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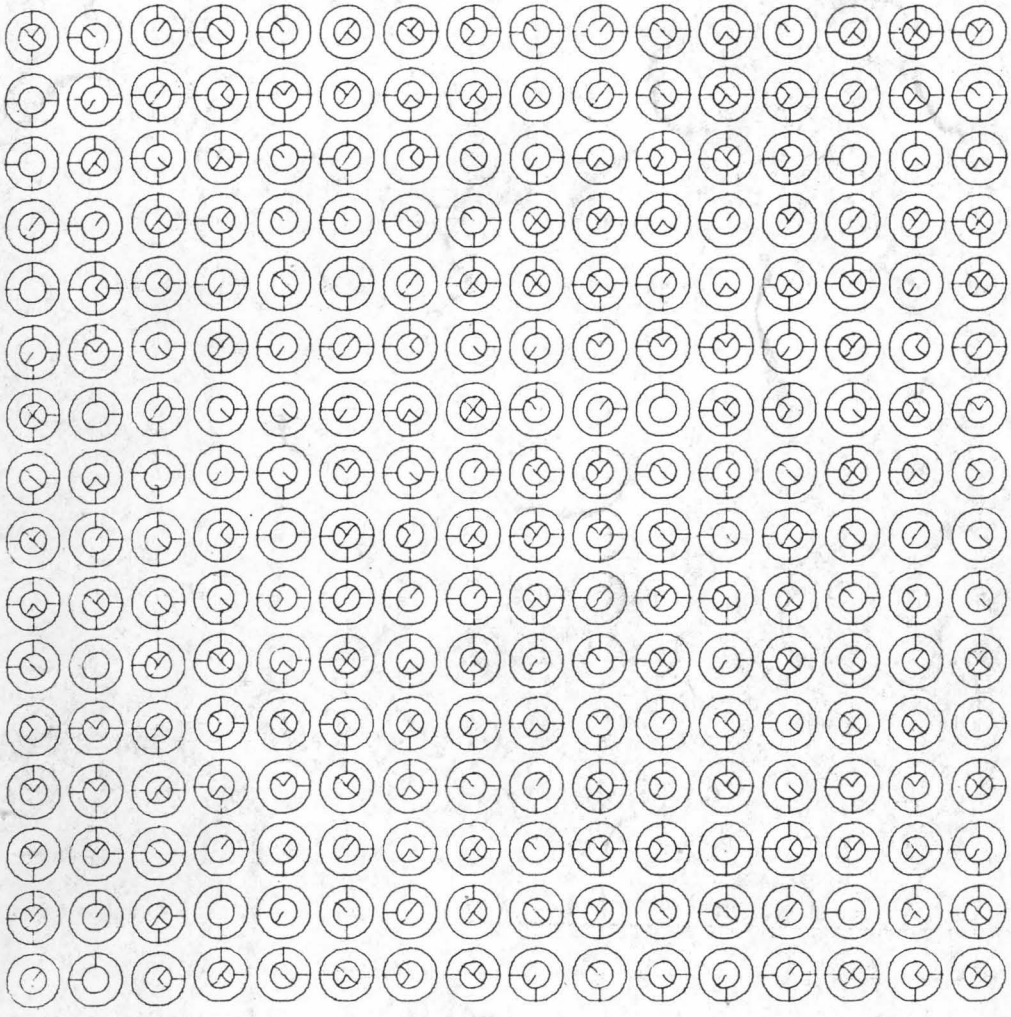

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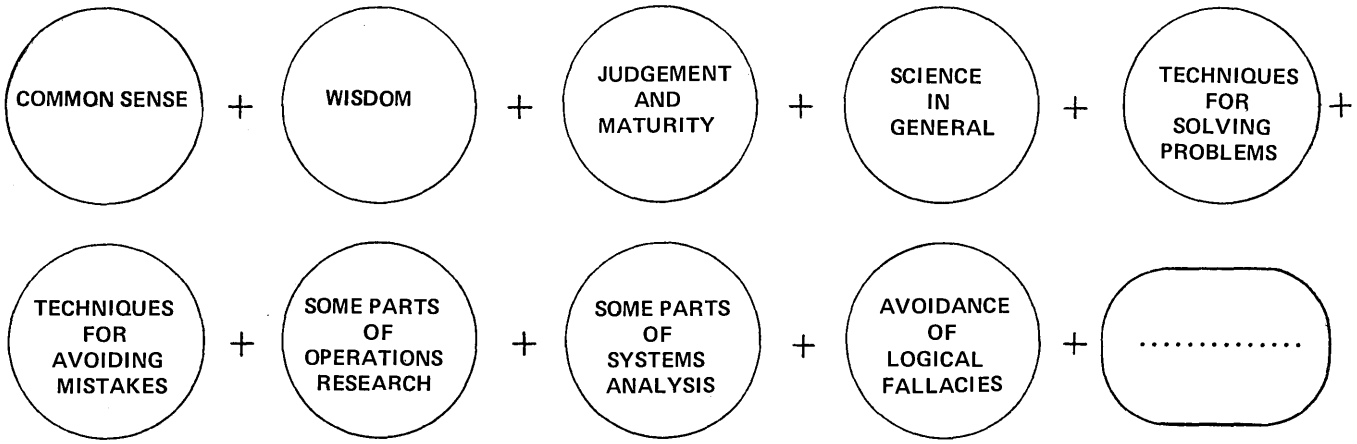

Editor: Edmund C. Berkeley, author, businessman, actuary, scientist, computer professional, first secretary of the Association for Computing Machinery 1947-53, editor of *Computers and Automation.*

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Announcement

The Most Important of All Branches of Knowledge

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

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

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

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

Examples, Understanding, and Computers / December 1964
The Barrels and the Elephant: Crackpot vs. Pioneer / May 1965
Some Questions of Semantics / August 1965
Perspective / April 1966
Computers and Scientific Models / May 1967
New Ideas that Organize Information / December 1967
How to Spoil One's Mind – As Well as One's Computer / August 1968
The Catching of Errors by Inspection / September 1968
Tunnel Vision / January 1969
The Cult of the Expert / May 1969
Computers, Language, and Reality / March 1970
Computers and Truth / August 1970
The Number of Answers to a Question/March 1971

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

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

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

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

Input – in the selection and acceptance of the data with which they begin;
Processing – in the processing through a system;
Output – in the interpretation and use of the answers.

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

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

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

All major cities on the planet are only a few hours apart by jet plane.
Millions upon millions of people who otherwise would be dead are alive because of miracle drugs, – thus creating a population explosion;
Nuclear weapons if used can destroy mankind and civilization in a few hours: etc.

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

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

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

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

Edmund C. Berkeley

EDITOR

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computers and automation

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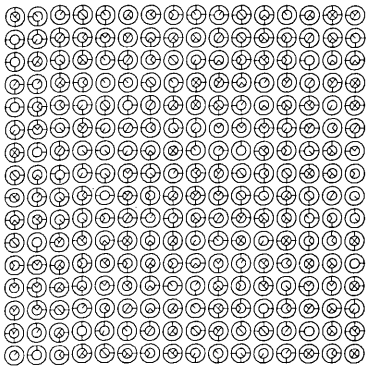

Front Cover Picture

The object of "Puzzle", by Ed Volkstorf, Radford, Va., is to find the two identical "ferrite-core-like" figures. Each figure is based on a binary number between 2 and 255 (base 10); the presence or absence of a binary one determines whether or not one of the eight possible straight line segments in the figure is drawn. We invite our readers to test their keenness of pictorial observation, and tell us how long it takes to find the two identical "ferrite-core-like" figures. For more information, see page 57.

Departments

Key

[A] – Article
[C] – Monthly Column
[E] – Editorial
[F] – Forum
[G] – Golden Trumpet
[NT] – Not Technical
[T] – Technical Computer Information

Can A Computer Apply Common Sense?

