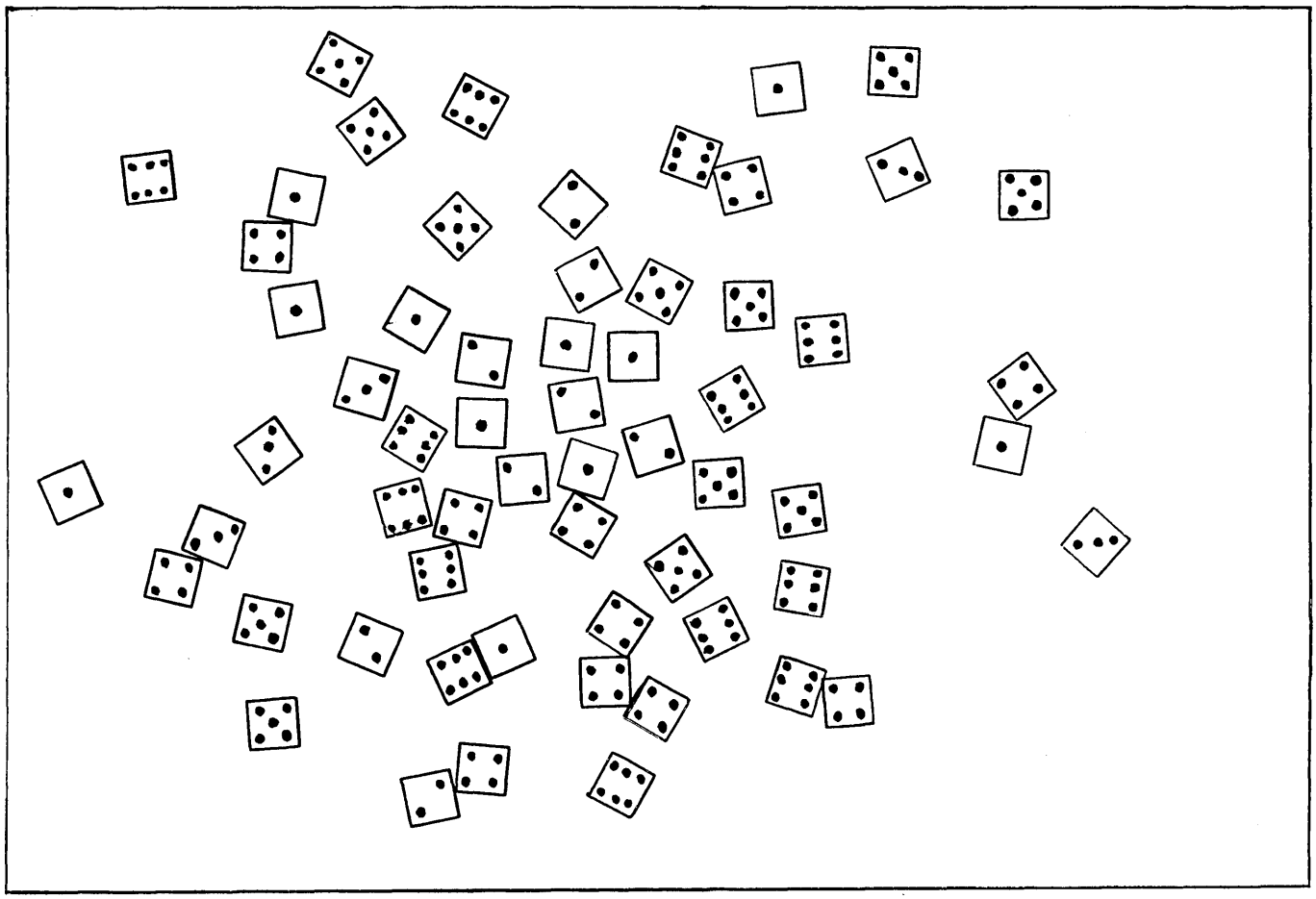


Figure 5 — A throw of dice plus a move by Nature

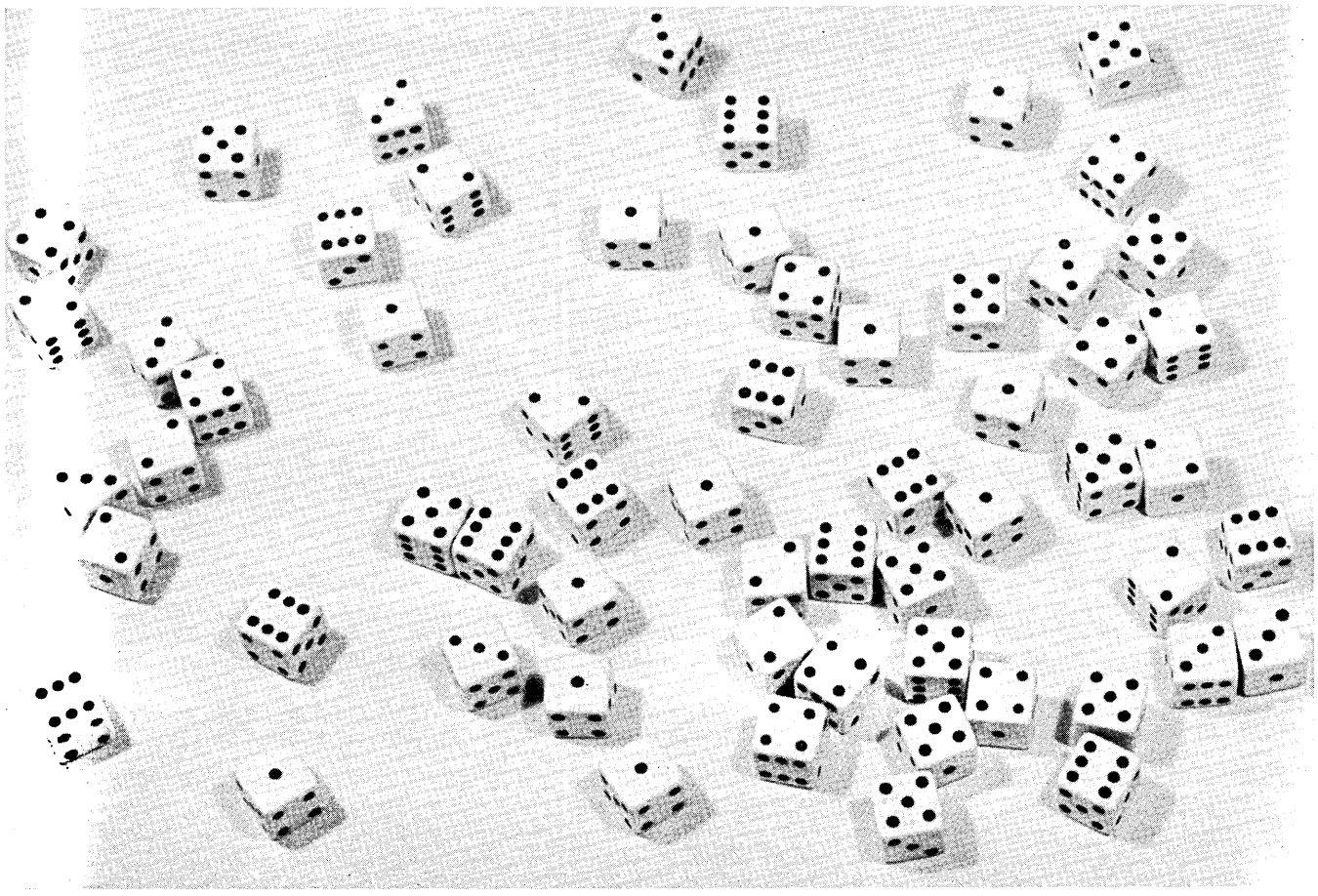


Figure 6 — A throw of dice plus a move by Nature

ACROSS THE EDITOR'S DESK

Computing and Data Processing Newsletter

Table of Contents

APPLICATIONS

COMMUNICATIONS TERMINAL WILL LINK FULTON COUNTY JAIL WITH COMPUTER

Robert T. Sheperd
Fulton County Information and Economic Development
165 Central Ave., S.W., Room 443
Atlanta, Ga. 30303

The time-honored police blotter may be joining the five-cent trolley ride, spats and the free lunch counter as nostalgic reminders of the past.

At the Fulton County, Ga. jail, Sheriff's Department deputies use a TV-like display terminal as a kind of electronic blotter to enter information directly into a computer on individuals remanded to their custody. The system also permits the deputies and other law enforcement officials to determine an inmate's status at any time simply by flashing current information from the computer's files on the terminal screen. Information was previously contained on alphabetically-filed index cards, which were prepared manually.

In addition to maintaining an up-to-the-minute index of the jail's population, the system establishes a judicial timetable for the courts and calls attention to individuals who have been confined for an unusual period of time without a hearing or trial.

The system will provide maximum utilization of Sheriff's Department facilities and provide a data base for development of a judicial administration system that will serve all of the county's courts.

VARIAN COMPUTER SYSTEM USED IN STUDY TO IMPROVE EFFICIENCY OF MEAT PRODUCTION

Varian Data Machines
2722 Michelson Drive
Irvine, Calif. 92664

Smith Kline & French Laboratories has installed a small computer in its Animal Health Research Center near Philadelphia to help animal scientists study meat-producing animals and the efficiency with which they convert food intake into protein. The scientists use a Varian 620/f-VORTEX computer system to record and analyze experimental data. They are seeking methods to improve the rate of growth or weight gain needed to produce marketable food animals.

