computers
and people

formerly *Computers an*

RESPONDING TO DISASTER, 1913

INVENTORY OF THE 36 ISSUES OF

THE NOTEBOOK ON COMMON SENSE, FIRST YEAR

— TITLES AND SUMMARIES

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

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    A: Some of the issues, like "Falling 1800 Feet Down a
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    are among the most exciting true stories we know.
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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 =

(COMMON SENSE) + (WISDOM) + (JUDGEMENT AND MATURITY) + (SCIENCE IN GENERAL) + (TECHNIQUES FOR SOLVING PROBLEMS) +

(TECHNIQUES FOR AVOIDING MISTAKES) + (SOME PARTS OF OPERATIONS RESEARCH) + (SOME PARTS OF SYSTEMS ANALYSIS) + (AVOIDANCE OF LOGICAL FALLACIES) + (. . . . .)
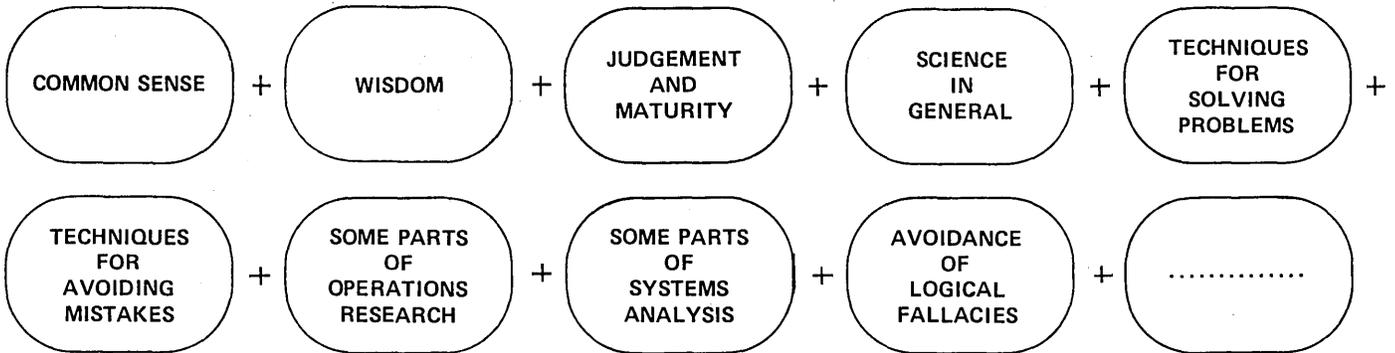
PURPOSES:

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
. . . . .

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.
LOGIC is important —
But this field is more important than logic, because common sense plus wisdom plus science in general is much broader than logic.
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.

Topic:
THE SYSTEMATIC PREVENTION OF MISTAKES

Already Published

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

To Come

Preventing Mistakes from:
Bias
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
Understanding

To Come

Strategy
Teachable Moment
Indeterminacy
System
Operational Definition
. . . .

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computers
and people formerly *Computers and Automation*

4

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.

Corrections: (1) In the April issue, on page 36, in the titles of three puzzles, replace "753" by "754". We regret this silly mistake. (2) On the same page a plus sign and an equals sign were omitted in error from the statement of Numble 754. In this issue (May), on page 35, this Numble is restated in correct form and renamed Numble 755. We regret this unfortunate error.

Front Cover Picture

When disaster strikes, it is the tradition of Western Electric to respond. In February and March 1913, a series of Midwestern sleet storms, floods, and tornadoes devastated communications from Chicago to Omaha and in between. Some of the thousands of pounds of emergency cable and equipment supplied by Western Electric are shown being loaded in Pittsburgh, for shipment to the west. See "FIRE IN NEW YORK TEL CO!" on page 16.

Key

[A]	—	Article
[C]	—	Monthly Column
[E]	—	Editorial
[F]	—	Forum
[N]	—	Newsletter
[R]	—	Reference

Computers, Telephones, and Fire

In this issue we report, in an article by Miki Felsenburg of Western Electric, an extraordinary and inspiring story of the rebuilding of a telephone central office installation after a disastrous fire which produced 170,000 dead telephones.

Many questions are to be asked about the fire, and some questions about the way its damages were repaired. But nothing can detract from the magnificent demonstration of selfless devotion by probably more than 3,000 people, most of them employees of Western Electric, but also many other persons inside and outside the Bell System, who combined their energies, their skills, and their spirit, to restore service at almost miraculous speed.

In the telephone system in the United States, Canada, and Mexico, there is a great deal of automatic connection, automatic computing, automatic billing, and automatic adjustments of many other kinds. The system probably extends for over a million miles of multiple telephone line routes, to say nothing of individual subscriber lines. Almost certainly this telephone system is the largest of all computing and communicating systems in existence. In the story of this disaster and recovery is much that is instructive for computing and communicating systems.

The first basic issue is lessons from the fire and prevention of similar fires in the future.

The fire should not have started. So why did it? The telephone company reports a short circuit. Why? Although I have no information at this point from the telephone company about possible reasons for a short circuit, I am confident that a lot of engineers in the telephone system are currently investigating that question.

A second basic question, perhaps even more important, is this. The fire should not have spread that way. Why did it? Obviously, a defective engineering design — perhaps the adoption of some highly inflammable material, probably decades in the past, for use in cables. And this was coupled with failure to consider how, if the cable did catch fire, the fire could be confined in a small space and extinguished.

Another question is based on the main strategy of firefighting — which is to catch a fire when it is small: it is far easier to put out a fire when it is little than when it is big. A firefighting organization knows that if it can arrive at a burning house within 2 or 3 minutes after the fire starts, it probably will save nearly all of the house; but if it arrives at the burning house 20 minutes after the fire begins, the house will be gutted or gone up in smoke. Quick response is a vital key. But the telephone company report is that the fire alert came from an employee who smelled smoke. The use of human beings to smell smoke is not a desirable technique for fire detection. Inanimate sensing devices are likely to be far more accurate, positive, and prompt. In the telephone company fire, the report is that no sensing devices reported the fire. Why not? Why were no fire sensing devices tripped? Were there none?

Most readers of this magazine are of course more interested in computers than they are in telephones. In the case of protection of computers against fire, even large ones, there are some considerable advantages over a communication system central office. It is regular standard practice to keep a back-up file of copies of programs and data bases at a location far enough away so that a catastrophe like fire, flood, tornado, or other "Act of God" will not prevent picking up and restarting operations, with not too much delay, perhaps not more than 24 hours. For a computer installation a fire as catastrophic as the New York Telephone Company fire is hard to imagine.

But it seems to me that the most interesting and significant aspect of the fire is the "Miracle on Second Avenue": the restoration of 170,000 telephones to service in the time from Feb. 27 to March 21 — an eight month job done in three weeks.

How? Because of people, loyal team spirit, and excellent training.

Why can't this kind of magnificent, constructive, swift team effort be applied to some of the really important large-scale problems of human beings, such as:

1) More food, and a better distribution of it;

2) More energy, and tapping of more resources, such as the use of sunlight for hot water heating and a share of the heating of buildings, on a vast scale;

3) Better international control over nuclear weapons — for this horrible danger to the world could easily produce 170 million dead people instead of 170,000 dead telephones.

Of course such team effort is possible.

Where there is a will, there is a way. We need to organize Western Electric team spirit and know-how on a vast scale.

Edmund C. Berkeley
Editor

MULTI-ACCESS FORUM

THE RIGHT TO PRIVACY

ADAPSO
(Association of Data Processing Service
Organizations)
210 Summit Ave.
Montvale, N.J. 07645

A Statement of Position

ADAPSO is deeply concerned by the growing tendency of government, and society generally, to evaluate the social impact of complex computer technology on the basis of inadequate and often simplistic considerations.

Most recently, this has been especially true with regard to the operation of information data banks, where the threat to privacy has too frequently obscured other even more important issues.

ADAPSO believes that problems concerning the accumulation, storage and dissemination of information by the evaluating authority can properly be determined only after full examination of all the relevant facts, through preparation and publication of a "Privacy Impact Statement". The underlying principle to be applied, following evaluation, is that the operation of mass data banks should be determined upon a fair balancing of all the benefits of operation against all the detriments.

_____

The accumulation, storage, and dissemination of information concerning individuals and organizations is of enormous importance to the health and well-being of our society. At the same time, the existence of vast data banks can pose a potential threat to the freedom of the individual.

Society is beginning to appreciate this potential threat of the mass data bank to privacy and freedom, and corrective action in the form of administrative regulation, legislation and private action is under way. Unfortunately, however, much such action has overlooked major adverse side effects, and important benefits jeopardized as a consequence of the remedial action. For example, legislative concern with the individual's right to know the contents of secret files, led to enactment of the requirement that schools and universities open their files to students and parents. Because this statute was inadequately discussed before enactment, Congress failed to understand that the uncontrolled disclosure of such information would have the inevitable — and terrible — side effect of violating the right to privacy of those who had furnished the confidential information in the first place, as well as the need for schools to have continuing access to full and frank information concerning their charges.

Almost always the failure to properly balance all the pluses and minuses of data bank operation results from inadequate study and information. ADAPSO believes that issues concerned with the operation of

mass data banks, require the analysis of all relevant data, for which reason it urges Congress, state legislatures, the executive and administrative agencies having jurisdiction, to require the preparation and publication of an impact statement with respect to every mass data bank subject to the jurisdiction involved. This impact statement should set forth, in detail, all facts applicable to the data bank's operation, including its reasons for existence and its safeguard and security systems. Only after there has been such full and frank disclosure, and review by the applicable authority, should action be taken.

THE COMPUTER AND PRODUCTIVITY

IBM Corp.
Armonk, N.Y. 10504

(From an advertisement, "IBM Reports")

At a time in which many economic axioms are being severely tested, one stands firm. Today, more than ever, productivity is recognized as a basic measure of economic progress.

In the long term, raising the standard of living of all the world's people will require major break-throughs in productivity. In the short term, the erosion of inflation makes substantial increases in productivity necessary to help maintain the standards that have already been achieved.

These needed increases in productivity will come not only from working harder, but from working "smarter". Only through improved management of our resources — human, natural and financial — will we be able to maintain and improve our quality of life.

Of all the "engines" that have been developed to help us with our work, few possess the computer's potential for contributing to productivity.

Today, computers are helping design engineers test concepts without building expensive prototypes. They are helping farmers raise more abundant crops by providing information on the best land use patterns. They are helping manufacturers increase production yields and improve product quality while conserving raw materials and energy. They are helping hospitals improve medical care by relieving doctors and nurses of many administrative duties. And they are doing much, much more.

A principal reason for this growing usefulness is the increased productivity of computers themselves. In 1952 it cost $1.26 to do 100,000 multiplications on an IBM computer. Today they can be done for a penny on a modern large-scale computer system.

A dozen years ago the least expensive IBM computers were beyond the financial reach of many smaller firms. Now models with comparable capacity are available for a fraction of the cost.

IN PRAISE OF ROBOTS

Dr. Carl Sagan
Professor of Astronomy
Director, Laboratory for Planetary Studies
Cornell University
Ithaca, N.Y. 14853

"With this more or less representative set of examples of the state of development of machine intelligence, I think it is clear that a major effort . . . . could produce much more sophisticated programs."

The Word "Robot"

The word "robot", first introduced in the 1920's by the Czech writer Karel Capek, is derived from the Slavic root for "worker". But it signifies a machine rather than a human worker. Robots, especially robots in space, have lately been getting a bad press. We have read that a human being was necessary to make the terminal landing adjustments on Apollo 11, without which the first manned lunar landing would have ended in disaster; that a mobile robot on the lunar surface could never have been so clever as the astronauts in selecting samples to be returned to earthbound geologists; and that machines could never have repaired, as men did, the sunshade that was so vital for the continuance of the Skylab missions.

All these comments turn out, naturally enough, to have been written by humans. I wonder if a small self-congratulatory element, a whiff of human chauvinism, has not crept into these judgments. Just as whites can sometimes detect racism and men can occasionally discern sexism, I wonder whether we cannot here glimpse some comparable affliction of the human spirit — a disease that as yet has no name. The word "humanism" has been preempted by other and more benign activities of mankind. From the analogy with sexism and racism I suppose the name for this malady could be "speciesism" — the prejudice that there are no beings so fine, so capable, and so reliable as human beings.

This is a prejudice because it is, at the very least, a pre-judgment — a conclusion drawn before all the facts are in. Such comparisons of men and machines in space are comparisons of smart men with dumb machines. We have not asked what sorts of machines could have been built for the thirty or so billion dollars that the Apollo and Skylab missions together cost.

Compact, Self-Ambulatory Computer

Each human being is a superbly constructed, astonishingly compact, self-ambulatory computer — capable on occasion of independent decision making and real control of his or her environment. But there are serious limitations to employing human beings in certain environments. For example, without a great deal of protection, human beings would be inconvenienced on the ocean floor, the surface of Venus, the deep interior of Jupiter, or even on long space missions. Perhaps the only interesting information from Skylab that could not have been obtained by machines is that when human beings remain in space for a period of months, they undergo a spectacular loss of bone calcium and phosphorus. This seems to imply that human beings will be incapacitated under zero gravity on missions of six to nine months or more. The minimum interplanetary voyages have characteristic lengths of a year or two. Spinning the spacecraft can produce a kind of artificial gravity, but it is inconvenient and costly.

Machines for Risky Missions

Because we value human beings highly, we are reluctant to send them on extremely risky missions. If we do send human beings to exotic environments, we must also send along their food, their air, their water, amenities for entertainment and waste recycling, and companions. Machines, however, need no elaborate life-support systems, no entertainment, no companionship, and we do not yet feel strong ethical prohibitions against sending them on one-way or suicide missions.

Certainly for simple missions, machines have proved themselves many times over. Unmanned vehicles performed the first photography of the whole earth and the far side of the moon, the first landings on the moon and Venus, and in the Mariner 9 mission to Mars, the first thorough reconnaissance of another planet. Here on earth it is increasingly common for high-technology manufacturing — in chemical and pharmaceutical plants, for example — to be performed largely or entirely under computer control. In all these activities machines are able, to some extent, to sense errors, correct mistakes, and alert distant human controllers about perceived problems. The powerful arithmetical abilities of computing machines — now hundreds of millions of times faster than unaided human beings — is legendary. But what about really complex discussions? Can machines, in any sense, think through a new problem? Can they make discussions of the branched-contingency-tree variety, which we think of as characteristically human? (That is, I ask question 1; if the answer is A, I ask question 2; if the answer is B, I ask question 3; and so on.)

Turing's Conditions for Belief in Machine Intelligence

Some decades ago the English mathematician Alan Mathison Turing described what would be necessary for him to believe in machine intelligence. The condition was simply that he could be in teletype or type-writer communication with a machine and be unable to tell that it was not a human being. Turing imagined the following conversation between a man and a machine:

Q. In the first line of your sonnet which reads "Shall I compare thee to a summer's day", would not "a spring day" do as well or better?
A. It wouldn't scan.
Q. How about "a winter's day"? That would scan all right.
A. Yes, but nobody wants to be compared to a winter's day.
Q. Would you say Mr. Pickwick reminded you of Christmas?
A. In a way.
Q. Yet Christmas is a winter's day, and I do not think Mr. Pickwick would mind the comparison.
A. I don't think you're serious. By a winter's day one means a typical winter's day, rather than a special one like Christmas.

No machine of this sophistication has yet been built, but so far only a limited amount of effort and money has been put into artificial intelligence, and there are only a half-dozen centers of such activity in the world.

Machine for Arranging Blocks

One of the more striking results, obtained in a very limited universe of discourse — that of children's blocks — comes from work done at the Artificial Intelligence Laboratory of the Massachusetts Institute of Technology. Here is a dialogue between a man and a machine:

Man. What does the box contain?
Machine. The blue pyramid and the blue box.
Man. How many blocks are not in the box?
Machine. Four of them.
Man. Is at least one of them narrower than the one I told you to pick up?
Machine. Yes, the red cube.
Man. Is there a steeple?
Machine. Sorry, I don't know the word "steeple".
Man. A steeple is a stack that contains two green cubes and a pyramid, for example.
Machine. I understand.
Man. Are there any steeples now?
Machine. No.
Man. Build one.

The machine does. It reaches out its mechanical hand, moves the cubes, and builds the structure that has just been described.

Man. When did you pick up the pyramid?
Machine. While I was stacking up the red cube, the large red block, and the large green cube.
Man. Why?
Machine. To get rid of it.
Man. Why did you clear off that cube?
Machine. To put it on the large green cube.