It is often said that:

A computer cannot apply common sense.

In this context, the term "computer" of course means a computer with a program controlling it, a programmed computer.

I would maintain that this statement is not true, and it is possible for a computer to apply many kinds of and many degrees of common sense. But what do we mean by "common sense"?

One of the more lucid discussions of the synonyms *sense, common sense, good sense, judgment* and *wisdom* is to be found in the Third International Webster's Dictionary, Unabridged, published by Merriam Webster, Springfield, Mass., page 2067. The substance of this is:

> *Sense* indicates an accustomed steady ability to judge and decide between possible courses with intelligence and soundness. *Common sense* and *good sense* add only slight additional suggestions to sense; *common sense* suggests ordinary good judgment and prudence without sophistication and learning; *good sense* implies an especial perception of circumstances and soundness in analysis.... *Judgment* involves notions of sense refined and tempered by experience, maturity, training, or discipline, to discern coolly and judge soundly in difficult matters. *Wisdom* suggests great soundness, sagacity, and insight, the result of blending together common sense, wit, experience, maturity, learning, and understanding.

Unfortunately, these implied definitions of common sense are not *operational;* they do not provide physical operations or tests which we can apply to the observed behavior of a human being (or a programmed computer), and as a result of the observations or tests say "Yes, it displays common sense" or "No, it does not display common sense."

But it seems to me that an operational definition of common sense behavior for a human being can be constructed out of four main ingredients: observation, intelligence, initiative, and common knowledge (i.e., not including special knowledge). In other words, a human being displays common sense behavior about a problem if:

- he is observant and alert;
- he shows initiative;
- he behaves reasonably;
- he modifies the instructions he is given (or the intentions which he started with) so as to adjust suitably to any new or unusual factors that he encounters;
- he draws on common knowledge or general knowledge only (not the special knowledge of any particular branch of knowledge);
- he effectively solves the problem.

Let's take an imaginary example. John Jones is a college student engaged in a three months summer job with a magazine publisher. His supervisor says to him:

> We have a rush order for 47 copies of the May issue from Samuel Smith. Please take our company car, go to our warehouse (a mile away), get 47 copies of the May issue, package them, and mail them to Samuel Smith with this label.

Now John Jones we shall imagine does the following things:

- Looks to see if any other requests to go to the warehouse are on hand and can be filled on the same trip; finds three and takes them along.
- Observes that the car is low on gas; stops at a gas station on the way; puts in a dollar's worth of gas; and writes a slip for the bookkeeper requesting repayment of his $1.
- Finds that there are only 45 copies of the May issue in the warehouse; uses 42 to fill the order; leaves one issue in the storeroom tagged with a slip "Last copy – To be replenished";
- Fills the other three requests to the warehouse, putting them in the car to bring to the office;
- Wraps up the 42 copies securely, ties them additionally with string, affixes the label, weighs the package, affixes proper postage from the postage meter, and mails the package at the post office on his way back;
- Directs the remaining two copies of the May issue to the clerk in charge of reprinting, with a slip reporting that the supply of the May issue is exhausted;
- Returns the car to a nearby parking space, since the original space has been filled by another car; and
- Reports the completion of the task to his supervisor, informing him of other actions taken.

John Jones has been observant, alert, displayed initiative, acted reasonably, modified given instructions appropriately, drawn on his general knowledge, and has effectively solved the problem – even though only 42 copies were shipped instead of 47. There is no doubt at all that Jones has displayed a great deal of common sense – as if he were an employee of ten years experience and had been taught over the years all the modifications of instructions that he needed.

With this example in front of us, we can see plainly the answer to the question:

Can a computer apply common sense?

The answer is *yes.*

First we make the program cover logically, appropriately, and completely, all or almost all of the kinds of

situations that can arise. That takes work, but if a clerk of ten years experience can do it, so can a good systems analyst do it and then translate it into a computer program.

Second, we equip the program with an evaluating function such as in a computer program that plays chess. In other words, in situations where different degrees of desirability attach to different courses of action relative to a purpose, the computer is given a subroutine that weighs factors and makes decisions. This also takes work, but if a chess-playing program can do it, so also can other programs. To modify instructions in the light of purposes is not hard, provided we take the trouble to express the evaluating function in a computer program.

Of course a computer cannot regularly observe or perceive all of the environment – any more than a blind man can. But we do not expect the same kind or degree of common sense from a blind man as we expect from a sighted person.

We can properly expect a very high degree of many kinds of common sense from well-worked-out computer programs.

Edmund C. Berkeley

Edmund C. Berkeley
Editor

Note: An expanded discussion of "What is Common Sense?" and how different organisms apply it constitutes Issue No. 24 in *The C&A Notebook on Common Sense, Elementary and Advanced.* See the announcement on page 2.

C.a

PROBLEM CORNER

Walter Penney, CDP
Problem Editor
Computers and Automation

Problem 7110: Operation Search

"Here's a really far-out search procedure", said Pete. "Don't know why they want it, but ours not to reason why, etc."

"How does it work?" asked Al.

"Well, the program is supposed to be looking for a certain number. It starts with 1, then adds 2, the 4, and so on, doubling the amount added at every point as long as the sum is less than the number it's looking for."

"Sooner or later it will reach a number bigger than the target number. What does it do then?"

"Actually if the number is of the form $2^n - 1$ the machine will reach it directly by addition", said Pete. "For other numbers it starts subtracting half the last number used and continues doubling and adding or halving and subtracting depending on whether the number it's after is more or less than the current number."

"How can the machine tell when the number has been found?"

"The machine is able to compare two numbers, deciding whether one is less than, equal to or greater than another. It stops when it finds the two are the same."

Al looked a little puzzled. "I'm still a little confused", he said. "How would it go about finding the number 6, for example?"

"It would go 1 + 2 + 4 − 2 + 4 − 2 − 1 so that seven operations would be necessary."

"How many operations would be necessary for a number in general?"

Solution to Problem 719: Messages in Math?

Of the 63 possible two-digit endings of cubes, only 00, 17, 25, 41, 37, 57 and 97 yield admissible endings for squares when 41 (the last two digits of 1971^2) is subtracted. Additional restrictions on the hundred's digits of squares and cubes allow us to reduce these possibilities further until we find $1971^2 + 1430^2 = 181^3$.

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

THE LIVERPOOL CONGESTION CONTROL SCHEME

The ever-increasing density of traffic in our city streets, and the astronomical costs of major revisions of street layouts, have stimulated research into methods of traffic control to cope with congestion efficiently and economically. One solution to this problem would appear to be the application of computer control. Two experimental control centres have been established in Great Britain by the Ministry of Transport, in West London and in Glasgow. In Liverpool, the Corporation have gone one step further, and in June 1968, established a working control system.

By A. Davison and D. W. Honey

The Mersey road tunnel links the City of Liverpool, sited on the east bank of the river Mersey, to the Wirral Peninsular (bounded by the Mersey and the river Dee), and was opened to road traffic by King George V in 1936. This tunnel is currently the only practicable road link between Liverpool and Birkenhead, although a second two-lane tunnel is scheduled to be opened in 1971. The existing tunnel has four 9-ft wide lanes between the main entrances in Liverpool and Birkenhead, together with two two-lane branches off the main tunnel, one leading to the docks at Liverpool, and the other to Birkenhead. The Birkenhead branch is now restricted to use by traffic entering the tunnel only; the Liverpool branch is used for exit traffic only.