The experimentation involves testing for chemicals that selectively act on parts of the central nervous system which influence feeding behavior. Sensors are mounted on the animals tested; additional sensors are attached to their feeders and water cups. Physiological functions are coded and entered with time by a Massey Dickison Data Acquisition System into the Varian computer for compiling and temporary storage.

If successful, SK&F will help the agricultural industry by improving the efficiency of meat production. But progress in this work is not easily determined. Growth is a slow, organic process with many variables. For example, SK&F researchers must know how much food and water is consumed. Up to 24 animals are measured simultaneously in what is called the "intensive behavioral room." These measurements include: the length of time spent eating and drinking, how many times eating and drinking take place, and the quantities consumed; several measures of animal mobility; stomach contractions; and body temperature.

Dr. Clifton Baile, Project Supervisor at SK&F explains: "This is a long-range study, perhaps five or ten years. Ours is one of the very few facilities in the world designed to do extensive monitoring of several physiological functions and behaviors of large animals. Another unusual aspect is the use of a minicomputer which enables us to have immediate access to data from each day's experiment for evaluation and planning of the next step in experimentation."

LOOKING FOR A RARE COIN? COMPUTER MAY HOLD YOUR ANSWER

Gene Shelton
Alexander/Scott
2711 Cedar Springs
Dallas, Texas 75201

A downtown Dallas business firm has put a million-dollar computer to work — looking for pennies. And dimes and quarters. The coins are special. They are rare coins, much in demand among collectors throughout the nation.

The Dallas firm, Steve Ivy Rare Coin Co., Metropolitan Mall, #7, 1310 Elm Street, does a 1/4-million dollars worth of business each month with coin collectors from coast to coast. With such a business volume and thousands of rare coins in the bank vaults and store inventory, Steve Ivy, president of

the firm, wanted to find a better and faster way to serve the customer looking for a specific coin.

"The computer lets us know instantly if we have the coin a customer wants in stock," Ivy said. "If we don't, then we can go to our teletype system and find it for him. We're the first rare coin company in the Southwest to utilize a computer to improve customer service."