Machine for Imitating a Psychiatrist

As another example, a computer program that imitates a psychiatrist was also once developed at MIT. This is a much simpler program than the blocks

program because it does not attempt to "understand" much of what is said to it, but only manipulates the phrases in sentences it has heard in accordance with a contingency tree sensitive to certain words that are considered especially important by humans. This program involves nondirective psychotherapy, which generally speaking, requires extremely simple computer programs. Here is a remarkable dialogue between a human being and a computer psychotherapist. (It is one of the most interesting of such conversations. Many other such machine/human psychiatric dialogues are not nearly so striking. But I suppose most human/human psychiatric dialogues are not very striking either.) In order to keep the respective roles of therapist and patient clear in this interaction, the computer therapist types upper case while the patient types lower case:

men are all alike.
IN WHAT WAY?
they're always bugging us about something or other.
CAN YOU THINK OF A SPECIFIC EXAMPLE?
well, my boyfriend made me come here.
YOUR BOYFRIEND MADE YOU COME HERE?
he noticed that i'm depressed much of the time.
I AM SORRY TO HEAR YOU ARE DEPRESSED.
he's right. i am unhappy.
DO YOU THINK COMING HERE WILL HELP YOU NOT TO BE UNHAPPY?
i need some help, that much is clear.
WHAT WOULD IT MEAN TO YOU IF YOU GOT SOME HELP?
perhaps i could learn to get along with my mother.
TELL ME MORE ABOUT YOUR FAMILY.
my mother takes care of me.
WHO ELSE IN YOUR FAMILY TAKES CARE OF YOU?
my father.
YOUR FATHER?
you are like my father in some ways.
WHAT RESEMBLANCE DO YOU SEE?
you are not very aggressive, but i don't think you want me to notice that.
WHAT MAKES YOU THINK I AM NOT VERY AGGRESSIVE?
you don't argue with me.
WHY DO YOU THINK I DON'T ARGUE WITH YOU?
you are afraid of me.
DOES IT PLEASE YOU TO BELIEVE I AM AFRAID OF YOU?
it pleases my father to think that i am afraid of him.
WHAT ELSE COMES TO MIND WHEN YOU THINK OF YOUR FATHER?
bullies.
DOES THAT HAVE ANYTHING TO DO WITH THE FACT THAT YOUR BOYFRIEND MADE YOU COME HERE?

This astonishing — one is very tempted to say perceptive — response from the computer is, of course, preprogrammed. But then, so are the responses of human psychotherapists. No such computer program is adequate for psychiatric use today, but the same can be remarked about some human psychotherapists. In a period when more and more people in our society seem to be in need of psychiatric counseling, and when time sharing of computers is widespread, I can imagine the development of a network of computer psychotherapeutic terminals, something like arrays of large telephone booths, in which, for a few dollars a session, we would be able to talk with an attentive, tested, and largely non-directive psychotherapist. Insuring the confidentiality of the psychiatric dialogue is probably the most important step to be worked out.

Tic-Tac-Toe, Checkers, and Chess

Another sign of the intellectual accomplishments of machines is found in games. Even exceptionally simple computers — those that can be wired by a

bright ten-year-old — can be programmed to play perfect tic-tac-toe. One computer has played master-class checkers — it has beaten the Connecticut state champion. Chess is a much more difficult game than tic-tac-toe or checkers. Here, programming a machine to win is not easy, and novel strategies have been used, including several successful attempts to have a computer learn from its own experience in playing pre previous chess games. For example, computers can learn empirically that it is better in the beginning game to control the center of the chess board than the periphery.

So far no computer has become a chess master; the ten best chess players in the world have nothing to fear from any present machine. But several computers have played well enough to be ranked somewhere in the middle range of serious, tournament-playing chess players. I have heard machines demeaned (often with a just audible sigh of relief) because chess is an area in which human beings are still superior. This reminds me of the old joke in which a stranger re-marks with wonder on the accomplishments of a checker-playing dog, whose owner replies, "Oh, it's not all that remarkable. He loses two games out of three." A machine that plays chess in the middle range of human expertise is a very capable machine; even if the there are thousands of better human chess players, there are millions of worse ones. To play chess requires a great deal of strategy and foresight, analytical powers, the ability to cross-correlate large numbers of variables and to learn from exper-ience. These are excellent qualitites not only for individuals whose job it is to discover and explore but also for those who watch the baby and walk the dog.

Unpredictable Machine Behavior

Chess-playing computers, because they have very complex programs, and because, to some extent, they learn from experience, are sometimes unpredictable. Occasionally they perform in a way that their pro-grammers would never have anticipated. Some philo-sophers have argued for free will in human beings on the basis of our sometimes unpredictable behavior. But the case of the chess-playing computer clearly tells us that, when viewed from the outside, behav-ior may be unpredictable only because it is the re-sult of a complex although entirely determined set of steps on the inside. Among its many other uses, machine intelligence can help illuminate the ancient philosophical debate on free will and determinism.

With this more or less representative set of ex-amples of the state of development of machine intel-ligence, I think it is clear that a major effort over the next decade, involving substantial investments of money, could produce much more sophisticated pro-grams. I hope that the inventors of such machines and programs will become generally recognized as the consummate artists they are.

Self-Controlled vs. Remotely Controlled Robots

In thinking about the generation of machine in-telligence, it is important to distinguish between self-controlled and remotely controlled robots. A self-controlled robot has its intelligence within itself; a remotely controlled robot has its intelli-gence located someplace else, and its successful op-eration depends upon successful communication between its external central computer and itself. There are, of course, intermediate cases in which the machine may be partly self-activated and partly remotely controlled. The mix of remote and in situ control seems to offer the highest efficiency for the near future.

We can imagine, for example, such a machine designed for the mining of the ocean floor. Enor-mous quantities of manganese nodules litter the abyssal depths. They were once thought to have been produced by meteorite infall on the earth, but are now believed to be formed occasionally in vast man-ganese fountains caused by the internal tectonic activity of the earth. Many other scarce and indus-trially valuable minerals are likewise to be found on the deep ocean bottoms. We clearly have the capa-bility today to design devices that can systematic-ally swim above or crawl upon the ocean floor, per-form spectrometric and other chemical examinations of the surface material, radio back all findings to ship or land, and by means of low-frequency radio homing instruments, mark the sites of especially valuable deposits.

The radio beacon in the robot will then direct great mining machines to the appropriate locales. The present state of the art in deep-sea submersibles and in spacecraft environmental sensors is compatible with the development of such devices. A similar sit-uation exists for offshore oil drilling, for coal and other mineral mining, and other operations. The likely economic returns from such devices would pay not only for their development but for the entire future space program many times over at the present rate of spending.

Machines can be programmed to recognize partic-ularly difficult situations and to inquire of human operators — working in safe and pleasant environ-ments — what to do next. The examples just given are of devices that are largely self-controlled. Remotely controlled devices are also possible, and a great deal of preliminary work has been done in the remote handling of highly radioactive materials in laboratories of the U.S. Atomic Energy Commis-sion. In the application of this technology, I can imagine a human operator connected by radio link with a mobile machine; for example, the operator is in Manila; the machine is in the Mindanao Trench in the Philippine Sea — the deepest level of the earth's surface. The operator is attached to an array of electronic relays that transmit and amplify his movements to the machine and that can, converse-ly, carry back to his senses what the machine per-ceives. When the operator turns his head to the left, the television cameras on the machine will turn left, and the operator will see on a great hemispherical television screen the scene revealed by the machine's searchlights and cameras. When the operator in Manila takes a few steps forward, the machine in the abyssal depths will amble a few meters forward; when the operator reaches out his hand, the mechanical arm of the machine will extend itself. The precision of the man-machine inter-action will be such that exact manipulation of material on the ocean bottom by the machine's finers will be possible. With such devices, human beings will be able to "enter" environments other-wise closed to them forever.

Robot Landers to Examine Mars

In the exploration of Mars, the time is almost upon us when unmanned vehicles will soft-land; only a little further in the future they will roam about the surface of the red planet as some do now on the moon. We are not yet ready for a manned mission to Mars. (Some of us are concerned about such missions because of the danger of carrying terrestrial mi-crobes to Mars and Martian microbes, if they exist, back to earth; and because of the enormous expense involved.)

The unmanned Viking landers scheduled to be deposited on Mars in the summer of 1976, however, have a very interesting array of sensors and scientific instruments. Each lander has two cameras with the resolution and stereoscopic capabilities of the human eye, plus a much greater range of color sensitivity, extending into the near infrared. Each lander has a single ear — a seismometer sensitive only to the lowest frequencies in the audio spectrum. The seismometer is, in fact, equipped with a filter to prevent higher frequencies from being registered. Viking also has an elaborate instrument that is the equivalent of a nose and taste buds. This gas chromatograph/mass spectrometer will enable the landers to detect, in abundances of parts per million, hundreds of different organic molecules, many of which unaided humans are incapable of detecting. The Viking lander sports a single arm with which to collect the Martian soil and withdraw it into its body for further examination. Among the lander's range of instruments are three biology sensors, unknown to human anatomy, that are designed to measure microbial metabolism. (However, were we to ingest soil samples, as Viking will, and were those samples to contain microbes, we might discover them by getting sick.) Although it will have the capacity to taste, Viking will not have to eat while on the Martian surface. The lander is equipped with two radioactive thermal generators which will generate electricity from the radioactive decay of the element plutonium. This is an energy source that should be adequate for a lifetime of many months on the Martian surface.

Reprogramming a Robot 50 Million Miles Away

The reprogrammability of computers is an important virtue. Suppose we send a human astronaut to Mars, trained in, say, geology. After he or she lands, we discover that we really should have sent a biologist. Reprogramming the astronaut is equivalent to waiting for that individual to complete, on Mars, a remote postgraduate course in biology. A robot geologist on Mars, however, would require only a few hours to be reprogrammed and debugged for biology.

Robot Rover to Explore Mars

The obvious post-Viking approach to Martian exploration, one that takes advantage of the Viking technology, would be a tractor-treaded robot rover that would carry the entire Viking spacecraft slowly over the Martian landscape. But such a vehicle would pose a new problem, one never encountered in machine operation on the earth's surface. Although Mars is the second closest planet to Earth, it is so far away that the light travel time between the two becomes significant. At a typical relative position of Mars and Earth, the red planet is twenty light minutes away. A message from the robot on Mars to the human controller on Earth, traveling at the speed of light, would take twenty minutes to arrive. Thus, if the spacecraft encountered a steep incline, it might send a message of inquiry back to the earth. Forty minutes later the response would arrive, saying something like, "For heaven's sake, stand dead still." By then, of course, an unsophisticated machine would have tumbled into the gully. Any Martian rover consequently requires slope and roughness sensors. Fortunately these are readily available and are even found on some children's toys. When confronted with a steep slope or boulder, a rover so equipped would either stop until it received instructions from the earth in response to its query (sent with a televised picture of the terrain) or back away and move in another and safer direction. If every decision in Martian exploration must be fed through a human controller on the earth, the robot rover can traverse

only a few feet an hour. But the lifetimes of such rovers — and of human operators — are so long that a few feet an hour represents a perfectly respectable rate of progress.

Contingency decision networks much more elaborate than anything now in existence can be built into the onboard computers of spacecraft of the 1980s. For objectives more remote than Mars, to be explored further in the future, we can imagine human controllers in orbit nearby. In the exploration of Jupiter, for example, I can envisage operators — installed on a small moon outside the planet's fierce radiation belts — controlling, with only a few seconds' delay, the responses of a spacecraft floating in the dense Jovian clouds or wandering about its metallic hydrogen oceans. Earthbound human beings can also be part of such an interaction loop, provided they have the patience to cope with the increased light travel time involved. As we speculate about expeditions into the farthest reaches of the solar system — and ultimately to the stars — self-controlled machine intelligence will clearly assume heavier burdens of responsibility.

Insects Compared with Robots

In the development of such machines we find a kind of convergent evolution. The Viking lander is, in a curious sense, like some great, outsize, clumsily constructed insect. It is not yet ambulatory, and it is certainly incapable of self-reproduction. But it has an exoskeleton, a wide range of insect-like sensory organs, and is about as intelligent as a dragonfly. Viking also has an advantage that insects do not; by inquiring of its controllers on earth, it can, in effect, assume the intelligence of a human being — that is, its controllers are able to reprogram the Viking computer on the basis of decisions that they make.

To construct something with the intelligence of an insect may not seem a very impressive feat. But it is a feat that took nature four billion years to accomplish. We have been exploring space for less than a hundred-millionth of that time. A machine of this intelligence is a great human achievement.

As the field of machine intelligence advances and as more and more distant objects in the solar system become accessible to exploration, we will see the development of increasingly sophisticated onboard computers — instruments that slowly climb the phylogenetic tree from insect intelligence to crocodile intelligence to squirrel intelligence and, in the not very remote future, I think, to dog intelligence. Any flight to very great distances must have a computer capable of determining whether it is working properly. There will be no possibility of sending to earth for a repairman. The machine must be able to sense it is sick and skillfully doctor its own illnesses. A computer is needed that is able either to fix or replace its own faile parts or sensors or structural components. Such a computer, which has been called STAR — for Self-Testing And Repairing computer — is on the threshold of development. It employs redundant components, as biology does — we have two lungs and two kidneys partly because each is protection against failure of the other. But a computer can be much more redundant than a human being — we have, after all, only one head and one heart.

Miniaturization

In view of the weight premium on deep-space exploratory ventures, there will be strong pressures for continued miniaturization of intelligent machines.

Remarkable miniaturization has already occurred; vacuum tubes have been replaced by transistors and wired circuits by printed circuit boards. A few years ago a circuit that occupied much of a 1930s radio set was regularly being printed on the equivalent of the head of a pin. Today the same circuit can be printed on the point of a pin, and the head can accommodate a fair fraction of a small computer.

Domestic Robots

If intelligent machines for terrestrial mining and space exploratory applications are pursued, the time is not far off when household and other domestic robots will become commercially feasible. Unlike the classical anthropoid robots of science fiction, there is no reason for such machines to look any more human than a vacuum cleaner does. They will be specialized for their functions. There are many common tasks, ranging from bar tending to floor washing, that involve a limited array of intellectual capabilities, although they require substantial stamina and patience. All-purpose ambulatory household robots, capable of performing the domestic functions of a proper nineteenth-century British butler, are probably many decades off. But more specialized machines, adapted to specific household functions, are already on the horizon.

Conceivably, many other civic tasks and essential functions of everyday life could also be carried out by intelligent machines. A recent newspaper report states that garbage collectors in Anchorage, Alaska, have won a wage settlement guaranteeing them a yearly salary of $18,000. Economic pressures alone may make a persuasive case for the development of automated garbage-collecting machines. For the development of domestic and civic robots to be a general social good, the effective reemployment of those displaced by robots must, of course, be arranged; but over a human generation that should not be too difficult — particularly if enlightened educational reforms are initiated.

Adjusting to Intelligent Machines

We appear to be on the verge of developing a wide variety of intelligent machines capable of performing tasks too dangerous, too expensive, too onerous, or too boring for human beings. The development of these machines is, in my mind, one of the few legitimate spin-offs of the space program. The main obstacle to their development seems to be a human problem: the quiet feeling that comes stealthily and unbidden to claim that there is something unpleasant or "inhuman" about machines performing certain tasks as well as, or better than, humans; the feeling that generates a sense of loathing for creatures made of silicon and germanium rather than proteins and nucleic acids.

Our survival as a species depends on our transcending these primitive chauvinisms. Adjustment to intelligent machines is, in part, a matter of acclimatization. There are cardiac pacemakers in existence that sense the beat of the human heart. Only at the slightest hint of fibrillation does the pacemaker stimulate the heart. This is a mild but useful sort of machine intelligence. I cannot imagine the wearer of this device resenting its intelligence. I think that there will shortly be a similar sort of acceptance for much more intelligent and sophisticated machines. We have a generation of youngsters who are growing up with pocket computers, machine languages, computer graphics, electronic music, automated instruction, and computer games. They are unlikely to find anything alien about machine intelligence. There is nothing inhuman about an intelligent machine; it

is, indeed, the expression of those superb intellectual capabilities that only human beings, of all the creatures on our planet, now possess.

For Good or For Evil?

A legitimate concern in the development of machine intelligence is its potential for misuse by unscrupulous governmental, military, and police agencies. Here, as in many other areas of modern technology, the same devices can be used either for enormous good or enormous evil. A world with central data banks containing dossiers on all its citizens, with robot policemen and robot judges, and with automated battlefields is not a world in which I personally would care to live and bring up children. It would be a nightmare world. But a world with adequate food, mineral, and energy resources; a world that provides its human inhabitants with ample leisure and an intellectually and spiritually rich environment with which to make that leisure meaningful; a world engaged in the exploration of other distant and exotic worlds — that is a world I would find extremely attractive. Both of these future worlds are accessible through machine intelligence. To avoid the nightmare and realize the dream requires a wholesale restructuring of the planet's political institutions — a restructuring that is clearly required quite apart from the implications if intelligent machines. If we survive, I think our future will depend to a significant degree on a partnership between human and machine intelligence. □

At the same time as per-function costs have decreased, major strides have been made in applying computers to new kinds of jobs and in simplifying their operation. Today thousands of computers, large and small, are at work helping small companies to compete, helping large firms run more efficiently, helping make the economy more productive at all levels.

For us at IBM, the challenge of productivity is plain. It lies in continuing to help increase the productivity of the computer. The rest will follow.

"INSTITUTE OF CERTIFIED RECORDS MANAGERS" FORMED

Gerald L. Hegel
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Certification of Records Managers has been a dream of the profession for many years. The program and examination have been under active development. A first group of candidates has taken the examination. Now, in an effort to solidify the profession, the two Records Management associations have combined to administer the Certified Records Manager Program.