The first major use of 'tidal flow' control in the tunnel was made in 1950. This is the utilisation of the main tunnel lanes in the ratio of 3:1 in a particular direction, to assist commuter flow during the morning and evening peak hours. Between the hours of 08.30 and 09.15, and 17.00 and 18.30, some 3,500 vehicles per hour flow into and out of the city through the tunnel. During these hours, congestion within the tunnel causes extensive queueing on the city streets leading to the tunnel entrance, with subsequent dislocation of the other traffic not requiring access to the tunnel. In particular, traffic attempting to cross the tunnel-bound traffic is delayed by nose-to-tail queues of vehicles blocking the cross-roads.

Traffic conditions are aggravated by the radial distribution of roads leading into Liverpool, and steadily deteriorate as the 'central area' (centralised on the Mersey tunnel entrance) is approached. Conditions on the Birkenhead side are not so critical, because the approach routes are not intersected by cross-roads to the same extent. In 1965, a traffic control scheme was recommended to and adopted by the Liverpool Council. Design work started immediately on a comprehensive, one-way street, traffic signal controlled scheme in which reserved lanes for the tunnel-bound traffic were provided on the tunnel approach routes, with physical separation and channelising islands to cut out queue-jumping from 'local' lanes. This scheme was put into operation in 1966, with the knowledge that further controls would be required to give positive directions to tunnel traffic during the periods of congestion, and at other times to enable the lanes reserved for tunnel traffic to be used by the local traffic.

Thus the Tunnel Approaches Congestion Control Scheme was born, and from the beginning it has been regarded as the first step towards a more complex 'area control'. The main objectives of the scheme were

a) control of tunnel-bound traffic queues at main intersections by red signals rather than by a 'voluntary' restriction using box junction regulations;
b) forward movement of tunnel-bound traffic at intersections to be made in phase with flows of local traffic, restricted as necessary by limiting the green-time by the use of sub-controllers;
c) maximum queue occupancy of tunnel lanes, thus limiting queue-jumping from local lanes and side routes;
d) overall control and display of regulatory and informatory part-time signs;
e) maintenance and improvement of bus schedules, with free flow of other local traffic as far as practicable at all times; and
f) the establishment of a traffic control office, with a central processing unit to pursue and maintain these complex and integrated objectives.

The adoption of signal controls was dictated by intense competition for forward movement of traffic towards the tunnel, the shapes, areas and distances to be kept clear, the prevalence of vehicles stopping in a 'box' under slow-moving queue conditions, and irrespective of a bias linking programme, the opportunities presented by boxes for queue-jumping and infiltration. Prior to computer control, 'box offences' occurred at an abnormally high level on the tunnel approaches, but not elsewhere.

Sub-controllers at key intersections on the tunnel

Reprinted with permission from the December 1970 issue of *The Computer Bulletin,* published by The British Computer Society, London, England.

approaches were manually operated by traffic engineering technicians between 1966 and 1968. This relieved police from traffic duty and confirmed the decisions made, as the public quickly became wholly reliant upon these controls. Surveillance by closed-circuit television assists the programme development and enables action to be taken to re-direct public transport and to deal with abnormal traffic problems. Internally illuminated gantry signs, including part-time signs, were erected in 1966 to direct traffic into the correct lanes.

The objectives necessitated the inclusion of an on-line real time computer, a general purpose digital type being selected for its programming flexibiity, and with a capacity for expansion and integration in future traffic management projects. Schemes and tenders for an automatic control system were invited from commercial firms with specialist knowledge, and a tender accepted from the Plessey Company Limited (Automation Group), to supply a general purpose XL9 digital computer, together with associated hardware and software. A closed-circuit television contract was awarded to Pye TVT. Most of the necessary traffic signals and cables had been installed during the implementation of the comprehensive one-way traffic scheme in 1965-66.

Control centre

The main facilities available to the supervisory staff are the computer and its peripherals, including manual override of traffic signals and sign displays, control of the closed-circuit television, VHF radio, telephones, a map display, and various tally and record panels. Two dual position control desks have been installed, and are placed one behind the other with the rearmost elevated on a dais. The rearmost desk is allocated to transport personnel, due to their predominant use of the radio telephone equipment and the engineering personnels' greater reliance on the map display, which faces both desks.

Two banks of eight 19-in. television monitor displays are located on each side of the map display. Nine displays are being used in the present closed-circuit television system, the remainder being taken up at present by internally illuminated maps of key intersections and signs, an internally illuminated calendar, and a spare TV monitor. Each desk has a camera control panel with two 8·5-in. desk monitors and two telephones. The engineer's desk has switch panels for the control of signals, signs and the map display, together with a radio telephone link *via* the normal telephone handset. The transport desk has the normal radio telephone speaker equipment together with tally and record panels displaying vital information regarding availability and location of personnel and vehicles.

The map display is about 12 ft long by 8 ft in height, and represents the road layout within the central area and around the proposed Liverpool inner ring road, suitably distorted to permit clear presentation of the existing and future road pattern.

The streets are shown in white with light and dark blue colours for areas of land and water respectively. Green triangles with their apexes in the direction of vehicle traffic flow indicate green signal aspects, with red bars and orange discs showing inhibit and queue conditons on the approach routes. At pedestrian crossings, green discs are illuminated when the 'cross' signal is showing.

The computer room is to the rear of the map display and contains the computer and its peripherals, the closed-circuit television and radio telephone engineering cabinets and an air conditioning unit. A false floor is provided over the whole area to cater for the large amount of cabling. The street cables terminate on a main distribution frame which is situated in the basement below the computer room. The engineering cabinets of the closed-circuit television and radio telephone equipment are contained in blocks separate from the main computer to allow for further expansion of the computer system.

Computer equipment

The Plessey XL9 is a general purpose, 24-bit word digital computer used 'on-line', in real time. It currently has a 16K word core store (2 μsecs cycle time) of which about 12K is used in the current scheme, with only some 40 *per cent.* usage of the computer available time. An additional 32K core store has been added during 1970 to allow for expansion of wider area control and for numerous additional control schemes.

Two data channellers containing the interface equipment handle input and output signals, *via* relays in a relay buffering rack in some cases and directly in others such as the loop detectors. The computer scans these data channellers at $\frac{1}{4}$ sec. intervals and transfers up-to-date information to and from core store. The conventional peripheral equipment includes a paper tape reader and punch capable of processing about 500 and 110 words a second respectively, and a control typewriter, for input and output commands and messages. An off-line Flexowriter is used for tape preparation of the program which is written in a pseudocode known as 'EXEC 9'.

In an annexe, located immediately off the main equipment room, are six master signal linking controllers, the sub-master controller, engineering work benches, and electronic test equipment.

Control philosophy

Under normal conditions tunnel-bound traffic, parallel and cross 'local' traffic use the various intersections under conventional biased linking of traffic signals. During congestion, sub-controllers controlled by the computer limit the durations of the green aspects on the tunnel lanes by artificially inducing red aspects within the normal overall green phases.

Congestion conditions originate in the Tunnel Plaza where three approach routes (a total of eight tunnel lanes) merge, and where tunnel-bound traffic passes through 11 toll booths* into one, two, or three tunnel lanes according to the prevailing lane-working in the tunnel proper. The two sections into which the operational program is divided relate to the Plaza and the approach lanes/roads respectively.

Plaza program

'Presence' loops, placed at the entrance to the Plaza and 'A' loops in the final sections of the approach lanes are scanned by the computer to detect very slow moving or stationary traffic. These are compared with adjustable parameters set in the program and when necessary, trigger the control program into 'close control'. For example, a process in the computer establishes 'presence' conditions after at least a 7 sec. duration for each loop. Three such conditions occurring coincidentally trigger the Plaza control program.