The computer, he explained, can tell an employee instantly if a customer's request for an 1880 proof silver dollar from a specific mint is in stock. In the past, looking up that information manually from an inventory of thousands of coins could be a time-consuming project.

Two terminals, one a visual display cathode ray tube resembling a television set and another a teletype printer, connect the Dallas firm with the central computer on a time-sharing arrangement. The Alpha Systems DEC 10 computer is located in the data processing firm's Noel Page building in Dallas. The computer also performs bookkeeping chores, including invoicing, and generates a number of reports useful to management in keeping abreast of the rare coin market.

The firm maintains teletype communications with 150 dealers across the nation and has Telex communications with world gold and silver markets, including Zurich. The staff logs some 150,000 miles per year attending shows and rare coin auctions throughout the country.

Ivy, 23, has been a coin collector since age 8. The son of a Fort Worth attorney, Ivy opened the rare coin business in Dallas in January of 1970.

"SHIP DATA BANK" SPEEDS TRAFFIC AT PANAMA CANAL

Public Relations Dept.
National Cash Register Co.
Dayton, Ohio 45479

An NCR Century 200 computer is expediting the 15,000 ship passages made through the Panama Canal each year. It accomplishes this through the use of a "Ship Data Bank" which is believed to be the world's first fully-comprehensive ship data system in an operating environment.

The data bank contains 240 separate items on each ship that uses the canal. These include 145 on the ship's characteristics and 95 on transit times, tolls and cargo for each passage. Within the characteristics are the ship's dimensions, tonnages, capacities, mooring equipment and special handling needs. In the activity data are details of transit times, the pilot's evaluation of the ship's manuevering equipment and ability, tolls paid, customs and quarantine data, and cargo statistics for each passage.

To facilitate storage of the data, each ship is assigned a permanent identification number. This remains constant regardless of changes of name, ownership or flag. Using the number to find the stored data, the computer can automatically determine the number of pilots, towing locomotives, wires and tugboats needed for each vessel as it traverses the canal. These are based on the ship's length, beam, displacement and location of her bridge.

The program was designed and implemented in-house by the Systems and Data Processing Divisions of the Panama Canal Comptroller's office, working with the Canal's Marine Bureau.

NEW PRODUCT

LIBRARY PROTECTION PROGRAM PREVENTS FRAUD

Martin Burack
Datasonics, Inc.
663 Fifth Ave.
New York, N.Y. 10022

A program, called SOURCEGARD, would have enabled auditors to detect the fraud at Equity Funding. The program produces an audit trail of all changes made to a program. Up to 99 versions of a program can be maintained in a disk library. When a program is put into the library, code is inserted to have the version number, program name and compilation date printed when the program is executed. If the Equity Funding auditors had the version number of the debugged billing program, they would have seen that the program actually being run was a later version.

SOURCEGARD maintains, and protects, all source programs (regardless of language) and card image data in one central library on disk. All changes to the programs must be made through SOURCEGARD and a complete audit trail is produced. So even if the correct version of a program was used at Equity Funding when auditors were around, a listing of the SOURCEGARD library would have disclosed that later versions existed of a supposedly debugged program. Finally, if Equity Funding had SOURCEGARD, a validation feature could have been used to detect discrepancies between the source and the object programs.

Data compression and scrambling techniques are used to save storage and to protect the library.

Anyone stealing the file would wind up with unusable data. Password protection is used to prevent access to programs by unauthorized people. Management intervention is required to change a password, as well as to: delete a program from the library; delete versions of a program; punch out a source deck; or create temporary changes.

The program uses direct access files, and no file reorganization is necessary. Neither is it necessary to pass an entire file to access one program. Standard JCL and I/O functions are used. Only one easy control card is used to specify the action to be taken, such as: link-edit; compile with or without object deck; catalog in core image or in relocatable library. Programs are resequenced automatically. Programmers can concentrate more on technical tasks and less on clerical ones.

SOURCEGARD is self-relocatable, and uses device-independent work files. It is available on a perpetual lease for $1,500. Maintenance is free for the first three years, and costs $150 per year thereafter. The program can also be obtained on a month to month basis. It is written in assembly language for the 360/370-22 and up.

RESEARCH FRONTIER

RESEARCH PROGRESS ON SOLAR ENERGY PROJECT LEADS TO RENEWAL OF GRANT TO UNIV. OF MINN.

Bill Hafling or Nancy Pirsig
University of Minnesota
News Service – S 68 Morrill Hall
Minneapolis, Minn. 55455

Encouraging progress on a project to use solar energy for electric power has led to renewal of a grant from the National Science Foundation to Univ. of Minnesota researchers. Totalling $494,700, the renewed grant has been awarded to Richard C. Jordan, professor of mechanical engineering.

The project, begun in July 1972, seeks to find ways to convert the direct energy of the sun into an economical source of electrical power. Problems with the use of solar energy include high costs of energy-collecting units and the need to store the energy collected for use at times when the sun is not shining. Current fuel shortages, increasing energy demands, and environmental quality concerns now make solar energy more attractive than ever before.

The solar collector system will ultimately consist of several thousand trough-shaped mirror-surfaced devices which rotate with the sun. Each mirrored trough will be attached to a length of heat-absorbing pipe located in its center. As the sun shines on the mirrored surface, its heat will be concentrated and directed onto the pipe. Fluid heated in the pipe will then flow to a heat exchanger located at the end of the collector system. Collected and stored, this thermal energy will then be used to generate electric power on a large scale.

Several fundamental discoveries have already been made by the University researchers in cooperation with researchers from Honeywell Systems and Research Center, Dynatherm Corp., and Babcock and Wilcox. Jordan said that a very important part of the project has been the development of selective surface coatings for the mirrored surface of the reflectors. Various coatings are being studied for weather resistance at test sites in Arizona, Florida and Minnesota. A model heat pipe has been constructed and tested with various transfer fluids, particularly water, mercury and potassium. Several hundred mixtures of chemicals which might be used for storing the collected energy have been studied.