This independent body is to be called the "Institute of Certified Records Managers". Its initial governing body of ten "regents" is composed equally of members of the American Records Management Association (ARMA) and the Association of Records Executives and Administrators (AREA). These persons have been chosen from areas of business, industry, education, state, local, and national government. The Institute, once it has met and organized, will operate independently of both organizations. Its sole function will be to certify individuals who meet the established qualifications. □

The Computer Industry's Social Responsibilities
— Another Approach

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"Up to this point it is apparent that technology has been given priority over humans."

Introduction

In the March 1975 issue of "Computers and People" the chief executive officers (or their representatives) of eight large computer manufacturers responded to a questionnaire. The manufacturers were:

— Burroughs
— Control Data
— Digital Equipment Corp.
— Honeywell Information Systems
— IBM
— NCR
— Sperry Rand
— Xerox Data Systems

The questionnaire was:

1. Dehumanizing Image of the Computer. What active efforts does your organization have to cope with the "dehumanizing" image of the computer?

2. Human Engineering. Is human engineering being used to make computer hardware more adaptable to people — rather than twisting people to adapt to computers?

3. Human Communication with the Computer. What is being done to really simplify man's communication with the computer? Current languages (e.g., COBOL, FORTRAN, BASIC) are still not usable by the average person. These stylized languages "turn off" a lot of people (including some intelligent people)!

4. Human Factors in Computer Work. Computer planning, systems analysis, and programming techniques seem to concentrate on economic and technical factors. Are human factors being built into computer planning, design, and utilization?

5. Ultra-Technicians. Are we training computer people to be ultra-technicians who can't communicate with the rest of society? Are such technicians insensitive to the human part of society? What can be done in this area?

6. Society-Related Issues. What is your organization doing in the social-related issues of computers? For instance, privacy and data banks, computer crime, impersonalized data processing (e.g., relentless dunning notices, relentless errors in computer output), etc.

7. Over-Promotion of the Computer. It is held that the computer is overly promoted, and that it hasn't lived up to expectations. Can the computer really help in vital areas related to policy-level, unstructured decisions?

8. Consumer Complaints. Is it likely that the computer will be faced with consumerism complaints due to paperwork pollution, error pollution, "1984 Syndrome", and its technological rigidity?

9. Alienation of Employees. Are office workers being paced by the computer — just as blue collar workers have been paced by the assembly line and automation? Does this cause alienation of employees with the organization/work assignment?

10. Unemployment. What is the role of the computer, and what is the role of the human being? Should the complete job be computerized whenever possible? Has this attitude contributed to our high unemployment rate?

11. Over-Dependence on Computers. Can society become overly dependent on computers, causing an entropy in the human system?

The manufacturers' responses were included in an article by this author entitled "The Computer Industry's Social Responsibility: A Self-Appraisal".

Computer Users' Difficulties with Computers

Some years ago the great scientist, Norbert Wiener, said

...the new industrial revolution [computers and cybernetics] is a two-edged sword. It may be used for the benefit of humanity; but only if humanity survives long enough to enter a period in which such a benefit is possible. It may also be used to destroy humanity, and if it is not used intelligently it can go very far in that direction.

When we read about the projected characteristics of a planned new computers we are almost certain to be bombarded by such claims as:

— Tremendous memory devices, based on exotic
new technology, which can store billions or
even trillions of items of data.
— Very rapid processing circuits that permit
calculations in nanoseconds (billionths of
a second) or picoseconds (trillionths of a
second).
— Software packages which will quickly solve
intricate problems that would take many
man-years to solve by non-computer means.

This hardware and software hypnosis exists in
spite of the fact that most computers are under-util-
ized and that most users have difficulty in coping
even with current computer technology.

Human not technical problems are the major obsta-
cles to more effective computer applications. Yet,
it is the human problems that tend to be neglected.
Because the computer, one of the foremost technologi-
cal developments of our time, has often been used
with little sensitivity to its impacts on people, it
has been resisted by many whose cooperation is needed
to realize the full benefits that computerization
can bring.

The Critical Computer Issues of Today

The great computer issues of today are not those
of computer technology. The critical issues revolve
around people and social considerations, such as:

— Displacement of people by computerization
and automation.
— Dehumanizing people and organizational en-
vironments by twisting them to conform to
arbitrary mechanistic concepts and tools.
— Data banks which invade the individual's
right to privacy.
— The use of the computer for criminal pur-
poses.

Computer professionals have rarely constructively
faced these issues. They either ignore them or deny
their validity. As a result, computers have tended
to be far less useful than they could be.

The Maligning of the Computer

It is largely because the computer vendors and
users have poorly handled the human aspect of compu-
ters that the computer is so often maligned, is the
object of so many derisive jokes, and fails to at-
tain the great promises predicted for it. Computer
specialists need to learn that the computer must
truly serve people and not merely be served by people.

If the computer field is to become socially re-
sponsive, it needs to become more completely human-
ized. This means a "new generation" — if not of
computers, then of computer usage — which places
people first and technology second. Up to this point,
it is apparent that technology has been given prior-
ity over humans.

Dehumanization

Throughout our society there is the need for gov-
ernment and large organizations to take a more hu-
mane posture regarding their goals and operations.
The masses of people feel helpless against the cold,
impersonal power represented by remote organizations.
Too often these organizations have focused on pro-
fits or programs — with very little consideration
given to the discomfort of the individual. Compu-
ters are brought into organizations and employees
are required to adjust to the system. The same com-

puters are then used to communicate with customers
and citizens; too often the computer communication
is "noise" to the recipient. The human system is
interdicted by the computer systems. Most of them
have been designed with a mechanistic approach rather
than an organic one.

Human Engineering

Research by the author has indicated that few us-
ers employ human engineering and social scientists
on their computer systems projects. Significant
projects are put in the hands of computer specialists
having little or no professional expertise in psy-
chology, sociology, personnel management, or like
areas. Educational programs, available from the com-
puter vendors, are almost completely devoid of guide-
lines related to human engineering as it should be
applied in the users' preparation for computeriza-
tion. Computer programming languages, largely devel-
oped by the computer manufacturers, still are not
easy for the average person to use. Even with
the advances in data terminals and mini-computers,
it does not appear that computer hardware is suffi-
ciently simplified so that the average person feels
comfortable in operating it.

Communication with the Computer

The computer manufacturers and users (mostly
large organizations) have been working in this area
for years through the American National Standards
Institute. The most "universal" programming lan-
guages — COBOL, FORTRAN, BASIC — are still so
stylized and rigid that they are bound to limit the
number of persons who will be able to constructively
use computers. Quite a number of students are being
trained to access computer programs that have been
preprogrammed and are stored in computers. But un-
til more simplified English-like programming lan-
guages are available, it is suspected that the vast
majority of citizens will not be able to develop
their own computer programs to solve their unique
problems. While there is some indication that there
has been an erosion of students' reading, writing,
and mathematical attainments — there has not been
any significant advances in programming which would
make communication with the computer easier for such
persons.

Human Factors in Computer Work

The techniques of systems analysis, computer pro-
gramming, and management science have attracted much
attention and development efforts. However, the
bulk of these efforts by computer manufacturers and
users alike appear to dwell on mechanistic and eco-
nomic factors. Research by the author indicates,
for instance, that users' organizations seldom include
social scientists or even personnel professionals
on major computer projects. That attention which is
devoted to human factors is usually of a very super-
ficial and token nature. Such insensitivity to hu-
man factors may be the cause of so many computer
applications failing to attain desired objectives due
to alienation of the individuals affected by such
computerization. There is need for accelerated re-
search to develop approaches which will permit us to
consider human factors as professionally as we ad-
dress the technical and economic factors. For in-
stance, too little research has been done in the areas
of the psychological impact of human-machine inter-
face, the "appropriate" distribution of work to hu-
mans and machines, the hidden costs of psychological
and other pollution generated by computer applica-
tions, etc.

Ultra-Technicians

While it may be true that each profession has its ultra-technicians, there is need for a new and positive approach to broaden the computer professionals' viewpoints. Extensive research has indicated that there is an extreme paucity of effort devoted to training these computer people in interpersonal relations and the human engineering needed to design systems which are socially sound as well as technically sound. Too often, in the name of efficiency or profits, our economic system has been used so as to sacrifice the well-being of individuals and social groups. The author has suggested that social scientists (psychologists, personnel professionals, etc.) become integral parts of computer projects.

Privacy, Computer Crime, Etc.

There is a joint responsibility of computer vendors and users in these areas of social concern. While some large organizations conduct image-building public relations campaigns to convince the public of their contributions to society, too often this is a mask which hides the less noble organizational activities. The public is becoming increasingly aware of apparently socially harmful activities such as: automobiles which are "unsafe at any speed" and which are poisoning the air we breathe, chemical plants and others that are polluting our waters and destroying nature's endowment, collusion of politicians and wealthy power groups which pass legislation benefiting the rich which places an even greater burden on the non-rich, etc. In view of the many disconcerting and deleterious acts of large organizations, why shouldn't many citizens view the powerful computer with scepticism? Will the computer be used to obtain further central control over individuals, and thus further restrict their real freedom? Is the computer a more powerful weapon in the arsenal of the unscrupulous, including organized crime? Do computer systems result in a further depersonalization of our society? Individuals must deal with the cold, methodical computer which further increases the breakdown in human communication. As these undesirable trends continue, we see little corrective action being taken.

Over-Promotion of the Computer

It probably is true that generally the expectations from computers have exceeded the realizations from them. On the other hand, the computer has allowed man to perform tasks that would have been impossible without the new machines. Nevertheless, it would appear that computer manufacturers and users have not advanced very much in effectively applying computers to the higher-order decisions in vital areas or those problem areas related to social concerns. The computer has been used most widely in areas having well-defined models and rigid procedures ... which may account for the resulting friction in the real world with its imperfections and fluidity.

Consumer Complaints

Certainly there are considerable public complaints about computerized bills, junk mail, and data banks. These complaints result from computer applications which were inadequately planned and designed — and which ignored the human factors in systems. Computer users themselves have given evidence that they are not infrequently dissatisfied with the hardware and software supplied by computer manufacturers. Computer hardware and programs are too often undebugged when they are sold or leased, and the actual throughput performance of the computer is usually considerably lower than the manufacturers' claims. As previously mentioned, the nature of computers makes available the frightening possibility of organizational and governmental control as depicted by Orwell in "1984".

Alienation of Employees

Little advance has been made to determine the best way to allocate work to humans and machines. The level of dissatisfaction with work assignments raises concern whether organizations are properly designing systems. In the automotive plants and elsewhere, workers have "rebelled" against being paced by automation and the resulting idiot-type of work they are assigned. In some Scandinavian countries experiments are proceeding which involve de-automating and de-computerizing operations. Work as a complete unit is being returned to the worker and work group. The group creates its own system to reach objectives, rather than depending on a monolithic single system created by ultra-technicians from a central computer systems office.

Unemployment

There is obviously a need to reassess our national policies regarding our country's human resources. During periods of recession and depression a vast amount of our most valuable resource, people, is neglected and wasted. Besides the national waste, there is untold human suffering and psychological damage. Part of this complex scenario is the continual development of technology, including machines and devices which supplant human labor. Little effort appears devoted to developing a policy which attempts to balance such technological advances with the capacity of society and people to absorb the changes. Rather, such advances appear to cause extreme dislocations. In periods of high employment, one can rationalize the extensive use of automation and computerization. In periods of economic decline, a socially responsible person must wonder if it is not more humane to employ people who are without work rather than "employing" machines.

Over-Dependence on Computers

Over-dependence of Americans on the automobile has probably resulted in greatly reduced walking, with consequential increases in the number of overweight persons. Automation production lines have reduced craftsmanship; and the worker's interest in his or her work has probably declined. Similarly, the computer is absorbing vast ranges of white-collar-type work. As the computer is programmed to perform a particular task, the appropriate procedure and responsibility are at least partially removed from the province of the human being and shifted to the computer system. The computer can become a central hub and the radial human spokes can become very dependent on that fulcrum. Have you been in a bank when the bank clerk states, "I am sorry we can't update your account at this time — the computer isn't working"? Have you heard an executive state, "We can't do anything until the computer center produces the report"? Have you been involved with a complex computer application which generates reports that you use — but you really do not understand the computer model which is generating the reports? Can we experience a situation such as depicted in the motion picture "Dr. Strangelove" — whereby the President of the nation was unable to control the computer decision to bomb the Soviet Union?

"Fire in New York Tel Co!": The Saga of Recovery

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"Quick action in emergencies is part of our business . . . . When disaster strikes, Western Electric swings into action . . . . "

On Thursday morning, Feb. 27, 1975, fire started in the basement of the New York Telephone Co. building at 2nd Avenue and 13th St. Seventeen hours after it began, the holocaust was finally over. Millions of dollars worth of telephone equipment had been destroyed. Nearly 170,000 telephones in Manhattan, deprived of their switching equipment, were silent.

By March 21, 23 days after the catastrophe, the phones were back in service.

Western Electric People

As always when an emergency occurs, Western Electric's people had worked endless hours with Bell System people to get the phones back on line.

— By Friday, March 14, just two weeks after the fire, Western Electric (WE) installers alone had put in 123,000 man-hours of work in the restoration effort.
— WE's Northeastern Region engineers had logged 15,400 man-hours on the same date.
— More than 2,600 tons of equipment and material had been shipped from various WE locations, including some 525,000 linear feet of exchange cable and more than 380 million conductor feet of switchboard cable and wire. Involved in the shipment were 11 airlines and 30 trucking companies.

New York Telephone's February 27 fire was among the worst telephone catastrophes in Bell System history. Shortly after the fire was over, installer Fred Ferrara, who is a member of WE's permanent installation crew in the 13th Street building, said, "It looks like a bomb hit the place." Another installer, Jim Duff, said, "This is amazing. I never envisioned anything like this. I've been in many telephone buildings, but I've never seen any destruction like this."

That was how it looked shortly after the flames were under control. Just three weeks later, New York Telephone officials were calling the restoration effort their "miracle on Second Avenue." But the "miracle" happened, of course, because of the grinding, tireless efforts of everyone involved.

For Western Electric, the effects of the fire reached nationwide. WE's Northeastern Region Ser-vice Division and WE manufacturing locations at Hawthorne, Kearny, Columbus, Atlanta, Baltimore, Buffalo, Merrimack Valley, Kansas City, Omaha, Montgomery, San Ramon, Shreveport, and Phoenix were all involved. The equipment they shipped included cable, iron work, repeaters, coin boxes, connectors, terminal strips, wire, carrier equipment, and much more. WE's subsidiary, Nassau Recycle Corp., also became involved, making lead cable sleeves and receiving destroyed equipment that had been removed from the fire scene.

WE's shoulder-to-shoulder action, along with the other Bell System units, in the face of New York Telephone's fire, is part of a long tradition. A brochure published by the company in the 1950's, titled "Wind Water Fire and Ice" puts it this way: "Quick action in emergencies is a part of our business ... As the manufacturing and supply organization of the Bell System, Western Electric shares the telephone companies' tradition that all that is humanly possible must be done at all times to keep communications open. When disaster strikes, WE swings into action as necessary night or day, weekends or holidays, to bring our special experience and capabilities to aid the telephone companies."

That tradition goes all the way back to Chicago's horrible fire of 1871 when employees of Gray and Barton, which later became Western Electric, established a precedent by working with little food or sleep, supplying material and directing electricians in the restoration of telegraph service. A later disaster — a hurricane in New England in 1938 — took 700 lives and silenced half a million telephones. During that catastrophe, WE shipped nearly 23,000 tons of material, demand which, in the case of many items, exceeded the average monthly requirements for the entire Bell System. There are legions of other, similar examples, all exemplifying the dedication of the Bell System's people to the service they provide.

Installers

Before the smoke had even cleared from the fire-devastated New York Telephone facility on Second Avenue, a team of six Western Electric installers entered the building to assess the size of the restoration job ahead of them.

COMPUTERS and PEOPLE for May, 1975

The task was formidable. On the first floor, they found the main distributing frame, the heart of the central office, as well as three panel switching offices completely destroyed. The power equipment in the basement was rendered useless by water damage; cable shafts and ducts linking the equipment floors had been demolished; carrier equipment on the second floor had been destroyed; and relays and switches on the fourth, fifth, and ninth floors were in some cases operative but would require extensive, delicate cleaning.

"Based on the orders we anticipated from New York Tel. that first all-night tour of the building determined much of our plan for the next two weeks," reports Jim McGarry, WE's manager, N.Y. installation, with over thirty years of experience in installation. "As we determined a need for a piece of equipment or a tool, we would alert our field service people in an emergency van outside of the building. They put calls through to our service centers and field locations who were on 24-hour call. We saved a lot of time this way."

Normally, it takes 26 weeks to engineer, manufacture, and install a main distributing frame. New York Telephone wanted it in two weeks. "We knew there wouldn't be time for detailed engineering specifications on a job like this," said McGarry. "So we called in our best installation supervisors from all over the city. We had men who, based on their past experience could install a main frame, run cable, and restore power with just verbal assistance from engineers. It's a job like this when all those years of experience pay off."

The initial team of six grew to 600 by Saturday, and to 1100 working round-the-clock before the end of the week. Fathers and sons, teams of brothers, and even one husband-wife installer team joined the Western Electric effort to restore the damaged equipment.