Close 'control' of the Plaza approaches is then established using their own pre-set basic maximum 'green time' allowance. Subsequently this green allowance for each approach is reduced by 1 sec. for each second that a Plaza entry loop shows presence, but is increased by 1 sec. each

*The toll booths were moved to the Birkenhead entrance on 1 September 1970.

second, towards the basic maximum as vehicles are detected leaving the Plaza (*ie* entering the tunnel). When this allowance reaches a predetermined minimum, the computer applies an 'inhibit', turning the tunnel lane signals to red. Removal of the inhibit occurs when the allowance reaches the predetermined period of 12 secs.

The calculations take place independently of the normal signal cycling, but minimum durations of 8 sec. for the green and red phase are maintained, with the computer taking account of instantaneous and impending main phases changes. A smooth termination of the Plaza control is effected by giving fixed long green allowances (apart from normal phase changes) when a predetermined number of booth 'exit' loops show a simultaneous 'absence' of vehicles for a certain number of seconds. Switch-on of the Plaza program also initiates control of gantry signs, *etc;* switch-off of the Plaza program takes place if, for three consecutive minutes, no 'switch-on' condition has been detected.

Tunnel approach program

The main objective of the tunnel approach program is the optimum loading of the tunnel approach lanes. At certain intersections, merging of tunnel lanes takes place, using appropriate control programs. Elsewhere, special traffic control logic is used to assist general traffic movement, and is provided as sub-routines of the tunnel approach and Plaza programs.

In each tunnel lane, approximately one-third of the way down each block from its entrance, a pair of Plessey Mectest loops, 5 ft square and placed 7 ft apart, are set in the road surface, to measure vehicle presence and speed. These are known as the 'A' and 'B' loops. A threshold speed for each block is set in the computer in the range 34, 16, 11, 8·3, 6·7, 5·7 and 5 miles per hour. Basically each block is controlled independently of adjacent blocks, but queue indications on the A and B loops are checked, since false information can be generated by isolated slow or stopped vehicles, lane changing, *etc*. The criteria for each block are the state of the downstream signals, the downstream traffic density, and the long-term flows within the block. When the sum of the 'weighting values' given to these conditions exceeds a pre-set total, queue conditions are assumed within the block. The computer then continuously calculates for the block of the delay required before the application of a red (inhibit) aspect to the tunnel lane signals at the block entrance, *ie* the time necessary to fill the block with vehicles. This delay is continuously adjusted until the actual application of the inhibit, and takes account of entry traffic volumes and of downstream traffic movements, based on the state of signals at the entrance into the next downstream block.

Near the entrance to the block, at the optimum end of queue position as determined by the requirements of local traffic movements, is located a single loop entrance detector in each tunnel lane. These determine 'presence', 'absence' and 'instantaneous' entry traffic volumes. Presence and absence of vehicles on the entrance loops after the application of an inhibit indicate to the computer the adequacy of, and subsequent modifications required to, the inhibit calculations.

After application of an inhibit the computer continuously checks for inhibit release conditions and modifies a pre-set release delay according to

a) the state of downstream tunnel lane signals;
b) traffic flows, if any, over the A and B loops in the blocks; and
c) any restriction applied to cross traffic movements, where the computer supervises overall signal cycles and phases.

Heavy movements of vehicles into the Victoria Street tunnel lanes from local side streets introduced considerable difficulties, the prohibition of turning, even at peak periods, being impractical. The aim of keeping the main queue moving and filling available spaces was frustrated when the standard link scheme was being used, even with computer control, since the off-sets frequently encouraged use of the local streets to gain access to the approach. In fact, using vehicle-actuated (*va*) working, the heavy local flows on side roads tended to extend side road greens at the expense of the main approaches, with their limited movements, whilst fixed-time working was too rigid. A Plan 2 bias link, with off-sets timed back from the Plaza, could not allow for variations of inhibits within the overall main road green phases, or for the substantial variations of queue progression speeds causing wide departures from the calculated off-sets.

Since the signal controllers could offer a 'green wave' facility whereby the computer can make direct demands for phase change and duration, a Plan 3 system was evolved. In this, the computer induces isolated *va* working, triggered on and off by the Plaza program through a master controller. On inhibit release, the computer commands the controller (subject to safeguards, *eg* minimum green on opposing route, *etc*) to select tunnel route phase green. This is held either for maximum phase green, or until the block is filled, after which normal *va* working is restored. This 'green wave' facility is also used for emergency services. This system reduces and limits filtering from local streets into tunnel approach lanes but gives maximum (virtually indefinite) green time to the cross routes under stationary tunnel queue conditions, thus helping to clear local traffic.

Emergency service

A special computer program facility (the 'hurry call' program) permits the Fire Service to select, at the press of a button, a priority route to any one of 18 sub-areas of the city centre. A wave of long green phases (known as the 'green wave') is transmitted to assist overall movement of traffic on local lanes prior to and during the scheduled passage of the fire appliances. Certain junctions not directly on the route are also controlled, to give traffic clearance ahead of and away from the selected route. The sub-area route selected is shown on the map display in the control centre. A maximum of 12 simultaneous route demands can be made, at present affecting up to 12 controlled intersections. On a clash of requirements at an intersection, one phase takes priority on a pre-set basis, but even on repeated calls, no phase may be held more than 2 min. The computer seizes the required phases at appropriate times based on operational experience. To cover variations, the phase is called 20 sec. before the scheduled arrival of the appliance, and is held for a total of 50 sec. As all safety guards, *eg* minimum green on the opposing phase, intergreens, *etc*, are observed, the phase is in fact held for less than 50 secs.

An average of all fire calls during a 24-hr period, shows savings of up to 50 *per cent*. on trip times, this saving being most marked during the peak hours and its associated congestion. Expansion and improvement of control are envisaged for a new second central area fire station, with automatic triggering of the hurry call program by the departure of the appliances themselves, and subsequently, the synchronisation of the program with the actual progress of the appliance through the selected route. The latter facility is to ensure that the appliance and the progress of the green wave remain in synchronism throughout.

Part-time signs

Part-time signs indicate traffic conditions to the involved motorist, effect lane switching and assist in the regulation of traffic movements. These signs are computer operated, using 'logic' conditions based on the tunnel traffic conditions, the major determining factor being the switch-on of the Plaza control program, and congestion states of the various blocks. Sign changes are subject to pre-set smoothing periods (at present set to 5 min.) irrespective of the main control logic. With the Plaza program alone triggered, the first signs restrict the tunnel lanes to the tunnel traffic only. As the approach blocks fill, advisory 'congestion' signs are switched on further upstream, indicating the prime cause of the delay.

Additional part-time signs are fitted to the traffic signals at the entry to each block, showing 'tunnel congested' when the inhibit starts. This aids driver co-operation and discipline, when the tunnel signals are red, often for prolonged periods. Part-time regulatory signs (for example, 'NO LEFT TURN'), operated according to the traffic situations prevailing at any time, obviate unnecessary restrictions on traffic movements, but experience shows a need for advance advisory signs indicating the state of these regulatory signs. Further control of high capacity arterial routes, and more particularly the approaches to two road tunnels, will make extensive use of part-time signing.

Operational program

The Operational Program is made up with sub-programs which are run at $\frac{1}{4}$-sec., 1-sec., and 1-min. intervals. These time intervals are defined by interrupts generated by a real time clock synchronised with the frequency of the National Grid electricity supply; the interrupts are served by a small but powerful supervisor program. Parameters of interrupted programs are preserved until the interrupt has been serviced, and a sequence of program priorities established according to the interrupt priorities. When the programs of a higher priority have been completed and terminated, the interrupted program is continued from the point at which it had been interrupted.

The $\frac{1}{4}$-sec. program scans all the detector information staticised on buffer relays and transfers the information into core store. Some minor calculations establishing 'change of presence' on each loop in the system are also executed. The 1-sec. program contains a number of sub-programs. Demands for 'hurry calls' for a fire appliance using a 'green wave' are dealt with first. Subsequent programs are the Plaza control program, which establishes the necessity for close control, followed by the tunnel approach program, in which the various blocks of road on each approach are optimised. The gantry signs are then adjusted according to the traffic conditions, and finally all the outgoing data is output (*via* wetted reed relays) to the sub-controllers, gantry signs and secret signs. The amount of spare time is also calculated at this point for the assessment of program efficiency, and displayed on the engineering console.