Another major research advance has been the development of a computer program for studying the efficiency of the solar energy concentrating system at various times of the year and in various locations. Additional research in the coming year will culminate in the fabrication of a scaled version of a solar energy collector module, including concentrator, heat pipe, vacuum envelope, and calorimeter — all the parts of a finished collection system.

NAVY CONSIDERS "INTELLIGENT" MACHINES TO ASSIST IN NAVY TASKS

Office of Information
Department of the Navy
Office of Naval Research
Arlington, Va. 22217

The Navy of the future may employ "intelligent" machines to assist man in the performance of tedious or hazardous tasks. Under a program funded by the Office of Naval Research, scientists at the Stanford Research Institute, Menlo Park, Calif., are assessing the potential application by the Navy of computer-controlled automation. One of the main objectives of the study is a comprehensive survey of the state-of-the-art of computer-assisted machinery. The intent of the survey is to examine how available and future machines might be used in work that is inherently dangerous, unhealthy, or monotonous.

Computer-assisted devices to perform monotonous assembly line jobs are in wide use in industry. These machines, however, are rigidly limited in their capabilities and usually can only do a relatively simple repetitive task in operations with long production runs.

The Navy's aim is the development of automated devices along with computer programs to endow these devices with a certain amount of "common sense". These machines could be utilized to perform such duties as spray painting, precision assembly, maintenance work at air stations, or manufacture and repair tasks in shipyards.

Several prototype systems that have sensors and electromechanical actuators integrated with computer control are presently being developed by industry and academic institutions. One of these is being developed at the Artificial Intelligence Laboratory of the Massachusetts Institute of Technology. Established under an ONR contract with funds provided by the Defense Advanced Research Projects Agency, the Laboratory conducts research on techniques to give machines a limited amount of humanlike skills. The main goal of the Laboratory is to design robots that will be able to survey their environment and move about it. These robots could not only see (by means of a television camera) and hear, but would also possess a sense of touch.

At present all these "automatons" can be said to have only rudimentary intelligence. However, they demonstrate the possibility that through extensive research, intelligent machines can be developed. Remotely controlled by computer, they may be able to supplement or, in some cases, even replace man in performing repetitive tasks or work with a minimum of human assistance in hostile or stressful environments.

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Sanders Data Systems, div. of Sanders Associates, Inc., Nashua, N.H.	International Brotherhood of Teamsters (IBT)	Programmable computer terminals for TITAN, (Teamsters Information Terminal and Accounting Network); will replace existing bookkeeping and accounting system	$13+ million
McDonnell Douglas Corp., St. Louis, Mo.	Air Force Human Resources Laboratory	Developing and furnishing an Advanced Instructional System (AIS) designed to reduce training costs by at least 25 per cent	$9.8+ million
Sanders Associates, Inc., Nashua, N.H.	Lockheed California Co.	Start-up costs on third production lot of Acoustic Data Processors for U.S. Navy's S-3A carrier-based antisubmarine warfare aircraft	$6 million (approximate)
Univac Div., Sperry Rand Corp., Blue Bell, Pa.	Environmental Protection Agency, Office of Administration, Research Triangle Park, N.C.	Purchase of a UNIVAC 1110 system; contract includes manufacture, installation, maintenance, and software for the system over a five year projected life span	$4.8 million
AB Recognition Equipment Industri, subsidiary of Recognition Equipment, Dallas, Texas	Postipankki, Helsinki, The Finnish Postal Bank and PostGiro	Two TRACE (TRAnsaction Control and Encoding) document processing systems to be installed in Helsinki and Tampere	$3.6 million (approximate)
Collins Radio Company, Dallas, Texas	Integrert Databehandling A/s (IDA), Norway	An advanced data communication system to serve member banks; the IDA communication system will collect banking data, handle inquiry transactions, switch administrative messages and provide store-and-forward message switching for night reports	$2.8 million
Boeing Company, Seattle, Wash.	Bonneville Power Administration, Moses Lake, Wash.	A supervisory control and data acquisition system, known as SCADA II, for the BPA's new Eastern Control Center	$2+ million
Electronic Associates, Inc., West Long Branch, N.J.	U.S. Army Missile Command, Redstone Arsenal, Alabama	Large-scale special-purpose PACER hybrid computer systems, a PACER 100 digital computer, linkage systems, central trunking station, controllers, interactive graphics, associated peripherals and software packages for Advanced Simulation Facility	$1.7 million
Xynetics, Inc., Canoga Park, Calif.	Camsco, Inc., Richardson, Texas	Plotters to be incorporated into computerized Camsco "MARKAMATIC" system used in apparel industry, and "GRADMATIC" system used in shoe manufacturing	$1.5 million
Computer Data Systems, Inc. (CDSI), Bethesda, Md.	U.S. Navy	Systems design, analysis and computer program development services for the design, development and implementation of financial, personnel and logistics systems	$1+ million
Cubic Corp., San Diego, Calif.	Riverside County, Calif.	46 Votronics vote counters; the machines replace Votronics vote counters originally purchased in 1964; used units were taken in trade for an undisclosed amount of cash	$1.1 million
Brandon Applied Systems, Inc. New York, N.Y.	Southern California Edison Co.	Conversion of Customer Accounting System and Meter Records System from Honeywell Argus to IBM 370 ANS-COBOL; redesign and convert the 158 programs in a 12 month period	$910,000
Cossor Electronics Ltd.,	Cable and Wireless Ltd.	A complete air traffic control system based on Secondary Surveillance Radar (SSR) for Civil Aviation Dept. of Hong Kong Government; includes training airport staff in operation and maintenance	$900,000 (approximate)
Trans-A-File Systems Co., Sunnyvale, Calif.	Washington State Patrol	An automated document storage and retrieval system, for newly formed Identification Section, which will maintain fingerprint and related records for all criminal justice agencies in the State	$865,000
Keane Associates, Inc., Wellesley Hills, Mass.	Northeast Utilities, Inc., Berlin, Conn.	Development of computer-based financial and accounting system	$300,000
Accu-Sort Systems, Inc., Sellersville, Pa.	CBS Records, div. of Columbia Broadcasting System, Inc.	Nine scanners for automatic sorting control of various record labels; to be installed in three plants	——
American Management Systems, Inc. (AMS), Arlington, Va.	American Association of Museums	Developing and operating computer-based systems in membership and accounting areas	——
American Management Systems, Inc. (AMS), Arlington, Va.	American Association of Retired Persons and National Retired Teachers Association (AARP/NRTA)	A data-processing contract to maintain a computer-based communications system that permits the systematic retrieval of name, address, and title information for more than 10,000 key association officials	——
Daconics, Sunnyvale, Calif.	Department of Commerce, Washington, D.C.	Two awards for a total of 95 additional minicomputer systems for use at National Weather Service (NOAA) stations located throughout the U.S. and its territories	——
Honeywell Bull, France	Societe Generale, Paris, France	Four Honeywell systems, a dual 6080 system and a dual 6060 system, for banking applications	——
Lockheed Aircraft Corp.	Ministry of Defense, Government of Italy	A minicomputer-based ARTS II (automated traffic control) system; includes installation and training services	——