Before the target date of two weeks after the fire, Western Electric had completely assembled a main distributing frame, had tripled the power capacity on the seventh floor to 15,000 amps, had made over 900 cable runs, had hand wiped 6.1 million switch contacts and 10 million relays, and had participated in almost 17 million tests on central office equipment.

Said installation supervisor Bobby Hull, "When the Tel. Co. said they wanted to triple the output of a power plant from 5,000 to 15,000 amps in two weeks, I thought 'no way'. But you never say that. You start the job, you improvise, you complain, guys come up with new and better ways to do things right on the job, and before you know it, you've got the job done. If you slow down, if you stop and think about the magnitude of what you're doing, you lose it. In an emergency you work by instinct. Hell, every WE installer knows his job inside and out. You just have to work your tail off every once in a while, that's all."

On ordinary jobs, Bobby might supervise as few as five people; for the next 15 days, he worked with 80 to 100. "It's really no big deal with installers," he said. "Normally they're like anybody else, a little cocky, maybe, but in times like these, I don't know how to explain it, it seems everyone works a little beyond his capabilities. It's like it's your own personal phone network. Maybe you didn't install it yourself, but some other WE people did, and you feel responsible."

Gene Doyle, another WE installation supervisor working on the construction of the main frame, had similar feelings. "When I came in the building the first time, it was a sad thing. Here was all this equipment that I had worked on all my career, lying about dead and useless. If you've ever put together something from nothing and then been there to see it work, well, it's a wonderful thing, but then to see all that go down the tubes in a fire or flood or whatever, it's really eerie. It gives you a gut feeling that makes you want to work twice as hard to get things back together again."

Regional Engineering

Bernie Blatt just smiles at the word "miracle". He'd use other words to describe the engineering efforts that made restoration of service possible after New York Telephone's Second Avenue fire. WE's Northeastern Region general manager Bob Cowley said, in a rare, restful moment at the scene of the fire, "After all, nothing else happens until Engineering d does their thing." That makes Blatt, the Region's assistant manager, Systems Equipment Engineering with responsibility for New York Telephone, smile, too.

Blatt, like Cowley and some other key Western Electric Service Division people, was in Columbus, Ohio, when word of the fire arrived. He was having breakfast with the other members of the group around 7 that February 28 morning when a call from Bill Pharo, director of Regional Engineering and Services, alerted then to what was going on. "We didn't realize the enormity of it then," says Blatt, "but I called Hank Wheat, one of the department chiefs in my group, to see what I could find out." Wheat and others were already busy setting up a "war room" to control whatever engineering efforts would be required at the NE Region's Headquarters, Newark, N.J. Special phones to keep in contact with people at the scene of the fire were being installed, and every engineering drawing associated with telephone equipment in the Second Avenue building was being pulled from storage. "At that point," adds Blatt, "reports on the fire were so 'iffy' we didn't know what would be needed. But we wanted to be ready."

To the NE Region's Reproduction Service personnel, "being ready" meant starting to copy about 65,000 drawings — some 41 miles of them if laid end-to-end.

Meanwhile, engineers Carl DeNisco and Peter Szymialowicz headed for the fire site. They were to stay there throughout the restoration to advise their colleagues back at Newark on cable and power engineering needs and to help the installers where an engineering assist was required.

By the time Blatt and the others had returned from Columbus, the status of service out of the Second Avenue building was pretty clear. "From the third floor down, it was a total loss," says Blatt. "So, the cable vault, the whole main frame, the power plant, the carrier center, and lots of other vital equipment was gone. Also, one vertical shaft carrying cable all the way up to the 11th floor was destroyed. For cable engineering purposes, that meant regarding the job as a whole new building — from scratch."

For Blatt, and about 130 engineers, the news signaled the beginning of endless hours of work around the clock for two days, with occasional brief naps on the floor. And, 24-hour activity would continue

until service was restored. Two weeks later, NE
Region's engineers had received 65 orders. They had
accomplished work that would normally take them two
or three months.

Blatt said, "These people were under unbelievable
pressure, trying to meet promised hours, not even
promised dates. Engineering, of course, is used to
operating within pretty rigid guidelines. We do
things certain ways because we know they're usually
the best ways. But we had people who normally ex-
pect formal orders accepting scribbled scraps of pa-
per to work from. They had continuous changes thrown
at them, and through it all, they just kept working.
Through 20 gallons of coffee and 14 dozen doughnuts
in about the first two days, they just kept work-
ing. I'm filled with admiration for what they ac-
complished." As of early Thursday morning, March
13, Blatt's outfit had contributed 15,400 man-hours
of engineering work.

Transportation

"Yes, we were able to come up with what you asked
for, and we've just put it on a truck ..."

It was a typical answer to a hurried request and
part of Western Electric's immediate response to
the emergency. But for WE's Transportation organi-
zation, this typical answer was not part of a solu-
tion but the start of a challenge. There's a big
difference — a difference of about 2,500 miles —
between having reels of vitally needed cable on the
loading platform of the Phoenix Works and having
them on site, on Second Avenue, New York City, to
be wheeled in as soon as firemen permit.

Before the fire had even been pronounced under
control, the lines of supply from Western Electric
locations all over the country had focused on New-
ark, New Jersey. There, at the Northeastern Re-
gional Center, the resident transportation super-
visor Lionel Harris and his crew kept track of
equipment coming in by air charter (example — a
load of 7,500-pound reels of cable that landed at
4:30 am.) and truck (at one time, 46 trailerloads
of equipment, some of them coming from Phoenix and
Hawthorne and running smack into a midwest snow-
storm). They either spurred the equipment on to
the stricken building or arranged for brief storage.

It was a hectic weekend, but on Monday, Harris,
a large, unflappable man, did not look as if he had
been propelled into the vortex of a crisis. "That's
because this has not been a one-man operation," he
said. "My department is a group of capable and
dedicated people and they've carried the burden of
the work. We've worked 'round the clock and Satur-
day and Sunday, mostly from the office but some-
times from our homes. A lot of our work is done by
phone — calls to the sender, calls to the carrier —
and if a man is handling a hot item, he might have
to stay with it no matter where he is." Harris was
overlooking his own efforts. On Monday, when he
decided to go home for dinner, he'd been in the of-
fice since Sunday morning.

The work paid off: four days after its first
call on the emergency, Harris' crew had closed out
61 of its 93 requests for expedited service. The
other 32 were "under control". "Our biggest single
problem was probably that snowstorm," Harris said.
"Storms not only slow things up but, in addition,
make it difficult to give an estimated time of ar-
rival."

The fire job began for Harris on Thursday night
when his manager, Dick Russell, called him at home
and told him that some vertical pieces of distribu-
ting frame from Hawthorne were urgently needed on
the job site. A few minutes later, Harris was in
touch with Hawthorne, the airlines and trucking
companies. "Larry Johnson of Hawthorne's Trans-
portation group got an air charter, and in Chicago
they started preparing the material." Harris said.
"Those verticals, you know, are pretty big pieces
of ironwork and the ends had to be specially wrapped
so they wouldn't puncture the skin of the plane. A
few hours later they were here."

Harris credits WE's carriers, both surface and
air, with a great deal of cooperation. "The truck-
ers got the terminals opened on Saturday and Sunday.
Crews left on short notice. One airline even put a
larger plane on a regular flight from Omaha to carry
WE emergency material."

Expediting smaller shipments is frequently more
complex than sending the big ones. "You don't go
out and hire a whole truck to move a 500-pound pack-
age." Harris said. "Even in the face of this emer-
gency, we had to do things efficiently and economi-
cally, and that means a lot of coordinating to get
the most out of each carrier." Also complicating
Transportation's job was the need to coordinate
shipping not only from WE's many locations, but
from outside suppliers as well.

At 12:25 am. on Thursday, Feb. 27, an employ-
ee of the New York Telephone Company at 2nd Ave.
and 13th St. reported by telephone that he
smelled smoke. Shortly before, telephone opera-
tors who were monitoring calls began to notice
trouble on the lines. Apparently, in the pre-
ceding hour or so, a short circuit developed in
the cable vault room. The New York City Fire
Department responded to the alarm within 2 or 3
minutes. The fire raged until late in the
afternoon of Feb. 27 before being declared under
control. As many as 400 firemen fought the
blaze.

By 3 am. Thursday, the Bell System had begun
marshalling a huge task-force to restore service.
Across the country, key managers and technicians
from AT&T, Western Electric, Bell Laboratories,
and various operating telephone companies were
awakened in the pre-dawn hours, to set to work
to provide New York Telephone with the experts
and equipment to get service back for 170,000
telephones — the equivalent of an Albany, N.Y.
or a Jersey City, N.J.

As the fire raged, mobile telephone service
units came in from New Jersey, Pennsylvania, New
England and West Virginia. They supplemented
local mobile units in providing telephone service
for hospitals, police stations, and other critic-
al locations.

To aid customers without service a number of
steps were taken, including: / Local chapters of
the Telephone Pioneers of America, the organiza-
tion of veteran and retired telephone company em-
ployees, arranged for volunteers to visit aged or
handicapped residents of the affected area. The
volunteers placed phone calls, ran errands,
picked up dry cleaning and did grocery shopping.
/ More than 400 coin telephones were put into
service in store fronts and on portable vans,
connected to outlying central offices by trunk
cable. / A message center manned by 100 operators
was put into service so that the 8,500 business
and professional people without phone service
could receive messages.

It took 17 hours to bring the fire in New York Telephone's Second Avenue and 13th Street building under control. While it raged, thick smoke made the fight difficult for the firemen.

One of the earliest arrivals of emergency, re-routed equipment was these 270 pieces of main distributing frame, originally destined for California. The boxed pieces arrived from WE's Hawthorne Works at Newark Airport in the early morning hours of February 28.
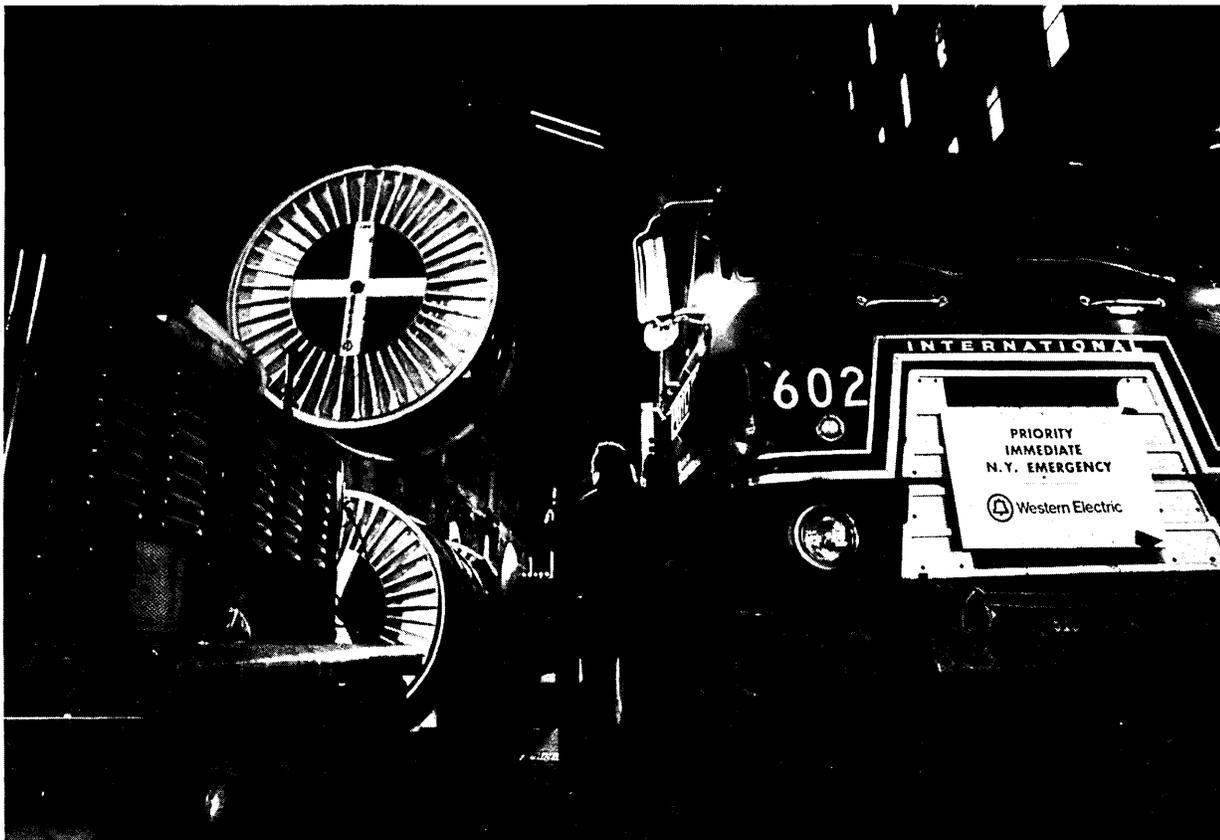
All through the night, equipment needed to get the phones back in service arrived at Second Avenue. This truck brought cable from WE's Kearny Works.
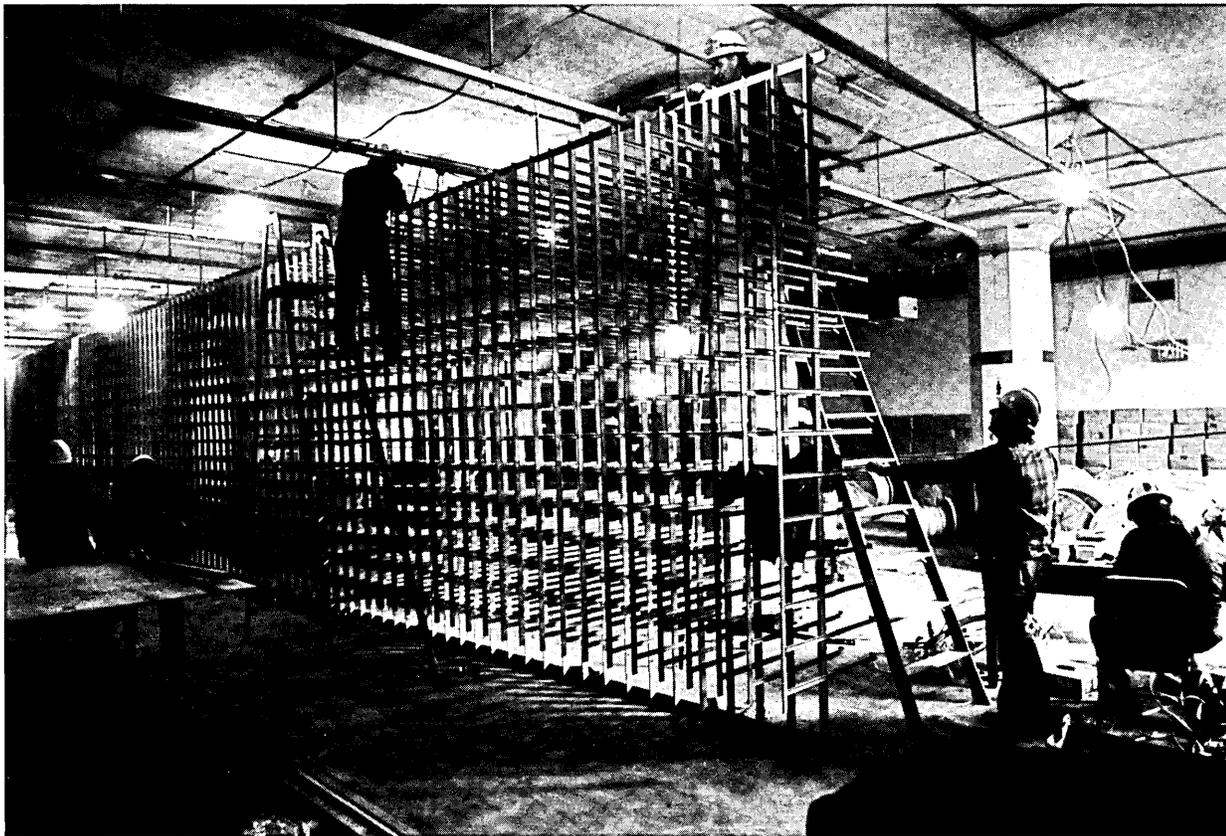
Installers began assembling a new main distributing frame in the Second Avenue building just two days after the fire was quelled. Two days later, it was completely in place.
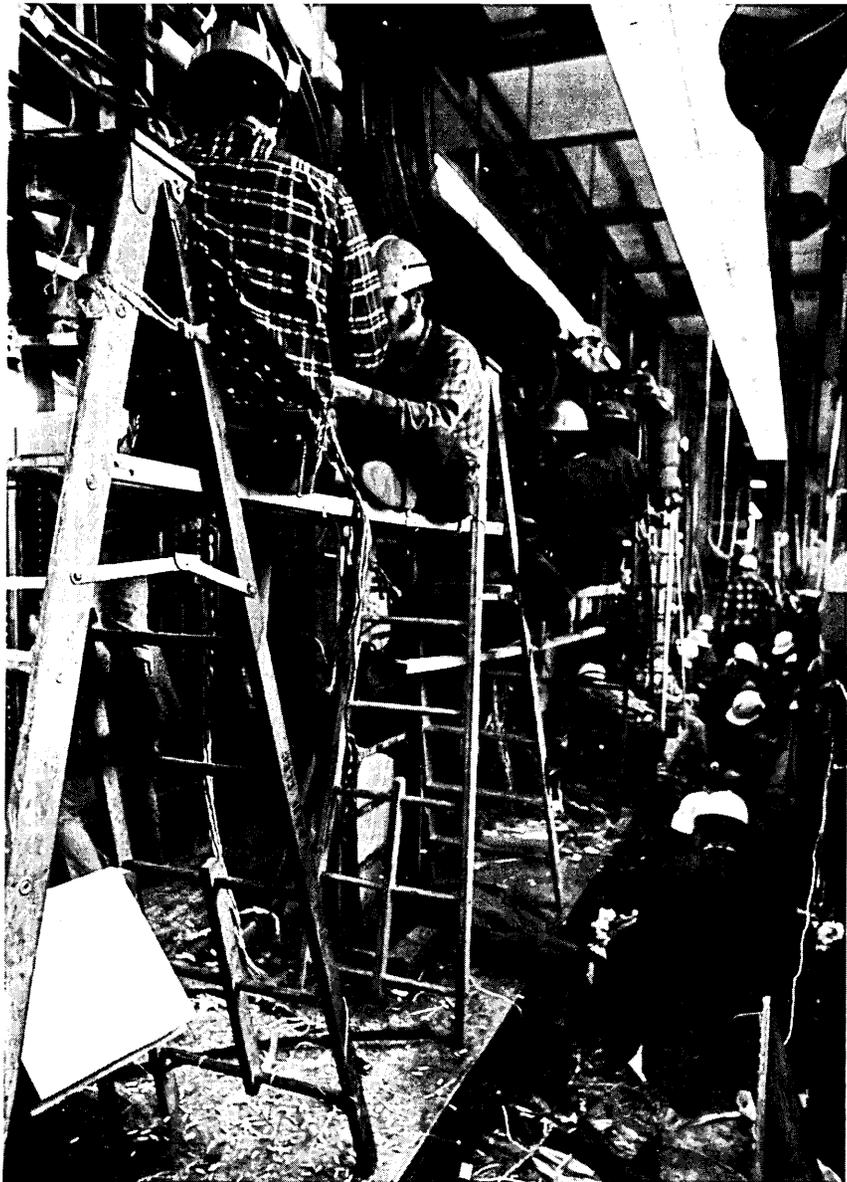
In the trenches and on the scaffolds, Bell System people do their restoration job in the wake of New York Telephone's disastrous Manhattan fire.