During the 1-min. program, a simple test is made on the majority of the computer functions. A failure of any test initiates an output fail message as a warning to the duty controller. (Since the official hand-over on 1 July 1968, there have been no known computer failures, although the system has been in operation 24 hrs per day, seven days a week, since that date.) The 1-min. program is also used when a 'fault log' of the system is demanded by the duty controller. On receipt of this demand, part or all of the system (according to the demand) is scanned for defects such as 'continuous presence' or 'absence' on a loop detector without a just cause – such as a parked car – and a report output at the end of a minute interval.

Miscellaneous facilities are available to correct the system parameters, or to output data from the core stores, by suitable commands *via* the control typewriter, or to be input *via* the typewriter or the tape reader whilst the system is on-line. Work is proceeding to extend these facilities to enable new programs to be loaded, run, suspended and terminated as in a simple multi-level programming system.

System evaluation

Two years of operational use, and the implementation of software modifications (made as a result of experience and to cater for changes in the approach routes) have made a qualitative assessment of the system very difficult. However, general evaluations of local traffic behaviour have been possible during periods of severe tunnel congestion.

The usual random appearance of accidents and serious breakdowns in the tunnel has continued to lead to long periods of stationary or very slow moving queues, but local traffic has moved freely with little or no interference from the tunnel queues. One unusual yardstick is the number of buses actually present in the main bus station, reflecting the low delays and reduced difficulties of traversing the city centre. With computer control, significantly larger numbers of buses are now seen at the bus station during the peak hours.

Future developments

The experience gained so far confirms that an early expansion of the system towards area traffic control is essential. Future systems will be based on the existing control centre, and will include advanced aids to drivers in the form of advisory signs.

In the city centre linked signal system, it is proposed that the selection of the linking program from the master controller's 'library' of three, and the choice of fixed time or vehicle actuated working will be made by the computer from traffic flow and density measurements made at selected points, coupled with a 'time of day' choice to cater for pedestrian movements.

Data transmission ducts are being provided in all new highway schemes and installations. Early use will be made of these in connection with approaches to the new road tunnel leading to Wallasey, scheduled to open in 1971, and the first stage of the inner ring road. Further part-time signs in the new and existing gantry signs will control and distribute traffic to the two tunnels, giving advance notice of congestion conditions, closures, and estimated time delays. Studies are being made of a wide range of advanced aids such as electronic displays (for the presentation of mimic and alpha-numeric information on TV monitors), simple time-division-multiplex units to permit economic transmission to the control centre of data relating to more remote installations, and new static 'detector' devices (particularly required on multi-storey car park schemes).

With the removal of the toll booths from the Liverpool entrance to Birkenhead during 1970, an automatic system controlling nine lanes of merging traffic into the main tunnel is being designed, not only to eliminate conflicts where the traffic merges but also as a first step towards the optimisation of the tunnel flow, in which a 5 *per cent.* improvement in traffic throughput is envisaged.

On-line checking of the city's one-million-pound traffic light system is already planned, by sampling the timing

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FEDERAL DATA BANKS AND THE BILL OF RIGHTS

"Whether he knows it or not, each time a citizen files a tax return, applies for life insurance or a credit card, seeks government benefits, or interviews for a job, a dossier is opened under his name and an informational profile on him is sketched. . . . Few people seem to appreciate the fact that modern technology is capable of monitoring, centralizing, and evaluating these electronic entries – no matter how numerous they may be – thereby making credible the fear that many Americans have of a womb-to-tomb dossier on each of us."

Arthur R. Miller
Professor of Law
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(Based on a statement presented to the Subcommittee on Constitutional Rights of the Committee on the Judiciary of the United States, February 23, 1971.)

Someone with limited vision might be tempted to say, as did a federal judge recently, that army spying on the lawful activities of civilians is "much ado about nothing." Viewed in isolation, perhaps the judge was right in characterizing the army's activities as an "assemblage of keystone cops" or as a mild irritant, especially since the public mea culpas by former intelligence agents *may* have helped to abort their expansion. But military spying cannot be viewed in a vacuum – unfortunately, it is symptomatic of growing governmental intrusion and heightened threats to our constitutional freedoms.

Arthur R. Miller is a Professor of Law at the University of Michigan. He is the author of *The Assault on Privacy* (University of Michigan Press, 1971), a comprehensive analysis of the computer-privacy problem. Prof. Miller has testified before a number of Congressional Subcommittees on various aspects of the legal implications of computer technology, and has written widely on these subjects. He is a graduate of Harvard Law School, and will be a visiting professor there during the academic year 1971-72.

The Surveillance Society

Consider the implications of these three propositions: First, Americans are scrutinized, measured, watched, counted, and interrogated by more governmental agencies, law enforcement officials, social scientists, and poll takers than at any time in our history. Second, probably in no nation on earth is as much individualized information collected, recorded, and disseminated as in the United States. Third, the information gathering and surveillance activities of the federal government have expanded to such an extent that they are becoming a threat to several basic rights of every American – privacy, speech, assembly, association, and petition of the government.

As recently as a decade ago we could smugly treat Huxley's *Brave New World* and Orwell's *1984* as exaggerated science fiction having no relevance to us or to life in this country. But in the last few years this comforting, but self-delusive, mantle has been stripped away. Revelations before congressional subcommittees and in the news media have presented a disheartening panorama of the ways in which the intruders of our society, aided by modern science, have destroyed many of our traditional bastions of privacy. The widespread use of spike and parabolic microphones, the emergence of various gadgets for electronic eavesdropping, and the ready availability of cameras equipped with esoteric optical devices have made it clear that we no longer enjoy *physical* privacy in our homes, offices, or remote country retreats. And now, ever increasing resort to the computer, laser technology, and microminiaturization techniques has begun to erode our *informational* privacy and to threaten several of our most fundamental rights guaranteed by the Constitution.

Spiraling Pattern of Data Collection

The hearings on governmental questionnaires and related matters held by this Subcommittee during April, 1970, and the wealth of material presented in my new book, *The Assault on Privacy: Computers, Data Banks, and Dossiers* (University of Michigan Press, 1971) demonstrate the spiraling pattern of data collection in this country, and no purpose is served by redocumenting here what now is self-evident. Whether he knows it or not, each time a citizen files a tax return, applies for life insurance or a credit card, seeks government benefits, or interviews for a job, a dossier

is opened under his name and an informational profile on him is sketched. It has now reached the point at which whenever we travel on a commercial airline, reserve a room at one of the national hotel chains, or rent a car we are likely to leave distinctive electronic tracks in the memory of a computer – tracks that can tell a great deal about our activities, habits, and associations when collated and analyzed. Few people seem to appreciate the fact that modern technology is capable of monitoring, centralizing, and evaluating these electronic entries – no matter how numerous they may be – thereby making credible the fear that many Americans have of a womb-to-tomb dossier on each of us.

Data Banks

Even though the threat to our informational privacy is growing constantly, most Americans remain unaware of the extent to which federal agencies and private companies are using computers and microfilm technology to collect, store, and exchange information about the activities of private citizens. Rarely does a day go by without the existence of some new data bank being disclosed. In recent months we have read of the Department of Housing and Urban Development's Adverse Information File, the National Science Foundation's data bank on scientists, the Customs Bureau's computerized data bank on "suspects," the Civil Service Commission's "investigative" and "security" files, the Secret Service's dossiers on "undesirables," and the surveillance activities of the United States Army – to name only a few of the federal government's data banks that have brought to light. Even now only the tip of the iceberg may be visible.