NEW INSTALLATIONS

OF	AT	FOR
Control Data Cyber 70 Model 72 system	Nationaal Lucht-en Ruimtevaart-laboratorium (NLR), the Netherlands	Processing data coming from wind tunnel experiments via two on-line CDC 1700 computers located in NLR's Amsterdam Laboratory; also processing research data from flight recorders in experimental and commercial airplanes; new system replaces CDC 3300 system (system valued at more than $1 million)
Digital Equipment PDP-11/20 system	Spar Food Wholesalers, Shrewsbury, England	A "stand-in" computer to be replaced later with a PDP-11/40; the interim business system prepares invoices; also will include stock control, sales and purchase analyses, and full integrated accounting for both the warehouse and the retail stores
Honeywell 2020 system	The Town of Wellesley, Wellesley, Mass.	Processing town payrolls, utility bills, real estate taxes and encumbrance accounting; in addition system will continue to process grades and attendance records for school department; future use includes student scheduling; replaces an IBM system
Interdata Model 85 system	School of Architecture and Planning, Massachusetts Institute of Technology (MIT), Cambridge, Mass.	Refreshing Raster displays in connection with contract work for the U.S. Navy
International ICL 1904S system	WD & HO Wills, Hartcliffe, Bristol, England	Administrative applications including sales accounting, stock recording, retail research and purchases, voucher accounting, payroll and pensions (system valued at $950,000)
NCR Century 100 system	Iranian Police Organization, Tehran, Iran	Administering country-wide duties which include in addition to maintaining law and order: issuing passports; registering aliens, immigrants; maintaining registry of all public places and personnel; control of Bureau of Narcotics; and assistance to other security and anti-espionage agencies. All record processing will be automated; other programs will be implemented later
	South Sea Bubble Co., Ltd., London, England	Stock control and to monitor order processing
NCR Century 200 system	American Bancservice Corp., Riviera Beach, Fla. (2 systems)	Serving as nucleus of Central Information File (CIF) systems which ABC is offering its subscribers
Univac Series 70/3 system	Bloomsburg State College, Pa. Edinboro State College, Pa. Mansfield State College, Pa. Shippensburg State College, Pa. (4 systems)	Administrative, payroll, student records, grade reporting, and other applications
	Roswell Park Memorial Institute, Buffalo, N.Y.	Research, administration, and patient laboratory information
Univac Series 70/7 system	Florida Power and Light Company, Miami, Fla.	Engineering simulation studies, structural design of transmission towers, preparing time-sharing programs, and other applications
Univac Series 70/45 system	Atlantic City Electric Co., Data Processing Ctr., Egg Harbor Township, N.J.	On-line customer service and engineering processing; is second system for company
Univac 1106 system	Kassenärztliche Vereinigung (KV), Bad Segeberg, Germany Mannheim, Germany Trier, Germany Frankfurt, Germany (4 systems)	Administrative tasks including a nationwide integrated network to coordinate the clearance of doctors' bills and social insurance claims (system valued at approximately $4.1 million)
Univac 9480 system	Southern Savings Association, New Orleans, La.	Hub of an on-line system with multi-terminal data communications; future use includes computer services to other Savings & Loan institutions in the Greater New Orleans area

Anderson — *Continued from page 15*

nite yes, we are profitable in computers and we shall become more profitable in the years ahead.

NCR's struggle to win a solid foothold in the EDP industry has been long and costly, but time will show that it was a price that had to be paid if the company was to remain a leader in the business equipment industry of the 1970's and 1980's. This far-reaching transition is now for the most part completed, and we are prepared for a new period of growth and accomplishment.

None of this would have been possible without you, our customers. In the final analysis NCR — like your own company — is totally dependent upon the people it serves. Because you have been receptive to new and improved systems, we have been encouraged to invest vast sums of money in the development and manufacture of those systems.

Good Value

When we sold you your computer equipment we said in effect, "Place your confidence in NCR and we will be worthy of that confidence".

That is still our pledge to you today. We know that if we want to continue to receive your business, we must provide good value for the dollars you pay us — value in systems design, in the hardware itself, in software, and in all the other supporting services you have a right to expect. We intend to do what is required to merit your confidence in our products and our people. □

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 digital computers manufactured and installed, or to be manufactured and on order. These figures are mailed to individual computer manufacturers quarterly 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. A few manufacturers refuse to give out, confirm, or comment on any figures.