New wires dropped from overhead cable and ready to be connected have the attention of this WE installer. He's one of the approximately 1,200 WE installers who were on round-the-clock duty in the aftermath of New York Telephone's terrible fire.

The intricate job of wiring proceeded day and night on the new main distributing frame in New York Telephone's burned switching center. Shown are two Western Electric installers.
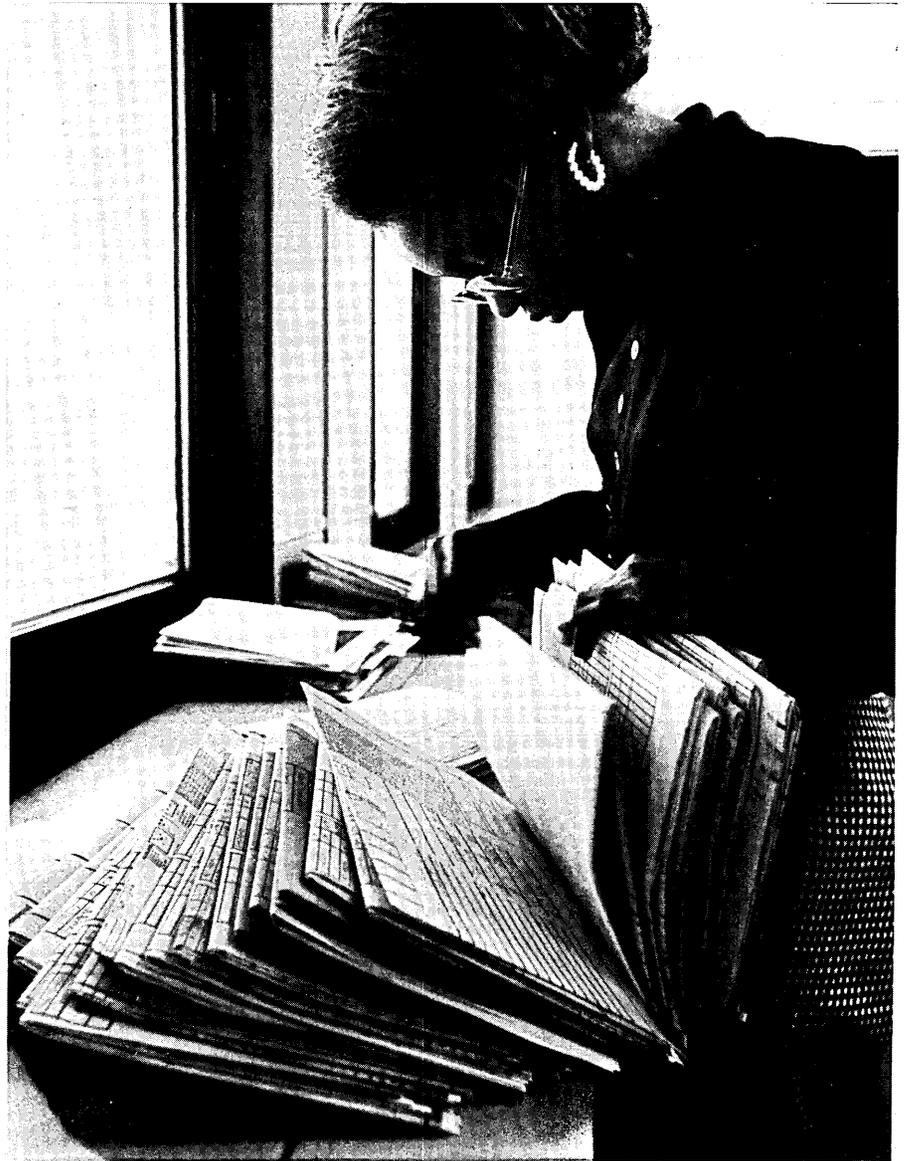
All the drawings needed to be instantly available to the engineers working to restore service in New York Telephone's Second Avenue building. The job of finding a particular drawing among the 65,000 pertaining to the switching center often fell to Mary Ann Davis, Regional Engineering clerk.

Operational Systems for Informing Management

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"Such a system will come incrementally: it will come as a new generation of management — a generation which has grown up with the computer — attains command responsibilities and top management responsibilities."

Management Information System

The way to reach a management information system that works and works well lies through the implementation of operational systems (systems that report and control operations), and integrating them with accounting and control systems through common data bases.

Ten years ago the term "management information system" was conveniently used to promise instant management information for decision-making by top management. This term had a favorable if mildly euphoric connotation of applying the computer to achieve a final solution to all management problems.

In the early 1970's, it became a term to be avoided — because it came to symbolize the failure of the application of data processing systems, not just the development of ill-conceived management information systems, but to applications in general.

Now, generations of equipment later, and generations of user experience later, there are indications that some form of what were once called management information systems are practical and are being well implemented.

Operational System

Much industry progress has occurred to facilitate the development of operational systems and their integration with accounting and control systems through common data bases. Users also have taken on the responsibility for learning to apply such systems to their work and have gained sophistication and experience.

Some History of Problems to Which Computers Were Applied

The first computers in the 1940's were designed to solve complex mathematical problems. The 1950's saw the extension of this and the broadening of applications of a mathematical nature. The benefit was the solution of problems up to then not soluble or a large reduction of the work to solve complex problems.

The 1960's were the years of clerical applications. During this period, computers were mainly employed to handle routine clerical tasks, to do record keeping, file maintenance, payroll accounting and to generate statistics and control assets.

These applications resulted in significant reduction of the clerical workload and produced some savings. Also, there were reductions in assets committed to various phases of business, particularly accounts receivable and inventory. In addition to the savings, however, computerization supplied the means to handle increasing workloads in a period of high turnover and personnel shortages.

Accounting and Control of Receivables and Inventory

We have largely accomplished the job of computerizing the accounting and control functions. To be sure, we need to improve these systems to make them more reliable and more secure. We need to develop systems that are tamper-proof and more auditable. I think a computer system could even be developed to prevent the management abuses displayed in the Equity Funding case.

At the time that users were buying machines for these applications, most users intended that this would be only a first step in the development of a management information system. But the concept of the management information system was not realizable at that time, starting from the installation base of most users during this period. Many users spent a good deal of their available resources in the 1960's converting routine applications they had already implemented from one type of machine to another, because they believed the new machines to be faster and better, which they were. Once the conversion was done, the machine would have surplus capacity available and so this would be used to tackle the problems of a management information system.

The Aim of "On-Line Decision-Making"

Management information systems in this context refer to the "on-line decision-making world" of the mid-1960's. The idea was that any information needed to operate the business could be available instantaneously to anyone who needed to know it. In fact, some writers and salesmen went so far as to offer the idea that a manager could be supplied the necessary information whether he realized he needed it or not. The information system would supply all levels of management with any package of data they needed, anytime, instantaneously, in any form desired.

But the fact is that most top level managers can't define their information requirements exactly and their requirements change continually. Decisions are often slow, not fast, and don't depend upon "on-line" data. And the higher one goes in the management hierarchy, the more likely the information to be required will be unanticipated.

The time needed to define and develop such systems was not considered. The cost was ignored or grossly underestimated. Defined in these terms, a management information system is an illusion. It, and the concept of the computer utility, were the computer myths of the 1960's.

The concept of the management information system (MIS) had its initial implementation step in what I will call the operational system. The implementation of these systems, however, turned out to be difficult and costly, but some progress was made. Even if MIS was a long way off or abandoned, the benefits of improved productivity and better middle management effectiveness were shown to be worth the efforts.

Management Control "While It Is Happening"

What are operational systems?

We know that any information that helps a manager to manage an operation is part of a management information system. But in order to have a management information system that will allow true control, we have to move from systems that report what has happened to those which enable management to control while it is happening. These are operational systems. This kind of input measurement and feedback requires that the operation be under direct control of the manager or other employee empowered to decide the changes needed to effect the result and the time to effect it. In some cases, this means real time, but in all cases it means the defined response time. These same requirements for input measurement and feedback are necessary for operational systems.

Whereas the management information system might be categorized as a system for top management control, systems for operational areas are the automation of information systems which permit a new way of doing a function and permit a much larger degree of middle management control.

Tying Together

I believe operational systems to be the next big step in the application of computers. This is the application area for the 1970's. The control of operations will be the next step along the way to the creation of total management information systems.

However, this step will take years to accomplish and it will have to be tied together with the already effective accounting and control systems before the hierarchy of management information systems can be established and effectively used.

In reality, operational systems are not new, but so far their application has been relatively limited compared to accounting and control applications.

Some True Successes

But much work has already been done. In airline reservation systems, air traffic control, telephone toll rating systems and wet process control systems, operational systems exist. Ford Motor Co., for

example, has employed operational systems to allow automobile model production change-overs, without requiring a shut-down of the assembly lines.

While American Airlines' air reservation system was at first a disappointment, it was also one of the real success stories in this field. It and its sister systems are now the nerve systems of our modern air transportation system. Removal of these automatic airline reservations systems would be as impossible as the removal of our automatic telephone dialing systems. The current traffic in both cases is so great that there is no other way to accomplish the task.

The Weyerhaeuser Company was another case of a very early success in on-line integrated systems. This system was installed to accept and process sales orders from all over the United States. It did this job quite satisfactorily. However, one real accomplishment came out of their experience related to their being able to optimize the timing of price changes on lumber products. The critical requirement is to perceive the change in rate of arrival of orders early enough to be able to exercise some pricing options. Up or down in line with demand, the Weyerhaeuser operational system performs this task.

The Pillsbury Co. over the years has also developed a powerful and effective MIS at a high management level on a real-time basis. Basic sales and production data are fed into a central data base at the close of business daily. Information is presented for management review by division and product the next morning. Decisions are made daily based upon this review.

These are some early examples of operational systems. If the computer industry is to grow and we are to realize the promise of the application of computers for man's benefit, we need to expand the development of these kinds of systems.

Expenses and Difficulties

Operational systems have been expensive and difficult to implement. This was because industry technology and economics were not available to provide the tools, and the users in many cases did not dedicate sufficient resources and talents to implement them. Both constraints are in process of removal.

Let's consider the progress being made. The specifications for such systems read like a catalog of recent developments:

1. There is a need for common data bases and this implies data base management oriented systems.
2. There is a need for low cost communications and communication systems.
3. There is a need for low cost data storage, available with varying access times.
4. There is a need for improved computer reliability and system availability.

Data Base Management

Most operational applications require data base management techniques. Data developed in different parts of the operation must be maintained in a systematic way so that all relevant inputs are selected. Thus the data will be constantly updated from a variety of sources. When an output is required, the user must know that he has current total infor-

mation and not data that is old or incomplete. How
many times has one protested being dunned for a bill
which has already been paid only to be told that the
computer system is two weeks behind in posting cash
receipts? How many times has an order been placed,
when the shipment has already been executed? How
many times have job opportunities been lost because
job openings were late in being entered into the
system? These are the issues that cause dissatisfac-
tions, lost customers, and lawsuits.

What progress has been made in the data base
creation and management? We now know how to build a
data base using chains and referencing systems. Ten
years ago we did not. We have significant device
capability not available then. We have improved
mass storage speeds, sizes, and economics as well as
data communications performance and economics.

The work of Data Base Task Group on Standards has
been valuable in bringing this progress to pay off
at the user's installation. With Data Base Task
Group standards, software becomes transferable among
systems. It presents users with a single language
to learn — COBOL Extensions, and offers real oppor-
tunities to reduce programming costs.

Distributed Bases and Communications

Most large enterprises or government services
have a very distributed user base. Such bases are
distributed from a functional as well as a geographic
aspect.

A true operational system is not conceivable with-
out a communication network to gain input from the
proper sources — Those sources will first have the
relevant information — and to give output in what-
ever time frame is justifiable from the cost point of
view to the person who needs to act on the informa-
tion.

High communication costs held back computer appli-
cations in operational areas. Here industry trends
in both communications and computers are helping to
make these kinds of applications more feasible. In
the communication area, we have had improvement in
line integrity. User cost to send a unit of data
over a telephone line decreased by a factor of 2
between 1958 and 1966 due primarily to improved data
set technology and bit rate capability. Between 1966
and today, further improvements in data set technol-
ogy have yielded still higher transmission speeds
and further reductions in unit transmission costs,
in some cases to less than one-quarter the 1958 costs.

New Communication Technologies

Data transmission by satellite has become feasible
and the connection of terminals has been broadened
well beyond those which could be supplied only by
telephone companies. From the computer side, a whole
industry has grown up — terminals, modems, multi-
plexers, concentrating computers, front-end proces-
sors, network processors. All of these are some of
the contributions which the computer industry has
made to reducing the cost and increasing the relia-
bility of data communications.

A much discussed concept in the sixties was the
computer utility. Someone discovered that the cost
per bit processed decreased as the size of the com-
puter increased. This phenomenon was translated in-
to the idea that ultimately one or two large compu-
ter centers in each city could serve the needs of
all users in the area. A parallel was drawn to an
electric generating station serving the electrical

requirements of the residents in a modern city. For
many reasons, the concept was impractical and the
parallel false — but a vestige of the idea has been
reduced to successful practice. Large timesharing
networks now in operation testify to this practical-
ity. In fact, in many ways, the General Electric
timesharing network system combines many of the at-
tributes originally portrayed for the information
utility. The GE Mark III Service drives thousands
of terminals from more than 100 communication and
information processing computers working as a single
unified system for over 400 cities in North America,
Europe, Australia, and Japan.

Even this system would not be conceivable without
great progress in communications and the application
of computers to the communication function.

Facilities for Access

Then too, operational systems require large amounts
of data easily accessible. Data must be generally
on-line or able to be brought on-line within the time
frame that is less than the time interval of the oper-
ational decision it is to affect. This implies large
amounts of mass storage at reduced access times. As
an industry, mass storage capacity grew from 35 mega-
bytes per spindle in 1964 to more than 200 megabytes
this year, and we will double that in the next two
to three years. Density likewise increased from
1000 bits per inch (BPI) 10 years ago to 5000 BPI
this year, and it will double again in two years.
Access time has speeded up from 100 milliseconds in
the mid-60's to below 30 milliseconds today. And
further improvements are expected. Much has been
done in queue management, such as seek-access tech-
niques to speed up the apparent access time for each
query. And finally, new technologies may provide
an intermediate storage level between main memories
and disks that still decrease access times even fur-
ther. And in the future, semiconductor techniques
will provide still lower mass storage costs.