Justification of Data Banks

The lack of concern over these data gathering activities probably reflects the fact that by and large they are well intended efforts to achieve socially desirable objectives. For example, the law enforcement agencies can claim that filebuilding is necessary to combat organized crime and restore "Law and Order." In a similar vein, the FBI and the Army can justify their intelligence activities in terms of combating subversion or quelling campus disruptions and riots in our urban centers by knowing who to watch or seize in times of strife.

Negative Side to Data Banks

But there is a negative side to these mushrooming data banks – particularly those that bear the imprimatur of a governmental organization. Consider the information practices of the United States Army. Early this year it was revealed that for some time Army intelligence systematically was keeping watch on the *lawful* political activity of a number of groups and preparing "incident" reports and dossiers on individuals engaging in a wide range of *legal* protests. It must be emphasized that this monitoring not only covered society's "crazies" but extended to such non-violent organizations as the NAACP, the ACLU, the Southern Christian Leadership Conference, and the Women Strike for Peace.

The Army's intelligence system apparently came into existence as a by-product of the military's role in ending the civil disorders of the mid-1960's. Although there is considerable justification for certain types of information collection that are directly relevant to the Army's duties, the development of dossiers on people pursuing lawful social and political activities bears little relationship to the function of the military during periods of social unrest – especially when many of those being scrutinized are extremely unlikely to be involved in riotous conduct. Not only is the Army's filebuilding difficult to justify, but it appears to have been undertaken without sufficient appreciation of the fact that the creation and exposure of dossiers on people who are politically active could deter them from exercising their First Amendment freedoms of free speech and assembly, as well as their right to petition the government. If a citizen's conduct and associations are put "on file," and perhaps used to harass or injure him, he may become more concerned about the possible content of that file and less willing to "stick his neck out" in pursuit of his constitutional rights. The effect may be (to paraphrase a thought expressed by Justice Brennan in an analogous context) to encourage Americans to keep their mouths shut on all occasions (Lopez v. United States, 373 U.S. 427, 450 (dissenting opinion)). If we really take our constitutional guarantees seriously, we cannot afford to stand idly by and allow them to be debilitated any further by this type of coercion.

A Return to McCarthyism

After a flurry of publicity about the Army's activities, the institution of a lawsuit by the American Civil Liberties Union, and a number of sharply worded letters from members of the Congress, the Army announced that it was abandoning the data bank. But as has been pointed out repeatedly by the Chairman of this Subcommittee, many of the Army's statements have been vague and leave the status and future of its intelligence activities in doubt. Add to this uncertain state of affairs the existence of the Secret Service's unregulated computerized system containing dossiers on "activists," "malcontents," and "potential presidential assassins," as well as the recent disclosure that the Justice Department's civil disturbance group is maintaining an intelligence data bank, and no one should be surprised if some suggest that these surveillance efforts contain the seeds of the much dreaded police state or a return to McCarthyism.

NCIC Threat to Personal Privacy

The rapid development of a number of other information systems in the law enforcement arena also threatens personal privacy. The Federal Bureau of Investigation has established a National Crime Information Center (NCIC), which provides state and city police forces with immediate access to computerized files on stolen property and wanted persons. In the few years since its establishment, NCIC has become the keystone of an elaborate crime information network that eventually will integrate intelligence information centers throughout the nation into a single system. By the end of 1969, the FBI's Center was exchanging data with state and city police computers in every state except Alaska. In a recent speech to the Association of Computing Machinery (ACM) an FBI representative announced that there are already approximately 3,000 remote access terminals linked to the FBI's computer. Apparently 1,000 of these are in police stations that are tied directly to NCIC and 2,000 terminals are connected to state computer systems, which in turn have access to NCIC.

Dangers May Outweigh Benefits

There is no doubt that in its present form NCIC, as is true of many other law enforcement data banks, is highly utilitarian and justifiable. No one can quarrel with the notion that a policeman in a squad car should be able to call his dispatcher for an NCIC check on a vehicle he stops on the highway and its registered owner before he personally approaches it. How else is he likely to be warned that the driver may be armed and dangerous?

But if these data banks expand to include sensitive information about people who have not been branded as fugitives from justice and precautions are not taken to insure the security and integrity of NCIC and other law enforcement systems, the dangers may begin to outweigh the benefits. In the speech before the ACM mentioned earlier, the FBI spokesman also revealed that police arrest records probably will be computerized and added to the NCIC data base next year, assuming that Congress provides the necessary funds. Despite the notoriously misleading character of many arrest records (many people who are arrested are never prosecuted, even fewer are convicted, and many arrests are of the dragnet variety that occur during *perfectly lawful* demonstrations), it was admitted that there currently are *no* plans to insure the security of the NCIC network or to upgrade the quality and accuracy of the data that is recorded. That, it was said, is the responsibility of the user.

Other Law Enforcement Computer Systems

State and local law enforcement computer systems also are becoming increasingly sophisticated. New York already has in operation the essential features of a network built around a single computer center – the New York State Identification and Intelligence System (NYSIIS). This unit is designed to store information for state and local law enforcement agencies and permit them to retrieve data through their own terminals. In Ohio, the Cincinnati-Hamilton County Crime Information Center allows 38 city and state agencies to share its computerized information. This system is tied both to NCIC and the Ohio State Highway Patrol Computer Center in Columbus, Ohio and plans are underway to connect the Cincinnati-Hamilton County Center to systems in Kentucky and Indiana. Going farther afield, Scotland Yard is developing an information system that will be available to law enforcement agencies throughout the British Isles and similar computer systems are being developed in other nations and by multi-national organizations such as INTERPOL. Satellite or cable transmission will enable these centers to exchange data with NCIC, which can then forward them to state and local systems.

More Comprehensive Networks in Future

The same pressures of efficiency and expediency that are encouraging the exchange of information among agencies on the same and different levels of government will lead to even more comprehensive networks in the future. Direct federal funding already is contributing to this trend – the Office of Education is supporting a Migrant Worker Children Data Bank, the Department of Housing and Urban Development is sponsoring prototype computerized municipal information systems and building files on housing loan applicants (with particular attention to those who prove to be ineligible), and President Nixon's welfare reform proposal (the Family Assistance Act) would give the Department of Health, Education, and Welfare authority to collect and exchange data on individuals with state welfare agencies. It would be foolish to ignore the ease with which each of these data centers could be integrated with the law enforcement and surveillance information flow.

Other combinations are on the horizon. In light of the polarity of today's student activism and public and governmental reactivism, it is even conceivable that federal surveillance systems and educational data centers will be linked, either formally or informally. If anyone thinks that this notion is farfetched, let him consider the implications of President Nixon's request of September 22, 1970 for funding and increased statutory authority to use 1,000 new FBI agents on university campuses. Conceding the need for reinforced investigative manpower to restore peace to our institutions of higher learning, what controls will there be on the massive amount of potentially damaging personal information this type of operation is bound to generate and what assurance do we have that the integrity of university records will not be compromised?

The Need for Regulation

At present there are no effective restraints on the national government's information activities and no one has undertaken to insure that individuals are protected against the misuse of the burgeoning data banks. Indeed, a survey by the Senate Subcommittee on Administrative Practice and Procedure revealed many instances of agency demands for information that had not been authorized by Congress and concluded that most "government forms require either nonessential or too detailed information from the individual citizen." Similarly, the authority for the Army's surveillance of civilians is obscure. Neither the Executive Orders relating to security checks for government employment nor the so-called "Delimitations Agreement" between the military and the FBI, which allocates jurisdiction over personnel security investigations, seems to encompass the Army's file building.