Part 1 of the Monthly Computer Census contains reports for United States manufacturers, A to H, and is published in January, April, July, and October. Part 2 contains reports for United States manufacturers, I to Z, and is published in February, May, August, and November. Part 3 contains reports for manufacturers outside of the United States and is published in March, June, September, and December.

Our census seeks to include all digital computers manufactured anywhere. We invite all manufacturers located anywhere to submit infor- that would help make these figures as accurate and complete as possible.

The following abbreviations apply:

(A) -- authoritative figures, derived essentially from information sent by the manufacturer directly to COMPUTERS AND AUTOMATION
C -- figure is combined in a total
(D) -- acknowledgment is given to DP Focus, Marlboro, Mass., for their help in estimating many of these figures
E ---figure estimated by COMPUTERS AND AUTOMATION
(N) -- manufacturer refuses to give any figures on number of installations or of orders, and refuses to comment in any way on those numbers stated here
(R) -- figures derived all or in part from information released indirectly by the manufacturer, or from reports by other sources likely to be informed
(S) -- sale only, and sale (not rental) price is stated
X -- no longer in production
- -- information not obtained at press time and/or not released by manufacturer

SUMMARY AS OF AUGUST 15, 1973

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)		NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Part 3. Manufacturers Outside United States								
A/S Norsk Data Elektronikk	NORD-1	8/68	2.0		0	111	111	40
Oslo, Norway	NORD-2B	8/69	4.0	(S)	0	20	20	X
(A) (July 1973)	NORD-5	2/72	-		0	1	1	1
	NORD-10	5/73	2.0		0	0	0	34
	NORD-20	1/72	3.5	(S)	0	20	20	5
A/S Regnecentralen	GIER	12/60	2.3-7.5		0	40	40	0
Copenhagen, Denmark	RC 4000	6/67	3.0-20.0		0	22	22	3
(A) (May 1973)								
Elbit Computers Ltd.	Elbit-100	10/67	4.9	(S)	-	-	325	10
Haifa, Israel								
(A) (Nov. 1972)								
GEC Computers Ltd.	902	5/68	-		0	17	17	0
Borehamwood, Hertfordshire	903, 920B	12/65	-		1	464	465	19
England	GEC 905	5/69	-		0	77	77	1
(A) (Nov. 1972)	GEC 920M	7/67	-		0	130	130	103
	GEC 920C	7/68	-		0	19	19	0
	Myriad I	1/66	-		0	47	47	0
	Myriad II	11/67	-		0	32	32	0
	GEC M2140	10/69	-		9	21	30	0
	GEC 2050	6/72	-		0	5	5	32
International Computers, Ltd. (ICL)	Atlas 1 & 2	1/62	65.0		0	6	6	X
London, England	Deuce	4/55	-		0	2	2	X
(A) (Sept. 1972)	KDF 6-10	9/61	10-36		0	34	34	X
	KDN 2	4/63	-		0	1	1	X
	Leo 1, 2, 3	-/53	10-24		0	43	43	X
	Mercury	-/57	-		0	4	4	X
	Orion 1 & 2	1/63	20.0		0	10	10	X
	Pegasus	4/55	-		0	9	9	X
	Sirius	-/61	-		0	8	8	X
	503	-/64	-		0	18	18	X
	803 A, B, C	12/60	-		0	107	107	X
	1100/1	-/60	5.0		0	13	13	X
	1200/1/2	-/55	3.9		0	11	11	X
	1300/1/2	-/62	4.0		0	82	82	X
	1500	7/62	6.0		0	35	35	X
	2400	12/61	23.0		0	3	3	X
	1900-1909	12/64	3-54		2	2200	2202	-
	Elliott 4120/4130	10/65	2.4-11.4		0	100	100	X
	System 4-30 to 4-75	10/67	5.2-54		0	200	200	-
Japanese Mfrs.	(Mfrs. of various models include: Fijitsu, Ltd.; Hitachi, Ltd.; Matsushita Electric Co. of America; Mitsubishi Electric Corp.; Nippon Electric Co., Ltd.; Oki Electric Industry Co.; Tokyo Shibaura Electric Co., Ltd.; Toshiba.)					12,809	-	800 E
Philips Electrologica BV	P1000	8/68	7.2-35.8		-	-	105	39
Apeldoorn, Netherlands	P9200	3/68	-		-	-	300	25
(A) (Oct. 1972)	P9200 t.s.	3/70	-		-	-	5	1
	P880	9/70	-		-	-	29	16
	P850/55/60	9/70	-		-	-	40	290
	ELX	5/58	6-21		-	-	42	-
	PR 8000	1/66	-		-	-	23	-
Philips' Telecommunicatie	DS 714	-/67	-		11	27	38	19
Industrie BV	DS 18	9/72	-		1	-	1	9
Hilversum, Netherlands								
(A) (Aug. 1973)								
Redifon Electronic Systems, Ltd.	R2000	7/70	-		1	26	27	2
Crawley, Sussex, England	R2000A	6/73	-		-	2	2	12
(A) (Aug. 1973)								
Saab-Scania Aktiebolag	D21	12/62	7.0		0	38	38	-
Linkoping, Sweden	D22	11/68	15.0		0	35	35	2
(A) (May 1973)	D220	4/69	10.0		0	17	17	3
	D23	-/73	25.0		0	0	0	4
	D5/30	12/71	1.0		0	13	13	10
	D5/20	5/71	0.6		0	80	80	2000
Scelenia S.p.A.	GP-16	7/69	10.9	(S)	0	190	190	60
Roma, Italy	GP-160		5.6	(S)	-	-	-	-
(A) (Feb. 1973)								