Reliability

Finally, operational systems require a nearly
continuous availability of the computer system. In-
terruptions in service on an accounting application
is at worst, an inconvenience. Interruptions in
operational environment, however minor, can negate
the benefits of long periods of successful operation.
The loss of an assembly line for as little as 30
minutes can override the benefits of days of success-
ful optimization. This requirement implies high re-
liability of the main frame, of the operating sys-
tems, the software application systems, the peri-
pheral subsystems, of the network, the network sub-
systems and of the terminals. It implies redundan-
cy at key places in the system. It implies fail-soft
systems. It implies operational systems that sense
degradation and automatically decide what to do about
it. It implies the availability of files to more
than one computer system. Restart and recovery must
be able to be accomplished without loss of opera-
tional orders or data.

Progress is being made in all these areas but
good system design must take into account the state
of the art in reliability and not anticipate it.

Frankly, I am optimistic that the industry will
be able to answer these requirements in the decade
of the seventies and that operational systems can
be implemented with confidence.

Computers in Use: Analyzed by Standard Industrial Classification:

1974 Compared with 1968 — Part 1

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"The distribution of computers on a percentage basis has remained remarkably stable since 1968."

The original data (for 1968) was published in "Computers and Automation" for September, 1969. The 1968 data was derived from a mailing list owned by "Computers and Automation" of something over 20,000 records of computer installations. At that time SIC (Standard Industrial Classification) codes were determined and entered for something better than 95% of the records. In 1974 the current file of Companies and Institutions with Computers is some 39,000 for which SIC codes have been determined and entered for 94%. The 1974 file belongs to "Computers and People" and the list is maintained and updated by Ed Burnett, Consultant.

Computer installations located by the joint efforts of "Computers and People" (formerly "Computers and Automation") and the firm of Ed Burnett, Consultant, increased from 1968 to 1974 by some 40% -- from 17,500 to 24,500 which could be identified by SIC. (The actual file of computer locations to which SICs could be assigned increased from 19,300 to 36,800 -- but over 10,000 of these locations were in Computer Services and Service Bureaus which have been eliminated from tabulations derived both from 1974 and 1968 data.)

Stable Distribution

As Table I shows, the distribution of the computers on a percentage basis has remained remarkably stable since 1968. Manufacturing has gained 1%, Finance (probably because of the initial thrust in early years in banking) is now down a few percent; Wholesale, obviously a growing arena for penetration, is up a few percent -- and Service, Transportation, Communication, Utilities, Retail, plus "all others" show virtually the same proportion of computers in 1974 as in 1968.

Dr. Ruth M. Davis, (Director, Institute for Computer Sciences, National Bureau of Standards, Washington, D.C. 20760) writing in "Computers and People" for November, 1974 states the "principal applications of computers in the U.S. ... spread throughout all sectors of its economy."

Her rough figures indicate

Manufacturing (including Process Industries)	35%
Non Manufacturing	65%

The figures here show

Manufacturing (including Process Industries)	38%
Non Manufacturing	72%

... which is certainly good correlation.

Her rough estimates for Non Manufacturing indicate

Finance	15%
Service, Other than Government	15%
Government Service	15%
Other	20%

The actual distribution on this file is in reasonably close accord:

Finance	13%
Services (of which Gov't is 9%)	26%
Other	23%

The article published in 1969 emphasized that "the main thrust of computers (from a penetration point of view) has been into manufacturing, services and finance. Over 80% of all computers are found in these three classifications." Omitting Computer Services and Service Bureaus the two figures for 1968 and 1974 are 80% and 78% respectively.

Thus it is probably no longer noteworthy as it was in 1969 that "two out of every three computers are installed in some non-manufacturing entity ... a ratio possibly higher than might have first been imagined."

In 1969 about half the computers in use in manufacturing were in metalworking plants or companies. In 1974 metalworking installations accounted for slightly over 50% of installations in manufacturing. In both cases this is higher than the proportion (35%) that metalworking plants are to all manufacturing plants. In 1969 the data disclosed, "Of those SICs with penetration of one in ten or better, metalworking is again just about 50%." In 1974 the same holds true.

It should be noted that this is a study of installations -- and not of individual computers. Most federal government installations, as well as a high proportion of major business installations consist of multiple units at one address. It is

likely that the 39,000 odd installations involved
represent something like 60,000 of the nation's
120,000 or so full scale non-mini-computers. (No
attempt has been made by the magazine nor by this
writer to incorporate mini-computers into this file.)
Every reasonable effort has been made to locate in-
stallations, including compilation from virtually
every printed directory (state, classification, and
national) of computer installations published in
1973 and 1974.

The relatively modest increase (40% if just user-
oriented computer installations are considered) makes
one of the 1969 predictions rather suspect. This
read, "If computers are destined to double, as seems
rational, by 1972 and double again by 1980, it is
likely the penetration in manufacturing will move
from one in forty to one in twenty and then to one
in ten. By that time, every other firm in the higher
penetration quartile (about one in two plants in
manufacturing have ten or less employees) can be
expected to have its own computer in house."

From this data (Computers in Manufacturing now
are 1 in 25) it is likely that the prediction will
be amply true -- counting mini-computers, which are
likely in the next decade to double the number of
companies and institutions using in house computers.
But if we omit mini-computers from the picture, it
seems evident that while total installations are
growing, the much more dramatic growth is in compu-
ter power -- as users trade up -- for larger more
powerful and more sophisticated gear.

Since we are dealing with a 1974 file with 40%
more records, spread rather similarly to the 1968
file, it is not surprising to note that penetration
ratios have increased in virtually all business
classifications.

In manufacturing, computers have now penetrated
one of every twenty-five plants ... whereas in 1968
that penetration was one in forty. Modest penetra-
tion increases have been scored in Social Services,
and Mining. Wholesaling has doubled in this period
-- from one in two hundred to one in one hundred, as
have Business Services (still excluding Computer
Services and Service Bureaus). Even Retailing and
Contracting show similar doubling of penetration.
But as of this date only one Contractor in one thous-
and -- or roughly three hundred -- has a computer in
house. And the same ratio of one per one thousand
establishments holds for Retailing.

Penetration by
Standard Industrial Classification Code

In 1968 penetration by two digit SIC Code (See
Table II) ranged from 1 in 6 (for Ordnance) to 1 in
200 for Furniture and Lumber and Wood. By 1974 this
penetration range had been decisively narrowed to 1
in 4 (for Ordnance) to 1 in 80 for Furniture and
Lumber and Wood.

Again indicating that penetration is relatively
stable -- and pervasive over all manufacturing, there
is virtually no change in rank order between 1968
and 1974. (Petroleum Refining and Allied records
actually dropped slightly on the file between 1968
and 1974 which may indicate that this classification
is turning to larger and much more powerful instal-
lations rather than to more installations).

As in 1968 better than one in five computers in
use is now to be found in one of the social services
(8,000-9,400) -- which once again re-emphasizes the
tremendous impact of computers.

Again as in 1968 the total number of computers
in use in social services is greater than the total
number found in finance -- but in the six-year in-
terval the differential between these two classifi-
cations has increased.

COMPUTERS IN USE

	1974	1968
Finance	3,192	2,967
Social Services	5,324	4,206
Difference	2,132	1,239

Of the total for social services again as in 1968
almost half are found in governmental services (SIC
9100-9400) ... and the majority of these are loca-
tions in the federal government. (It should be noted
that this study deals with locations of computers,
and not numbers of computers per se. In the federal
government the proliferation of computers per loca-
tion -- about four to each location -- exceeds the
ratio to be found in the private sector).

The high figure for education is skewed somewhat
by the relatively thorough data available for College
and University computer operations. The number of
computers found in colleges and education in general
is nearly equal to all computers in all levels of
government, federal, state, and local combined. This
condition was also true in 1968.

In 1968 the only other significant penetration
within Social Services was in Hospitals and Associa-
tions, and to some extent Social Service organiza-
tions (primarily, it might be inferred, to control
recency, frequency, and dollars of donations). The
same is true in 1974. Church groups, labor, medi-
cal services other than hospitals still show little
penetration, so far. The vogue of the mini, however,
may and probably will alter this in the decade ahead.

I stated in 1969, "If some 300,000 trained minds
are now working on, with, and for computers, some
65,000 are now likely to be working in some form of
social service (non profit) applications. It is
possible, in fact even likely, that this important
minority will produce greater changes in the coming
years than all the 240,000 or so computer special-
ists working in the profit sector of our economy."
Not knowing just what the Armed Forces are doing
with 650 much more powerful installations today
than the 830 they had in use in 1968, one cannot be
certain if there is or is not validity in that pre-
diction of five years ago. Certainly outside the
Armed Forces there is little to indicate it is as
yet coming to pass.

Overall the penetration of computers for users has
increased from 1/200 in 1968 to 1/150 in 1974 --
which is considerably slower than the growth predicted
by most computer "experts" in 1969. It just may be
that a ratio of some 1 in 100 -- or 50% better than
present -- may be the leveling off point for main
frame computer installations for users in the U.S.
The slowing of the growth since 1969 plus large scale
developments at either end of the computer spectrum
-- time sharing on huge "computer utility" systems
at one end and proliferation of mini-computers at
the other, all seem to point in this direction.

Computer Services

A further factor which has obviously inhibited
the growth of systems by users is the remarkable
growth of Computer Services and Service Bureaus. In
1965 a compilation of all listings of such services

in every classified phone directory for every city of 10,000 population or above in the United States (sorted out by phone number to eliminate duplication) disclosed just over 1000 firms (offering computer based schooling, services, computer letters, tabulating, programming, analysis, systems, computer and peripheral equipment rental, sales and services). In 1968 firms in this cluster of classifications had risen to 7,000. Today it is over 12,000. And most have a computer "in house."

The Financial Field

Computer installations in Finance increased only slightly in the six years between the two studies -- so that the percentage of installations reduced from 17% in 1968 to 13% in 1974. Finance, in fact, is the one major SIC classification which shows virtually no difference in penetration of the market -- by number of installations -- from 1968 to date.

Penetration in finance in 1974, as in 1968, is somewhat deceptive. Insurance, overall, shows up in 1968 and in 1974 as 1/80. But Insurance Company Home Offices which do not total more than 1800 in the U.S. account for the lion's share of all computer installations in the insurance world which consists of 110,000 smaller fry including agencies, adjusters, branch offices, special agents, general agents, and brokers. Over half of all insurance companies are represented on this file giving a penetration ratio of one in two. This small group of home offices is the main reason Insurance accounts for 40% of all Computer Installations in the entire field of Finance.

The overall penetration of the offices of stock brokerage firms is somewhat less than for all banks.

The overall penetration of the offices of stockbrokers is about equal to that shown for all banks. It is probable, if the some 1,100 broker members of the New York and American Exchanges were segregated out, the penetration would, as in major banks, approach 1 in 4 or 5.

For loan and credit offices, where branch operations outweigh home offices by some 4 or 5 to 1, the penetration shown (1/100) is obviously nearer 1 in 25 when home offices only are checked. And if most, which is likely, are in the 500 or so firms in this field with some 15,000 branches, then the penetration ratio approaches 1 in 2 or 3.

The proliferation of small entities in real estate is emphasized by the extremely low penetration by computers in this field. Interestingly enough, insurance agencies, which are often equated with real estate so far as size and market for business services are concerned, show far greater penetration.

Retailing

In retailing (4.5% of computers) only department stores show greater penetration than business as a whole. There are more department stores with computers than are found in any complete two digit retail classification (Lumber and Building Materials, Food Stores, Automotive, Apparel, Home Furnishings, Eating and Drinking, All Other).

While department stores are roughly 1% of all rated and/or listed retail, they account for 30% of those computers found in retailing. This might be considered surprisingly high until it is recalled that all chain operators in the country with 3 or more outlets do not total over 10,000 -- and it is

likely a goodly proporation of that other 70% of computers in retailing will be found in chain operations.

Wholesale Trade

Computer Installations in wholesaling increased substantially in the period -- from 1232 to 2301 -- from 7% of installations to 9.37% of installations.

Wholesale Trade Shows a penetration ratio approximately ten times as great as retail, and now about one fourth as great as manufacturing (up from 1/5th in 1968). The range of penetration, which might have been anticipated, is much smaller for various classes of Wholesaling than for other business segments -- and this range has been decreased in the six years between the two studies. In 1968 this range was from 1/80 to 1/400 -- and averaged out at 1/200. In 1974 this range is from 1/59 to 1/200 -- and averages out at 1/100. Manufacturing using two digit SIC groupings (Table VII) shows in 1974 a range not of 4 or 5 to 1 but of 20 to 1 (1/4 to 1/80 in 1974; 1/6 to 200 in 1968). Higher ranges, of course, can be found in retail, finances, and services. It is instructive to note that the pressure of the workload, not the kind of wholesaler is the key to penetration. The following prediction made in 1968 seems to have held up rather well:

> As manufacturers and software producers bring to bear computerized thinking into the handling, picking, stocking, storing, shipping and recording of wholesale inventories, the infiltration of computers is likely to increase even more rapidly than in some of the other easier-to-penetrate business classifications.

PENETRATION BY WHOLESALE CLASS

3 Digit SIC	Universe	No. of Computer Installations	Penetration Ratio
501	28,000	154	1/200
502	8,000	170	1/50
503	7,000	81	1/100
504	43,000	400	1/100
505	7,000	53	1/150
506	18,000	177	1/100
507	12,000	115	1/100
508	36,000	324	1/100
509	94,000	824	1/100

The "Industrial Complex"

Some business analysts expand manufacturing into what they term an "industrial complex" ranging in SIC terms from Mining through Contracting, Manufacturing and Transportation, Communication and Utilities.

From the point of view of computer penetration, there is something to be said for this grouping.

Transportation, Communications, and Utilities (SIC 4000-4999) with 6% of computers, shows in 1968 a 1 in 80 penetration -- or about 1/2 of manufacturing. By 1974 the penetration has increased to 1/60.

Mining (1% of computers) is next in line with a ratio of 1 to 100 in 1968 and 1/80 in 1974.

The "Industrial Complex" theory breaks down, however, when one turns to Contracting (1/2 of 1% of Installations in 1968, 1% of Installations in 1974). Where the penetration ratio in 1974 is only 1 in 1000. There are virtually as many Research Labora-

POLITICAL ASSASSINATIONS IN THE UNITED STATES

— Inventory of Articles Published in *Computers and People* (formerly *Computers and Automation*)
1970 to 1975

– 1970 –

The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence / by Richard E. Sprague / May 1970
A reexamination of some of the evidence relating to the assassination of John F. Kennedy — with emphasis on the possibilities and problems of computerized analysis of the photographic evidence. A 32 page article demonstrating that the "lone assassin" story cannot be considered true.

The May article "The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence" — Report No. 2: / July 1970
More about Jim Hicks / Confirmation of FBI Knowledge 12 Days Before of a Plot to Kill President Kennedy / The Second Conspiracy about the Assassination of President Kennedy

The Assassination of Senator Robert F. Kennedy / August 1970
Preface, by Edmund C. Berkeley / Two Men With Guns Drawn at Senator Kennedy's Assassination: Statement to the Press, by Theodore Charach / Map of the Scene of the Assassination of Senator Robert Kennedy / The Pantry Where Senator Robert Kennedy was Assassinated / Bullet Hole in the Frame of a Door / Two Bullet Holes in the Center Divider of the Pantry Door

Patterns of Political Assassination: How Many Coincidences Make a Plot? / by Edmund C. Berkeley, Editor / September 1970
How the science of probability and statistics can be used as an instrument of decision to determine if a rare event is: (1) within a reasonable range; (2) unusual or strange or suspicious; or (3) the result of correlation or cause or conspiracy.

Computer-Assisted Analysis of Evidence Regarding the Assassination of President John F. Kennedy — Progress Report / by Richard E. Sprague / September 1970

The Conspiracy to Assassinate Senator Robert F. Kennedy and the Second Conspiracy to Cover It Up / by Richard E. Sprague / October 1970
A summary of what researchers are uncovering in their investigation of what appears to be not one but two conspiracies relating to the assassination of Senator Robert F. Kennedy.

Index to "Special Unit Senator: The Investigation of the Assassination of Senator Robert F. Kennedy" / October 1970
An index is supplied for the Random House book written by Robert A. Houghton, of the Los Angeles Police Department, about the investigation of the assassination of Senator Robert F. Kennedy.

Confidential and Secret Documents of the Warren Commission Deposited in the U.S. Archives / by Neil Macdonald, Assistant Editor / November 1970
A list of the subjects of over 200 documents of the Warren Commission which were classified confidential, secret, and top secret.

The Assassination of Reverend Martin Luther King, Jr., The Role of James Earl Ray, and the Question of Conspiracy / by Richard E. Sprague / December 1970
James Earl Ray says he was coerced into entering a plea of guilty to killing Martin Luther King . . . and contrary evidence (plus other evidence) have led to filing of legal petitions for relief.

– 1971 –

The Death of Walter Reuther: Accidental or Planned? / by Edmund C. Berkeley and Leonard Walden / January 1971
Some significant questions about the plane crash in May 1970 in which Walter Reuther was killed.

The Report of the National Committee to Investigate Assassinations / by Bernard Fensterwald, James Lesar, and Robert Smith / February 1971
What the National Committee in Washington, D.C. is doing about computerizing files of evidence, initiating lawsuits to obtain information, etc.; and comments on two new books by District Attorney Jim Garrison and Robert Blair Kaiser.