What is more, muscle flexing has become a common government technique for furthering some of its data-gathering activities. Information collectors often deceive people by intimating that the law requires a response to questionnaires that in fact are voluntary, or use coercive practices (such as subtle threats of a loss of government benefits) to extract information. Even among citizens who are offended by certain inquiries or practices, there is a natural reluctance to "buck the system."

Banking and Credit Transactions Watched

No one seems to be immune from these activities. For example, in an effort to trace the movement of American funds abroad – particularly to Swiss banks, draft evaders, and the Viet Cong – the FBI keeps watch on large numbers of domestic banking and credit transactions. Financial institutions rarely object to these intrusions on their files, perhaps in part because many bank and corporate security officers are former FBI and law enforcement agents. Furthermore, since the FBI has jurisdiction over bank fraud cases, the banks may find it to their advantage to "co-operate" – especially if they might want an information favor from their government friends tomorrow. Thus, it is not surprising that the FBI is able to examine over 25,000 credit bureau files annually without first securing

subpoenas.

Governmental Bugging

Nor is the government's hyperactivity in collecting information offset by its exercise of restraint in using it. On one occasion the FBI publicly released 1,200 pages of transcripts of electronically recorded conversations among reputed Mafia figures in which numerous prominent people were talked about, often disparagingly. Even conceding the desirability of informing the public of the threat organized crime poses to our society, need it be done by encouraging the daily press to publish unsworn conversations procured by governmental bugging? In a similar vein, why shouldn't citizens have doubts about the government's handling of personal information when presidential advisors have access to their federal tax returns and they are exchanged with state and local taxing agencies without taking any serious precautions to insure their confidentiality.

The data bank problem is being magnified by the computer. The trend toward computerization of personal information is resulting in a marked increase in the quantity, sensitivity, and variety of data that will be found in the electronic dossiers of the future, as well as expediting their exchange. Moreover, gaining access to these systems will be a desirable objective for a snooper, muckraking newsman, or political operative since a printout of someone's file may well contain public record information intermingled with subjective intelligence reports, data given by the subject or an informer with the assurance that its use would be limited, and information transferred from other computer systems. And it simply is unrealistic to assume that the managers or proprietors of computer systems – governmental or private – will take it upon themselves to protect the public against misuse of the data in their custody.

Growing Governmental Computer Power

Approximately 20 federal agencies, bureaus, and departments already operate time-sharing computer systems or are in the process of establishing them. Additional systems are certain to spring up both within other governmental organizations and as a result of a number of proposed legislative programs calling for the collection of new bodies of personal data. Thus, the roots of a federal information exchange network have taken hold and the Bureau of Management and Budget has extensive authority to promote its further development. In view of the disclosures, both before this Subcommittee and others, relating to the insensitivity of some government information handling practices, the prospect of an omnibus, de facto, federal data network evolving without prior comprehensive congressional review, or the formulation of any policy guidelines that impose an obligation to protect privacy and the various rights guaranteed by the Constitution, is not a pleasant one. Yet in spite of the obvious implications of this growing governmental computer power, in critical areas involving fundamental personal rights, federal agencies are still operating in an environment of policy by default and inaction. Information is being gathered, recorded, and disseminated with a Let-George-Worry-About-It philosophy that is putting us on the pathway toward a dossier dictatorship.

The irony of all this is that several years ago a proposal to establish a National Data Center was blocked by a combination of congressional opposition and public outrage. In retrospect, that suggestion has proven innocuous compared to the reality of some of the systems already functioning in the Executive Branch of the government. The phoenix that has arisen from the ashes of the Data Center proposal is the unregulated and haphazard proliferation of governmental data banks and machine interconnections that already is posing a threat to some of the pillars of our democratic society.

Suggestions for Protecting the Bill of Rights – The Inadequacy of Common-Law Remedies

If some of the constitutional protections we have enjoyed in this country are to survive in a data based, electronic world, the law must begin to adjust to today's realities. As I have attempted to demonstrate in my book, the existing patchwork of common-law remedies, constitutional doctrines, statutes, and administrative regulations is not capable of dealing with the problems raised by the accelerating pace of federal information gathering and the emergence of computerized information systems. Today's legal structure is characterized by uncertain application, lack of predictability, frequent inconsistency, unawareness of the ramifications of the new communications media, and an almost total disregard for the individual's right to participate in information transactions that may have a profound impact on his life. To take but one of many examples of this, the existing common-law tort theories deal almost exclusively with the public dissemination of previously acquired data, and ignore the implications of the unrestrained governmental collection of information. To be effective, a regulatory scheme must reach the latter problem and this simply may be impossible or may evolve too slowly from the right-to-privacy tort as we know it today.

Recognition of Citizens' Rights

But the law books are not entirely barren. The Supreme Court has recognized the individual's right to object to certain governmental attempts to extract information from him. Perhaps the most clearly developed of these notions is the citizen's right of associational privacy, which seeks to recognize the "vital relationship between the First Amendment freedom to associate and privacy in one's association." (NAACP v. Alabama, 357 U.S. 449, 462; 1958) Thus, when the government attempts to gather data concerning an individual's association with a group dedicated to the advancement of certain beliefs in "political, economic, religious, or cultural matters" (Id. at 460), it must "convincingly show a substantial relation between the information sought and compelling state interest." (Gibson v. Florida Legislative Investigation Committee, 372 U.S. 539, 546; 1963) These cases certainly contain the doctrinal seeds needed to curb the excesses of those federal surveillance activities that are likely to inhibit the exercise of First Amendment freedoms. It must be noted, however, that the successful assertion of a violation of one's associational privacy appears to depend upon a showing that disclosure will result in a restraint on an individual's ability to exercise his freedom of association.

Closely related to the right of associational privacy is another judicially recognized individual interest – the right to possess ideas and beliefs free from governmental intrusion. As the Supreme Court stated in Schneider v. Smith, 390 U.S. 17 (1968), First Amendment guarantees and the concept of associational privacy "create a preserve

where the views of the individual are made inviolate. This is the philosophy of Jefferson that 'the opinions of men are not the object of civil government, nor under its jurisdiction. . . .' " (Id. at 25)

This judicial recognition of privacy in one's associations and beliefs should not be narrowly construed; if it is, the people will receive only limited protection against highly inhibiting governmental intrusiveness. It seems to me that these Supreme Court cases announce an expansive principle, one that is part of a tradition basic to the nation's philosophical fabric – the conception of government as an institution of limited powers that is obliged to meet a heavy burden of justification when it undertakes a program or course of action that will inhibit the freedom of its citizens. It is axiomatic that the in terrorem effect of widescale governmental surveillance or information control can chill the exercise of an individual's constitutional rights. Thus, agency supplications based on claims of economy or gains in governmental efficiency or justified in terms of the current quest for the holy grail of "Law and Order" simply do not justify every demand for greater power to extract, manipulate, store, and disseminate data relating to the lives and activities of people and groups.

Altering Citizen-Government Balance

Unfortunately, the trends in the information surveillance field are altering the citizen-government balance so drastically that even if the common-law privacy remedies were refurbished and the First Amendment freedoms of association of belief were expanded, it still would be unwise to rely exclusively on private lawsuits for damages or an injunction against further intrusion on constitutional rights. In addition to the difficulty and imprecision of attempting to convert a loss of freedom into monetary terms, the right of an injured person to seek redress is hollow indeed because he is so completely excluded from the information gathering-recordation-dissemination cycle that in many instances he may never learn how his life is being affected by the circulation of personal data relating to him.

Possible Legislative Approaches

Direct legislative action based on the congressional power to safeguard constitutional rights clearly is indicated. Statutory protection might take a number of different forms. One relatively simple statutory approach is to prohibit governmental organizations from collecting designated classes of sensitive personal data – an approach that is bound to incur the ire of the agencies, all of whom believe that their data gathering activities are imperative for the success of some national policy.