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Siemens	300 Series	4/65-6/70	0.9-7.9	-	-	484	57
Munich, Germany	2002	6/59	16.4	-	-	41	-
(A) (Aug. 1973)	3003	12/63	15.8	-	-	32	-
	4004/15/16	10/65	6.1	-	-	93	2
	4004/25/26	1/66	10.0	-	-	90	14
	4004/35	2/67	14.2	-	-	207	41
	4004/127	4/73	14.0	-	-	13	52
	4004/135	10/71	20.5	-	-	124	37
	4004/45	7/66	27.3	-	-	357	37
	4004/46	4/69	41.0	-	-	13	2
	4004/55/60	7/66	35.0	-	-	26	-
	4004/150	2/72	49.0	-	-	96	39
	4004/151	3/72	61.0	-	-	15	8
	404/2	11/73	3.0	-	-	-	48
	404/3	4/71	2.1	-	-	58	31
	404/6	10/71	4.5	-	-	75	33
Telefunken Computer GmbH	TR 4	10/61	X	-	-	35	X
Konstanz, Germany	TR 440	6/70	51.0	-	-	21	4
(A) (July 1973)							
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIE	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	URAL 11/14/16 and others	-	-	-	-	C	C

Remote Terminal System — *Continued from page 12*

data and turns itself off. These features can facilitate economical transmission in the evening hours.

Page Copy

Most teleprinters are used in situations where moderate amounts of data need to be transmitted rapidly from a given point to a remote point for further processing and where a local hard page copy of the transmitted and/or received data is required. Perishability of the data is the key in the economic consideration of whether to use a teleprinter or not. If the data can arrive a few days late, the mail or courier is far cheaper than a remote terminal. On the other hand, when one is using the remote terminal for interactive communications with a computer, then direct data communications are a must.

Remote Terminals: Cathode Ray Tubes

A cathode ray tube (CRT) is a remote terminal device designed to display information on a screen similar to a television picture tube. As such, these devices provide a better alternative for some remote terminal applications than does the teleprinter.

CRT's differ from teleprinters in two major ways. First, since they are totally electronic they can receive information at a much higher rate than the majority of teleprinters. Nearly all CRT's can operate at 2400 bits per second (approximately 200 characters per second) and many can operate faster than that. Speed is limited by the line-modem capability and the capability of the computer site.

The second main difference between CRT's and teleprinters is that CRT's by themselves do not provide a hard page copy. What is displayed on the screen (generally the equivalent of half a typewritten page) is all that is visible at any one time. While it is true that many CRT's can have an optional capability to produce a hard page copy, it is more expensive and of poorer quality when compared to a teleprinter output.

Prices of CRT's vary over a much wider range than do teleprinters. Purchase prices range from $1495 to nearly $150,000.

(To be concluded in the next issue)

C.a PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

Solution to Problem 737: Cube Division

A cube cannot be cut up into 68 smaller cubes. But dissection into 69 to 75 cubes is possible. Therefore any cube can be cut up into 69 or more smaller cubes since any cube in a dissection can be cut up into eight cubes, thus increasing the number by seven.

Note: Mr. Penny is on vacation. His column will continue upon his return.

ADVERTISING INDEX

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

CALENDAR OF COMING EVENTS

Sept. 17-19, 1973: 7th Annual Intergovernmental Council for ADP Conference, Ottawa, Canada / contact: ICA Secretariat, 18 Keren Hayessod St., Jerusalem, Israel

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

Sept. 25-28, 1973: Engineering in the Ocean Environment Conference, Washington Plaza Hotel, Seattle, Wash. / contact: Ted Hueter, Honeywell Inc., Marine Sys. Ctr., 5303 Shilshole Ave., N.W., Seattle, WA 98107

Sept. 25-28, 1973: IFAC Symposium, Purdue Univ., W. Lafayette, Ind. / contact: Carl Jenks, Div. of Confs., Rm. 116, Stewart Ctr., Purdue Univ., W. Lafayette, IN 47907

Oct. 2-3, 1973: Elettronica 2 — 2nd International Conference of Industrial Applications of Electronics, Turin, Italy / contact: Secretariat, 2nd Covegno Internazionale di Elettronica Industriale, Corso Massimo d'Azeglio 15, 10126 Torino, Italy

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

Oct. 3-4, 1973: Semiconductor Memory Testing Symposium, Rickshaw Inn, Cherry Hill, N.J. / contact: R. A. Grossman, Technitrol, Inc., 146 Henfield Ave., Cherry Hill, NJ 08803

Oct. 3-4, 1973: 7th Annual Instrumentation & Computer Fair, Sheraton Inn/Washington-Northeast, Washington, D.C. / contact: Richard Bullock, Instrumentation Fair, Inc., 10774 Tucker St., Beltsville, MD 20201

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

Oct. 12-14, 1973: 12th Annual UAIDE Conference, Chase-Park Plaza Hotel, St. Louis, Mo. / contact: Bobby R. Peoples, HEW, Rm. 1070 North Bldg., 330 Independence Ave., S.W., Washington, DC 20201

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

Oct. 15-18, 1973: 28th Instrument Society of America International Conference and Exhibit, Astrohall, Houston, Tex. / contact: Philip N. Meade, Exhibit Director, ISA, 400 Stanwix St., Pittsburgh, PA 15222

Oct. 15-19, 1973: Fall Conference of USE, Hotel Radisson, Minneapolis, Minn. / contact: John H. Farber, USE Exec. Sec., Sperry Univac Div., Sperry Rand Corp., P.O. Box 500, Blue Bell, PA 19422

Oct. 16-18, 1973: Canadian Computer Show and Conference, East Annex, Coliseum, Exhibition Park, Toronto, Canada / contact: Industrial Trade Shows of Canada, 481 University Ave., Toronto, Ontario M5W 1A7, Canada