"The Assassination of President Kennedy: The Application of Computers to the Photographic Evidence" — Comment / by Benjamin L. Schwartz, Ph.D. and Edmund C. Berkeley, Editor / March 1971
I. Another View, by Benjamin L. Schwartz: A polemical attack on "The Assassination of President Kennedy: The Application of Computers to the Photographic Evidence" by Richard E. Sprague published May 1970. / II. Response, by Edmund C. Berkeley, Editor

District Attorney Jim Garrison on the Assassination of President Kennedy: A Review of *Heritage of Stone* / by Neil Macdonald, Assistant Editor / March 1971

The Right of Equal Access to Government Information / by the National Committee to Investigate Assassinations, Washington, D.C. / April 1971

The Assassination of President Kennedy: The Spatial Chart of Events in Dealey Plaza / by Robert B. Cutler, Architect / May 1971
The chart, first published in May 1970, is revised and brought up to date.

The Case of Secret Service Agent Abraham W. Bolden / by Bernard Fensterwald, Attorney, Executive Director, National Committee to Investigate Assassinations / June 1971
Bolden wanted to tell the Warren Commission about a Chicago plot to kill President Kennedy, and was jailed six years on a framed-up charge for trying to do so.

The Central Intelligence Agency and *The New York Times* / by Samuel F. Thurston, Newton, Mass. / July 1971
The issue of systematic suppression of questions about the assassination of President John F. Kennedy, and a hypothesis.

Jim Garrison, District Attorney, Orleans Parish, vs. the Federal Government / by Bernard Fensterwald, Attorney, Executive Director, National Committee to Investigate Assassinations / August 1971
How District Attorney Jim Garrison of New Orleans became interested in the New Orleans phase of the assassination of President Kennedy; and how the Federal government frustrated and blocked his investigation in more than a dozen ways.

The Federal Bureau of Investigation and the Assassination of President Kennedy / by Bernard Fensterwald, Attorney / September 1971
How J. Edgar Hoover and the FBI withheld much pertinent information from the Warren Commission, flooded them with irrelevant information, and altered some important evidence, thus concealing Oswald's connections with the FBI.

The Assassination of President Kennedy — Declassification of Relevant Documents from the National Archives / by Richard E. Sprague / October 1971
The titles of the documents and other evidence indicate convincingly that Lee Harvey Oswald was trained in spy work by the CIA before his visit to Russia; etc. Like the Pentagon Papers, these documents should be declassified.

The Assassination of President Kennedy: The Pattern of Coup d'Etat and Public Deception / by Edmund C. Berkeley, Editor / November 1971
Five significant, eye-opening events from May 1970 to October 1971, showing patterns of coup d'etat, assassination, and concealment; and some predictions.

The Assassination of President John F. Kennedy: A Model for Explanation / by Vincent J. Salandria, Attorney, Philadelphia, Pa. / December 1971
A study of the reasons why a great deal of the Federal government's own evidence in the assassination of President John F. Kennedy declared "conspiracy" — and a hypothesis, supported by considerable evidence, about why the President was assassinated and how the implications of that action were to be signaled to those who could read the signals.

The Strategy of Truth-Telling / by Edmund C. Berkeley, Editor / December 1971

– 1972 –

Spotlight on McGeorge Bundy and the White House Situation Room / by Robert B. Cutler, Manchester, Mass. / January 1972
An argument that the "lone assassin — no conspiracy" announcement from the White House Situation Room could have resulted from information available in Dallas and Washington prior to the announcement — and thus does not actually demonstrate that someone there had a guilty foreknowledge of the shooting.

Who Shot President Kennedy? — Or Fact and Fable in History / by Gareth Jenkins, Weston, Mass. / February 1972
How the physical evidence actually published by the Warren Commission relating to the assassination of President John F. Kennedy shows conclusively that more than one man was responsible for the shooting — contrary to the Commission's own report.

Dallas: Who, How, Why? (in four parts) / by Mikhail Sagatelyan, Moscow, USSR / March, April, May, June 1972
A long report published in Leningrad, USSR, by an ace Soviet reporter about the circumstances of the assassination of President John F. Kennedy, and their significance from a Soviet point of view.

The Shooting of Presidential Candidate George C. Wallace: A Systems-Analysis Discussion / by Thomas Stamm, Bronx, N.Y., and Edmund C. Berkeley, Editor / July 1972
An analysis of the shooting of Governor Wallace of Alabama; and a discussion of systematic methods for protecting American leaders from violent attacks.

The Shooting of Governor George C. Wallace, Candidate for President / by Edmund C. Berkeley, Editor / July 1972

The Assassination of Senator Robert F. Kennedy: Proofs of Conspiracy and of Two Persons Firing / by Richard E. Sprague / September 1972
A review and summary of the evidence showing conclusively the fact of conspiracy and the presence of two guns firing, at the time of the assassination of Senator Robert F. Kennedy.

The Central Intelligence Agency: A Short History to Mid-1963 — Part 1 / by James Hepburn, author of *Farewell America* / November 1972
The unverified, but probably largely true, secret history of the Central Intelligence Agency of the U.S. — as a preliminary to its involvement in the assassination of President John F. Kennedy.

The Central Intelligence Agency: A Short History to Mid-1963 — Part 2 / by James Hepburn / December 1972

Le Francais Qui Devait Tuer Kennedy (The Frenchman Who Was to Kill Kennedy) / by Philippe Bernert and Camille Gilles, Paris, France / December 1972

— *1973* —

The Frenchman Who Was to Kill Kennedy / by Philippe Bernert and Camille Gilles, *L'Aurore,* Paris, France; translated by Ann K. Bradley / January 1973
English translation of the French newspaper report on José Luis Romero, which was reprinted in French in the December issue.

Why I Distrust the Romero Story / by Robert P. Smith, Director of Research, Committee to Investigate Assassinations, Washington, D. C. / January 1973
The Romero report reprinted from *L'Aurore* has many earmarks indicating that it is very difficult to believe.

Analysis of the Autopsy on President John F. Kennedy, and the Impossibility of the Warren Commission's "Lone Assassin" Conclusion / by Cyril H. Wecht, M.D., Institute of Forensic Sciences, Pittsburgh, Pa. / February 1973
The coroner of Allegheny County, Pa., reports on his examination of the evidence that still remains (some of it is missing) locked up in the National Archives of the United States, not accessible to ordinary investigators.

The New Orleans Portion of the Conspiracy to Assassinate President John F. Kennedy — Four Articles: (1) by Edmund C. Berkeley (April); (2) by Jim Garrison (April); (3) by F. Irving Dymond (May); (4) by Jim Garrison (May)
On November 20, 1972, the Supreme Court of the United States refused to permit Jim Garrison, District Attorney, New Orleans, to prosecute Clay Shaw for perjury. On November 21, Jim Garrison issued a statement commenting on this refusal, which is Article 4 of this set; Article 1 is an introduction; Articles 2 and 3 are opening statements to the trial jury, by Jim Garrison, Prosecutor, and F. Irving Dymond, attorney for the defendant, in the February 1969 trial of Clay Shaw in New Orleans; Clay Shaw was charged by the grand jury with "having conspired with David W. Ferrie and Lee Harvey Oswald to murder President John F. Kennedy" — in regard to which the trial jury found Clay Shaw "not guilty".

Burying Facts and Rewriting History / by Edmund C. Berkeley, Editor / May 1973
Taken together, the information published May 1970 to May 1973 in *Computers and Automation* effectively destroys a large segment of the beliefs, the rewritten history, that the establishment in the United States has arranged for the people in the United States to believe.

The American News Media and the Assassination of President John F. Kennedy: Accessories After the Fact (in two parts) / by Richard E. Sprague, Hartsdale, N.Y. / June, July 1973
An examination of what happened in many important American news organizations, to cover up and hide the facts about how President John F. Kennedy was actually assassinated in Dallas.

Establishments and Truth / by Edmund C. Berkeley, Editor / September 1973
The nature of an establishment as a system

A Parallel of 1963 / by Marguerite C. Oswald, Ft. Worth, Texas / September 1973
The ignoring of evidence of conspiracy regarding Lee Harvey Oswald — a parallel to the Watergate cover-up.

The Framing of Lee Harvey Oswald / by Richard E. Sprague, Hartsdale, N.Y. / October 1973
When Lee Harvey Oswald was arrested, Nov. 22, 1963, for the assassination of President John F. Kennedy, he said to his captors in the Dallas jail cell, "I'm a patsy". A review of the evidence (including 18 photographs) proves that Oswald was a patsy, and that he was "framed" for the murder

of President Kennedy — although "establishmentese" American history denies it.

Burying Facts and Rewriting History — II / by Edmund C. Berkeley, Editor, *Computers and Automation* / November 1973

The Attempted Framing of Jim Garrison / by Richard E. Sprague, Hartsdale, N.Y., and Edmund C. Berkeley, Editor / December, 1973
How Jim Garrison, District Attorney of New Orleans, was tried on false charges brought by the U.S. Department of Justice that he received bribes; how the trial proceeded — making use of a bought judge, fabricated evidence, and spliced tapes; how the jury found Garrison innocent on the first ballot, and how the United States press almost entirely suppressed the true story — constituting evidence of a continuing conspiracy by a portion of the establishment in the United States.

— *1974* —

The Attempted Framing of Jim Garrison — Part 3 / by Ivan Dryer, Los Angeles, Calif. / January 1974
How one of the investigators, Pershing Gervais, formerly hired by New Orleans District Attorney Jim Garrison, was forced and paid by the U.S. Department of Justice to establish a fake life in Canada, and how Gervais told the whole story on television in May, 1972.

The Assassination of the Reverend Martin Luther King, Jr., and Possible Links with the Kennedy Murders — Parts 1 to 11 / by Wayne Chastain, Jr., Reporter, Memphis, Tenn. / February to December 1974
The report of a diligent study into the details and circumstances of the assassination of the Reverend Martin Luther King, Jr., on April 4, 1968, and related events, and the considerable evidence of a conspiracy.

Conspiracy to Kill Leaders of Blacks, and FBI Involvement in It / by United Press International / May 1974

Governor George Wallace and Gunman Arthur Bremer: An Interim Report Report on Evidence of Conspiracy and Cover-up / by Richard E. Sprague, Hartsdale, N.Y. / June 1974
Governor George Wallace of Alabama, presidential candidate, was shot and nearly killed May 15, 1972, in Maryland; at least a dozen pieces of solid evidence demonstrate conspiracy and cover-up, and the trail connects with Watergate.

Conspiracy Claimed in the Killing of the Reverend Martin Luther King / by United Press International, as published in *The South Middlesex News,* Framingham, Mass. / July 1974

— *1975* —

Nixon, Ford, and the Political Assassinations in the United States / by Richard E. Sprague, Hartsdale, N.Y. / January 1975
Presenting "a reasonable hypothesis" for Gerald Ford's pardon of Richard Nixon, and other extraordinary events correlated with that.

Computer Professionals: What Their Social Concerns Need to Be / by Richard E. Sprague, Hartsdale, N.Y. / February 1975
People in the Watergate United States of 1972-75 have finally begun to realize where the important issues lie: The important issues related to computers are largely political, criminal, or moral. What therefore is implied by a true social concern?

Conference in Boston on U.S. Political Assassinations Attended by Over 1500 Persons / by Assassination Information Bureau, Cambridge, Mass. / March 1975
Highlights on the largest conference so far on this suqject, and some news of developments in Congress and elsewhere.

American Oil Interests, the Central Intelligence Agency, and the Reversal of President John F. Kennedy's Plans to Get Out of Viet Nam / by Grace P. Vale, St. Louis, Mo. / March 1975
Reporting on some careful tracking of people and events related to the assassination of President Kennedy in Dallas, Texas, Nov. 22, 1963.

Political Assassinations in the United States, and *Computers and People* by Edmund C. Berkeley, Editor / March 1975
The policy of this magazine is to publish both "safe" and "unsafe" articles, both "pro-establishment" and "anti-establishment" articles.

The Assassination of President Kennedy — Some Comments / by Jack White, James P. Murphy, and J. L. Maynard / March 1975

The Politics of Conspiracy, the Conspiracy of Politics / by Sid Blumenthal and R. D. Rosen, Boston, Mass. / April 1975
A careful and thoughtful report on the information brought out at the conference attended by over 1500 persons at Boston University, Boston, Mass., Jan. 31 - Feb. 2, organized by the Assassination Information Bureau.

House Resolution 204 — For a Congressional Committee to Investigate Political Assassinations in the United States / by Representative Henry B. Gonzales, Member of Congress, Washington, D.C. / April 1975

"People and the Pursuit of Truth" / April 1975
Announcement of a new, separate, monthly magazine starting May 1975, which will take over and expand the reporting (up to this time provided by "Computers and People") of the cover-ups of political assassinations in the United States and other important suppressed truth.

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COMPUTER PENETRATION OF THE "INDUSTRIAL COMPLEX"

SIC	Classification	Computer Rated 1974	Computer Rated 1968	Penetration Percentage Universe $20,000 & Over 1974	1968	1974	1968
10-14	Mining		170	1/80	1/100	1/40	1/50
15-17	Contracting		98	1/1000	1/2500	1/250	1/700
19-39	Manufacturing		6498	1/25	1/40	1/15	1/20
40-49	Transport, Comm.						
	Utilities	1538	1172	1/60	1/80	1/15	1/20
40-47	Transportation	827	583	1/90	1/25	1/25	1/35
48	Communication	325	294	1/30	1/30	1/10	1/10
49	Utilities	386	295	1/15	1/20	1/8	1/10

tories and Management Consultants and Engineering and Architectural Firms with computers as all Contracting Firms with Computers. On the other hand Utilities show greater penetration (1/15) than do 13 of the 21 two digit classifications of Manufacturing -- and this is no new phenomenon for computer, penetration of utilities outpaced 14 of the 21 two digit manufacturing classes in the 1968 study.

(To be continued in next issue)

Responsibilities of Computer Manufacturers vs. Responsibilities of Computer Users

What about the respective social responsibilities of the computer manufacturers and computer users? It is difficult in some areas to draw a line where vendors' responsibilities end and users' begin.

Nevertheless, the computer vendors should be concerned about the public image of computers as it relates to both the computer industry and the use of computers. The automotive companies are apparently increasingly concerned about certain social responsibilities (even if they cannot directly control them in all instances): fatalities from automobile accidents, accidents causing injuries, air pollution due to fumes from car exhausts, recall of vehicles due to faults in manufacturing or quality control, etc. Similarly, other business organizations — including the computer vendors — are likely to face a broad spectrum of social responsibility issues.

An increasing awareness about such social responsibility areas, as discussed in this article, would probably aid the computer profession in setting broad goals which would strengthen its service to society and its public image. It would appear that both computer vendors and computer users can substantially improve their awareness of and contribution towards their social responsibilities.

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Economic Pressures

The long term trends and inflation in wages and material will provide the economic impetus for users to implement these types of systems. Certainly the forces of inflation and economic shortages are giving users the economic incentive to apply computers to an ever broadening spectrum of activity.

Just as the manufacturing half of the industry has made progress, and will continue to make more, so will it be with the user side. Users have learned how to use the tools available. They have learned something about the costs in resources and time in implementing operational systems. They have learned to balance these costs with the benefits to be achieved.

All of us have a job to do in bringing this about in the next 10 years. Computer companies must support the growth of such systems and provide the techniques, but users must shoulder the responsibility for executing them, and participate in their failures and costs, as well as their successes and profits. Middle and top management must provide the environment and sense of managing change that will bring them about.

The Base for Management Information Systems That Work

Looking a step beyond, if these operational systems and accounting and control systems are implemented with common data bases, then we have established the base for a management information system. Such a system will come incrementally. It will come as a new generation of management — a generation which has grown up with the computer — comes to command responsibilities and top management responsibilities. They will have grown up through a middle management experience familiar with data processing techniques and in many ways unfamiliar with seat-of-the-pants management.

They will know what files exist. They will know what information is useful in real time and what is just as useful in a monthly report. They will know about simulation, modeling, and statistical techniques.

They will start to extend the use of the operational data banks to help top management decision-making. They will develop a true management information system because they will know what information is available and what information is needed to do a more effective job of management.   □

Computing and Data Processing Newsletter

COMPUTER "BREEDS" CATTLE HERDS ON CAMPUS

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College of Agricultural Sciences
Texas Tech University
P.O. Box 4249
Lubbock, Texas 79409

Thousands of the finest beef-producing cattle ever bred are "roaming the grounds" at Texas Tech University. The mammoth herd is "corralled" in a computer on campus.

At the start of each semester, students studying Animal Genetics are assigned "herds" of cattle in the form of computer selections listing different genetic characteristics for as many as 50 imaginary animals. Each student's objective is to make genetic improvements by interbreeding the animals. The computer compresses 15 years on a genetic time scale into 12 weeks. A computer program simulates the most important genetic characteristics of livestock. Each student's initial computer-generated "herd" contains a list of characteristics for each animal including weight, fat thickness, sex, etc. Their breeding choices are entered into the university's computer, which combines the characteristics of each animal with random environmental factors to produce a second generation of cattle. Based on the sires and dams selected, the computer program determines if the mating was fertile, if the calf died at birth, or if a healthy animal resulted.