Oct. 16-18, 1973: Input/Output Systems Seminar '73, O'Hare International Tower, O'Hare Airport, Chicago, Ill. / contact: Dan Hrisak, DPSA, 1116 Summer St., Stamford, CT 06905

Oct. 17-19, 1973: 11th Annual Government-Industry Data Exchange Program Workshop, Kahler Motor Inn, Orlando, Fla. / contact: Ron Baldwin, Interstate Electronics Corp., 707 E. Vermont Ave., Anaheim, CA 92805

Oct. 18-19, 1973: Computer Science and Statistics: 7th Annual Symposium on the Interface, Memorial Union, Iowa State Univ., Ames, Iowa / contact: William J. Kennedy, Statistical Lab., Iowa State University, Ames, IA 50010

Oct. 21-25, 1973: 36th Annual Meeting, American Society for Information Science, Los Angeles Hilton Hotel, Los Angeles, Calif. / contact: H. W. Jones, Northrop Corp., Aircraft Div., Hawthorne, CA 90250

Oct. 28-30, 1973: 8th Annual Digitronics Users Association Conference, Atlanta, Ga. / contact: Mr. Glenn Lutat, IOMEC, Inc., 345 Mathew St., Santa Clara, CA 95050

Nov. 5-7, 1973: Automatic Support Systems for Advanced Maintainability, Inn of Two Flags, Forth Worth, Tex. / contact: O. R. Batchelder, Convair Aerospace Div., P.O. Box 748, MZ 2422, Ft. Worth, TX 76101

Nov. 5-7, 1973: Systems, Man & Cybernetics Conf., Sheraton Boston Hotel, Boston, Mass. / contact: S. A. Meer, Signatron Inc., 27 Hartwell Ave., Lexington, MA 02173

Nov. 7-8, 1973: High Level Language Computer Architecture Symposium, Univ. of Maryland, College Park, Md. / contact: E. I. Organick, Dept. of Computer Sci., Univ. of Utah, Salt Lake City, UT 84112

Nov. 8-10, 1973: 3rd National Conference of the Society for Computer Medicine, Denver, Colo. / contact: Dr. Joseph M. Edelman, Society for Computer Medicine, 200 Professional Ctr., 244 Peachtree Blvd., Baton Rouge, LA 70806

Nov. 13-15, 1973: Data Networks, Analysis and Design, Tampa, Fla. / contact: Raymond Pickholtz, Sch. of Engrg., George Washington University, Washington, DC 20006

Nov. 28-30, 1973: 1st Annual Systems Engineering Conference, Statler-Hilton Hotel, New York, N.Y. / contact: Technical Services, AIIE, 25 Technology Park/Atlanta, Norcross, GA 30071

Dec. 4-5, 1973: 1973 Vehicular Technology Conference, Sheraton-Cleveland, Cleveland, Ohio / contact: Robert Wylie, Motorola Communications, Inc., 12955 Snow Rd., Cleveland, OH 44130

Dec. 6-8, 1973: National Symposium on Computer Applications in the Juvenile Justice System, Marriott Motor Hotel, Atlanta, Ga. / contact: Lawrence A. Boxerman, Project Dir., National Council of Juvenile Court Judges, Univ. of Nevada, Box 8000, Reno, NV 89507

Dec. 9-11, 1973: Computer Architecture, Flagler Inn & Reitz Union, Gainesville, Fla. / contact: G. Jack Lipovski, 229 Larsen Hall, Univ. of Florida, Gainesville, FL 32601

Jan. 16-18, 1974: 3rd Annual AIIE-MHI Seminar, Marriott Motor Hotel, Philadelphia, Pa. / contact: Technical Services, AIIE, 25 Technology Park/Atlanta, Norcross, GA 30071

Feb. 12-14, 1974: Computer Science Conference, Detroit Hilton, Detroit, Mich. / contact: Seymour J. Wolfson, 643 Mackenzie Hall, Wayne State Univ., Detroit, MI 48202

Feb. 13-15, 1974: International Solid State Circuits Conference, Univ. of Penna., Marriott Hotel, Philadelphia, Pa. / contact: Virgil Johannes, Bell Labs., Room 3E331, Holmdel, NJ 07733

Feb. 19-22, 1974: 3rd Annual National Communications Week Convention, Chase-Park Plaza Hotel, St. Louis, Mo. / contact: David C. Brotemarkle, Communications Systems Management Assoc., 1102 West St., Suite 1003, Wilmington, DE 19801

Feb. 26-28, 1974: Computer Conference (COMPCON), Jack Tar Hotel, San Francisco, Calif. / contact: Jack Kuehler, IBM Corp., P 35, Bldg. 025, Monterey & Cottle Rds., San Jose, CA 95114

WILL YOU HELP?

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

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

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

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

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

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

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

cut here and tuck in flap

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

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

(1) Name_____
Address_____
City_____ State_____ ZIP_____

(2) Name_____
Address_____
City_____ State_____ ZIP_____

May we use your name? ☐ YES ☐ NO

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

cut here

cut here

B – staple or glue to A

FIRST CLASS
PERMIT NO. 33531
BOSTON, MASS.

BUSINESS REPLY MAIL

No postage stamp necessary if mailed in the United States

POSTAGE WILL BE PAID BY BERKELEY ENTERPRISES, INC.

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

Fold here – do not cut

bend here and fold

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

One Year (including the Computer Directory and Buyers' Guide — 13 issues) U.S. only. ☐ $18.50 until Oct. 20

One Year (excluding the Computer Directory and Buyers' Guide — 12 issues) U.S. only. ☐ $9.50 until Oct. 20

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

☐ Payment enclosed ☐ Renewal
☐ Bill me ☐ New subscription

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

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

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

A – staple or glue to B

cut here