The computer then produces a second generation "herd", again listing genetic characteristics students use to select their breeding animals. Mathematical models describe traits of cattle and the factors that influence these traits. Without the computer, the genetic computations would take months. As the students continue to simulate breeding of their animals, they learn the importance of an animal's rate of weight gain, the amount of feed it takes an animal to gain one pound, and other factors important in breeding.

At the end of the course, the computer produces an analysis of all the generations produced by each student. The final analysis enables students to see where they made mistakes. It shows them that selecting proper breeding animals is not a simple process. The fattest sire and fattest dam would be logical mates. However, the computer program shows that when progress is made in meatiness, reproductive performance declines.

The computer enables students to take classroom theory and test it, as if each student had an actual herd and a great number of years to experiment with it.

VIBRATION TESTS OF A LARGE SPACE TELESCOPE PROVE ITS FEASIBILITY AND CUT THE DEVELOPMENT RISKS

Newsbureau
Lockheed Missiles & Space Company, Inc.
(A Subsidiary of Lockheed Aircraft Corp.)
Synnyvale, Calif.

Experiments conducted in Sunnyvale, Calif., by Lockheed Missiles & Space Co. have identified and confirmed some of the complex engineering techniques needed to assure the extremely precise pointing accuracies that will be required for NASA's Large Space Telescope (LST).

The LST, one of the first payloads planned for the Space Shuttle in the early 1980's, will make astronomical observations from an orbit 300 miles above the Earth's surface. Lockheed presently is under contract to NASA's Marshall Space Flight Center for preliminary LST design and definition studies.

Free of the Earth's atmospheric interference, the LST will be able to observe objects 50 times fainter and 7 times farther away than is possible with the best ground-based telescopes. It will also offer a 10-fold improvement in resolution.

To do this, however, the LST must maintain pointing accuracy of .005 arc seconds while an object is under observation — sometimes for as long as 30 to 40 hours.

The Lockheed experiments centered on one potential source of image distortion: The possibility that extremely small microvibrations (50 micro-g's) from the high-speed rotation of LST control moment gyroscopes (CMG's) could be transmitted to the telescope's optical surfaces. The gyros are used for spacecraft attitude control.

A full-scale engineering model of the 2.4-meter-diameter telescope was used during the experiments. Standing approximately 9 meters tall, the test model contained representative LST structures, including primary and secondary optical surface simulators and operating CMG's.

A special support system used air suspension to isolate the model from building vibrations that could have produced erroneous response data.

To determine the effect of the gyros, the Lockheed experiments had five specific objectives:

— To develop and evaluate microvibration measurement techniques;
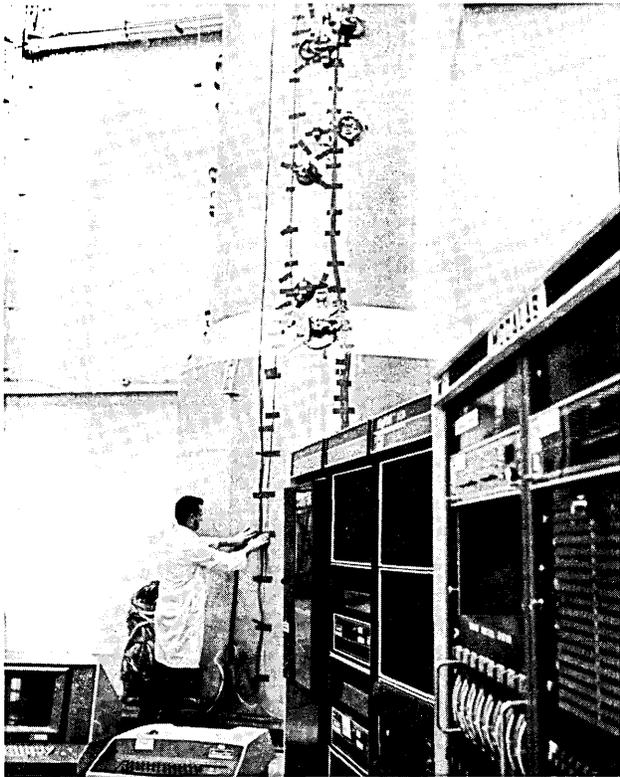
Large Space Telescope: Model Being Tested

— To verify the validity of analytical point-
ing accuracy prediction techniques by com-
paring theoretical and experimental struc-
tural response data;
— To evaluate the influence of CMG speed and
spin vector orientation on pointing accu-
racy;
— To evaluate the effectiveness of CMG vibra-
tion isolators in improving pointing accu-
racy;
— To examine the interaction effects between
adjacent CMG's.

The experiments were conducted using Lockheed's
MODALAB (Mobile Dynamic Analysis Laboratory) system.

This automated test system allows real-time re-
duction, display, and evaluation of test results,
highlighting those modes which are major contribu-
tors to total pointing accuracy distortions.

The portable MODALAB system includes an analog-
to-digital converter, a 256-channel multiplexer,
and a Digital Equipment Corp. PDP-11/45 processor
with dual removable discs, each having a capacity of
1.2-million 16-bit words.

The system also used 15 shakers and 240 accelero-
meters to generate and monitor microvibrations at
levels suited to the LST project.

According to Max W. Hunter II, Lockheed's LST
program manager, the project successfully met all
test objectives. It demonstrated the feasibility
of the microvibration measurement systems, verified
the validity of Lockheed analytical pointing accu-
racy prediction techniques, and provided substantial
insight into the principal factors contributing to
pointing accuracy control.

"As a result," Hunter said, "engineering develop-
ment risks — both cost and technical — have been
greatly reduced."

A NEW NETWORK TO SPEED PARTS CHANGES, INSTALLED FOR AMERICAN MOTORS CORPORATION

William F. Taylor
GTE Information Systems
Stamford, Conn. 06904

A new computerized Engineering Documentation Sys-
tem using video terminals is saving American Motors,
Detroit, Mich., about 90 percent of the time it usu-
ally takes to implement parts changes. A parts
change that used to take from six to nine weeks is
now completed in three days. The network, with a
total purchase value of over $300,000 is composed of
40 video terminals and other equipment at a dozen
locations. The system is fully operational and can
be expanded as requirements increase.

"A simple lug bolt that required as many as 300
to 400 separate entries can now be completed with a
single entry," according to John Sanders, Assistant
Manager of Engineering Documentation. He maintains
a data base of around millions of auto parts, their
relationships to one another, and where they are
used.

"When you consider that even a holdover Matador
model requires 20 percent parts changes, a new Pacer,
available in three models and 15 colors, has about
60 percent parts changes, and that the same part
may appear many times throughout the entire line,
the cost of parts changes in any model year commands
attention.

"It was impossible to do anything about it using
the old keypunch method; but, with terminals giving
AMC operators immediate, direct, and continuous ac-
cess to the data base, a change can be made, docu-
mented, and authorized in minutes.
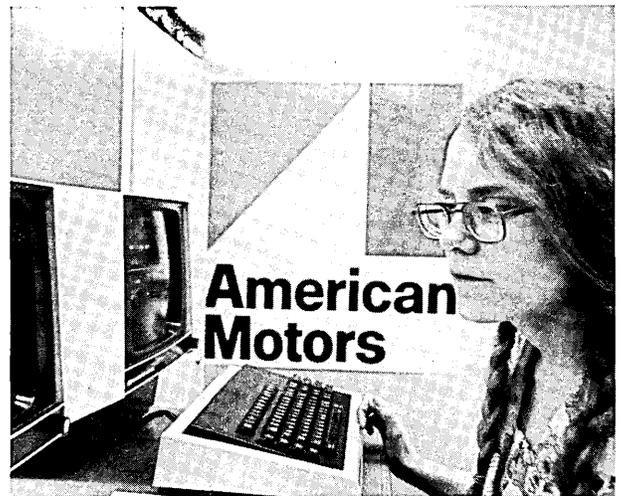
"As a result, redesign costs are lower and paper
floods in accounting, purchasing, production plan-
ning, and engineering are reduced. Last-minute
innovations that might improve the salability of AMC
cars can be encouraged." In calendar year 1974,
while industry sales declined almost 23 percent, AMC
held to within 15 percent of its 1973 volume.

So far, the payback on the system is substantially
ahead of schedule. The repeated purchase of keypunch
cards and use of operational printouts have been
eliminated for the most part, replaced by terminals
with alphanumeric keyboards. Instead of typing on
punch cards, the operator types his or her instruc-

tions in clear text on the screen. Data forms are lined on the screen so that parts changes become a process of "fill in the empty spaces".

"The use of one, clear, legible record on the screen takes the place of much paperwork. It has eliminated the mistakes that go with paper records."

"The integrity of our data base is improved with the elimination of the intermediate keypunch step, and so has our security."

The new Engineering Documentation System is segmented into 35 formats under seven classifications. Each format represents an area of responsibility, such as purchasing or engineering. Putting data into the data base is confined to a few skilled persons in each area who are given special numbers and passwords to which the computer will respond. An engineer's number will not access an accountant's format, and vice versa.

Because entries are limited to a few persons, the chances for pilferage and mischief are small. Because operators are chosen for their skill, mistakes are fewer and the quality of the inputs has become professional.

Each entry is recorded with the time, date, and who made it. The output is given to the department of origin every day so that misentries that do get through can be corrected.

The terminals are also used to monitor the basic methods and procedures Engineering Documentation has set up, in search for ways to improve them.

In this system, GTE/IS 7801 video terminals with alphanumeric keyboards (provided by GTE Information Systems, Stamford, Conn.) access an IBM 370/145 768K computer with tape drives and disc storage. Terminals are tied into a 1270 controller. Modulation and demodulation are accomplished with 24 baud modems through dedicated phone lines. The video terminals have 1920-character screens.

DIGITIZED SPEECH FOR IMPROVED TRANSMISSION

Diane Wilson
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Notre Dame, Ind. 46556

```
00011100011101100110011010100111110000011000000101000
11100011100001111001110011001100110010000000000001100
01111100100111100000011111111111000011111110010100100
00001111000010011110001010111100000111100101010100111
11000000011100010001111111001011001000001111110001010
00001111000001111110011010100110000011110001010001000
11110001101000011111000010100001111000010001010001111
00011111111100010000111100001000010000111110111100
```

That's not a test pattern, and no, the typesetter did not go berserk. Look again and you'll see a visual depiction of speech digitized for telephone transmission.

Each line of binary numbers represents a part of a telephone conversation. Using only slightly more complex equipment and without sacrificing quality, all eight conversations are taking place simultaneously on the same standard telephone line that now carries a single call.

The economic advantage of increasing capacity without a major investment in new equipment, plus the convenience and efficiency of digital trans-

mission, appeals to the phone company. The U.S. Defense Communications Agency, too, is interested in digital transmission, for building a worldwide strategic communications network with the capability to use existing telephone facilities.

The technology for reducing the bit rate, or digits per second, low enough to use a standard telephone circuit while keeping both cost and complexity of hardware low was developed at the University of Notre Dame's College of Engineering.

Dr. James L. Melsa, chairman of the Department of Electrical Engineering, and Dr. David L. Cohn, assistant professor of electrical engineering, used tape recorded speech and computer simulation to test sophisticated mathematical operations (algorithms) which could reduce the bit rate to 9,600 bits per second.

"There are other, more sophisticated speech processing techniques that will produce intelligible speech," Cohn said, "but it sounds like a machine buzzing at you, not like a person talking. We're interested in high-fidelity reproduction which allows you to identify the speaker's voice and emotional state."

In digital transmission, the voice signal is converted to binary numbers which represent exactly the voltage values of the wavelength at the points of measurement. The wave signal is reconstructed at the receiving end. According to Cohn, it's a simple operation and the phone company already uses some digital transmission — at 64,000 bits per second. Engineers have been able to halve the total number of bits needed simply by using the differences between consecutive absolute values.

What Melsa and Cohn have developed is a more sophisticated differencing operation to get the same quality voice representation in the range of 9,600 bits per second. Their system is designed to predict, based on the prior speech sample, what the next sample is going to be.

For any digital transmission system to be practical, it must be able to tolerate errors. When the system is based on simple differencing, one error will change the values down the line.

"If a single error makes the system blow up, then it's not useful, because errors are going to happen sometimes," Melsa said. "We made the algorithm more complicated, designing it to forget a single error. But while errors eventually disappear, there always is a little bit of information about the absolute value which accumulates."

It is very difficult to mathematically measure how well the processed speech compares in quality to the original. Using tape recorded sentences like "Cats and dogs each hate the other," the two engineers test their algorithms by simulating them on a computer. "If it sounds good, we know we've done a good job," Melsa said. "If it doesn't sound good, we know we've made mistakes. It's a very real cross check of theoretical problems."

Melsa and Cohn have developed a system which is more than a pretty concept. It is practical to build. The Defense Communications Agency has awarded a contract to an industrial group to design and build the small computer which will implement the system. □

GAMES AND PUZZLES for Nimble Minds – and Computers

Neil Macdonald
Assistant Editor

It is fun to use one's mind, and it is fun to use the artificial mind of a computer. We publish here a variety of puzzles and problems, related in one way or another to computer game playing and computer puzzle solving, or to the programming of a computer to understand and use free and unconstrained natural language.

We hope these puzzles will entertain and challenge the readers of *Computers and People*.

NAYMANDIJ

In this kind of puzzle an array of random or pseudorandom digits ("produced by Nature") has been subjected to a "definite systematic operation" ("chosen by Nature") and the problem ("which Man is faced with") is to figure out what was Nature's operation.

A "definite systematic operation" meets the following requirements: the operation must be performed on all the digits of a definite class which can be designated; the result displays some kind of evident, systematic, rational order and completely removes some kind of randomness; the operation must be expressible in not more than four English words. (But Man can use more words to express it and still win.)

NAYMANDIJ 755

```
2 0 9 6 1 1 6 4 3 7 8 8 6 9 5 7 0 6 3 2
0 5 1 1 0 2 2 9 5 9 5 1 6 8 0 8 1 4 0 9
0 5 2 4 4 0 5 6 9 1 4 0 6 7 7 1 2 0 9 9
7 3 8 1 7 3 8 6 6 5 6 8 1 7 6 8 4 1 6 0
3 3 1 1 3 7 3 3 7 8 8 2 6 5 8 5 7 8 7 4
6 8 7 4 2 5 3 4 7 4 8 5 9 5 9 6 9 0 8 6
8 9 8 7 3 1 2 1 3 6 2 8 0 3 7 2 1 0 5 9
9 2 0 5 2 3 5 8 0 3 9 3 3 3 1 6 1 6 1 2
9 7 4 9 7 9 8 3 7 0 7 6 9 2 9 1 1 5 3 0
2 1 8 3 2 1 0 9 2 8 7 4 5 1 3 3 1 5 6 7
```

MAXIMDIJ

In this kind of puzzle, a maxim (common saying, proverb, some good advice, etc.) using 14 or fewer different letters is enciphered (using a simple substitution cipher) into the 10 decimal digits or equivalent signs for them. To compress any extra letters into the 10 digits, the encipherer may use puns, minor misspellings, equivalents like CS or KS for X or vice versa, etc. But the spaces between words are kept.

MAXIMDIJ 755

✕ ① ♈ ⬆ ▽♈✕♈ ■ ✕
⊓ ⧬ ▽ ✕① ♈ ⬆▽♈✕♈ ■ ✕,
✕ ① ♈ ⊓ ♡✕♡▽♈ ⊓ ⧬ ▽
✕ ① ♈ ⊓ ♡ ✕ ♡ ▽ ♈.

NUMBLES

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 deliberate (but evident) misspellings, or is otherwise irregular, to discourage cryptanalytic methods of deciphering.

NUMBLE 755

```
      T H E
  + W O O D
  ─────────
  = R Y W H        D = R
  +     H A S
  ─────────
  = D S W L
```

23247 12805 51042 094

Note: In the April issue an incorrect version of this Numble was printed. In this issue (May) a corrected version of this Numble — containing a second plus sign and a second equals sign — is printed.

We invite our readers to send us solutions. Usually the (or "a") solution is published in the next issue.

SOLUTIONS

NAYMANDIJ 754: (In the April issue, incorrectly labeled 754): Row 8: under 4.

MAXIMDIJ 754: (In the April issue, incorrectly labeled 754): There is no rest for the weary.

NUMBLE 754: In the April issue, published incompletely; correctly published in the May issue as NUMBLE 755.

We regret these errors.

Announcing the publication of a new monthly magazine starting May 1975

"People and the Pursuit of Truth"

● The Watergate crimes and punishments have changed the atmosphere in the United States.

● Congressman Henry B. Gonzalez of Texas on February 19 introduced H. Res. 204 in the U.S. House of Representatives, calling for an investigation of political assassinations in the United States.

● More than 1500 persons attended a conference on "The Politics of Conspiracy", Jan. 31–Feb. 2, in Boston, called by the Assassination Information Bureau.

● Rusty Rhodes of "The Committee to Investigate Political Assassinations", Los Angeles, Calif., has collected more than 250,000 signatures calling for a new congressional investigation.

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   2) The relation of the Central Intelligence Agency to the killing of President Allende of Chile
   3) Concealed activities of the CIA, FBI, Pentagon, and other entities that are disruptive of the domestic affairs and rights of other countries and of the people of the United States

FIRST ISSUE: May 1975, about eight pages, full size, photooffset, some pictures

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