One variation would be a statute prohibiting data collectors from using, or threatening to use, coercion to compel individuals to disclose data they are not legally obliged to furnish. This would also require reappraising the existing statutes that make disclosure of certain information by citizens mandatory, presumably with an eye toward reducing their coverage. Some aspects of the bill introduced last year by the Chairman of this Subcommittee (S. 1791) illustrate this approach. The same is true of the proposals seeking to eliminate the criminal penalties for failure to answer many of the questions on the decennial census. Although eliminating some of the harsh sanctions for noncompliance with governmental demands for information appears to be desirable, doing so is not a panacea. Prohibitions against coercive data collection will only remedy some of the more blatant abuses; they will be of no assistance in assuring better data handling and dissemination practices or limiting the government's right to collect information from sources other than the data subject.

A different, and in some ways more drastic, legislative approach involves requiring computer manufacturers, users, and data networks to employ prescribed technical and administrative safeguards for maintaining the integrity of personal information. This also could take the form of imposing a general statutory duty of care on every federal official connected with the processing of data, which would have the effect of encouraging sensitivity to the dangers of information abuse, or of enacting detailed requirements that would have to be followed by all computer manufacturers, handlers, and users of personal information.

The Complexity of Legislation

It would be very difficult at this time to employ any of these legislative formats in a statute that was to have general application. Personal information is used for so many different purposes that it may be impossible to draft a single body of statutory rules to govern all data systems carrying individualized data. The problem is compounded by the chameleon-like character of many types of information – data collected in one context may carry an entirely different meaning when transplanted to another.

Extremely complex legislation therefore would be necessary if specific privacy safeguards are to be prescribed for different information environments. This would be a particularly useful way, for example, of insuring that the sophisticated protective schemes that do exist for safeguarding computerized data are employed. A variety of access regulations, personnel controls, and mechanical devices are available that can discriminate among users and differentiate data on the basis of its sensitivity. To protect a system adequately, a combination of these techniques will have to be used so that a weakness in one aspect of a system's security will not compromise the other protective schemes. Along the same lines, any legislation that purported to prescribe how sensitive personal data – whether computerized or not – should be protected would have to deal with every phase of information integrity and draw distinctions in terms of the various levels of information sensitivity.

A Potpourri of Statutory Controls

Thus, a potpourri of statutory controls might well prove necessary; some would establish degrees of confidentiality for different kinds of data and others might prescribe the technical and procedural safeguards to be employed by the system. This type of refined legislative structuring presumably would be based on an evaluation of how much "privacy" the data in a given system deserves and a balancing of the damage that could be caused by misuse of the information against the importance of the information to some legitimate government objective, as well as the cost and loss of efficiency that might result from implementing various safeguards. Alternatively, separate statutes could be framed in terms of the different types of information that is collected – e.g. health, military, internal security, financial – or to deal with the activities of the various groups that gather data – e.g., law enforcement agencies,

military organizations, administrative agencies, statistical organizations.

But a detailed congressional assessment along these lines becomes an overwhelmingly complex undertaking, especially if it must be made against the background of massive surveillance data banks or highly sophisticated computer networks that carry information from numerous sources and are used by different governmental organizations for highly disparate purposes. Our very limited experience with data centers and computer networks, however, makes the job of drafting sound, comprehensive, national legislation that will stand up under the pressure of rapid technological change virtually insurmountable at present.

Watchdog Group

Although various factors make detailed federal legislation in the near future both difficult to compose and a potentially unsatisfactory technique, they do not preclude the possibility that the current threat to our privacy and constitutional freedoms may be amenable to administrative regulation. In addition to obviating the need to make highly sophisticated policy judgments in statutory form, which may become obsolete shortly after going into force, giving the problem over to administrative control might have the effect of putting it in the hands of a watchdog group, composed of experts in the field who can exercise continuing supervision over governmental data activities. Moreover, if well drawn, administrative regulations should provide sufficient flexibility to permit experimentation and require less time for revision when new problems present themselves than do statutes.

Administrative Regulation Holds Promise

Unfortunately, there is a negative side. Administrative regulation has fallen into considerable disfavor in the United States because it frequently takes on a highly bureaucratic character. All too often, resort to agency action has become synonymous with delay, red tape, and arbitrariness, with the hoped for supervision of a field by an informed cadre giving way to the reality of politicized administrators who have little understanding of the complex problems under their governance. The situation typically is made worse by inadequate staffing and funding, which prevents many federal agencies from acquiring the expertise necessary for rational decision making. Despite these deficiencies, however, I believe that administrative regulation holds the most promise as a means of coming to grips with the important problems confronting us in the information arena.

Where Should Regulatory Power Be Placed?

It is not immediately apparent where regulatory power should be placed or what form it should take. Certain basic principles provide some guidance, however. Because of the national character of the citizen-surveillance problem and the computer-communications industries, there is no doubt that control at the federal level is essential. Yet a regulatory approach based on a general legislative directive to all of the agencies, but one that leaves each of them responsible for establishing rules governing their own information activities, is likely to produce such significant variations in philosophy and practice that little may be gained. Thus, regulation must come from a single source having jurisdiction over all of the federal government's information activities.

It also seems axiomatic that regulatory power ought not be given to an agency having operating responsibilities that are dependent upon or involve the handling of a flow of personal information. The debate over the proposed National Data Center and revelations before congressional subcommittees concerning the intrusive activities of the Internal Revenue Service, the Post Office, and the Immigration and Naturalization Service, make it abundantly clear that the rights of the individual often get short shrift from agencies that have a vested interest in gathering and using personal data. The result, of course, is that most of the existing information agencies should be disqualified from a leadership role in formulating regulatory policy for governmental data banks.

The Creation of a New Institution

Is there any organization to which the problem can be entrusted? I have given careful thought to the possibility that an existing federal bureau, agency, or department, such as the Census Bureau, the Bureau of Management and Budget, the Federal Communications Commission, or the Federal Trade Commission, might be given responsibility for developing an administrative scheme for regulating the federal government's information activities and computer systems. But I have sadly come to the conclusion that none of them would be an effective guardian of the rights of our citizens, either because they are obligated to various institutional "clients", or because they are philosophically committed to the paramount importance of administrative efficiency.

If this is true, then the conclusion is inescapable: regulatory control must be lodged outside the existing administrative channels. As repugnant as it may sound in an era of expanding governmental involvements, it may be necessary to establish a completely new institution – perhaps modelled after the semi-autonomous Government Accounting Office – that can operate under a set of legislative guidelines and establish policy for the protection of individual privacy and the preservation of Constitutional rights. A new agency might well succeed in regulating the nature of the data about citizens that can be collected, recorded, and stored by various governmental organizations, enforce a congressional standard of care for insuring the accuracy of the government's information store, and make certain that all federal data centers employ the latest and most appropriate technological safeguards to protect files against breaches of security.

Characteristics of the New Administrative Body

In addition, there are several necessary characteristics that any administrative body must possess in order to be effective as a guardian against undue informational surveillance, and it might be useful at this point to suggest what some of them are. The agency should be staffed by people who are versed in a wide range of disciplines – technology, science, law, and the humanities (particularly psychology and sociology). The agency commissioners or directors themselves should be drawn from various fields. The agency also must have access to all federal data banks and maintain a close liaison with other governmental organizations as well as the data gathering and using communities in the private sector. This is essential in order

both to stay abreast of the nation's information needs and to be in a position to recommend a revision of the regulatory scheme when changing conditions make that necessary.

Educating People About Society's Data Needs

One of the basic tasks of an agency of the type I am suggesting is to attempt to educate the data worshippers, the privacy paranoids, and the general public in the hope of achieving some common understanding of society's data needs and the growing public concern over the preservation of individual privacy and the First Amendment freedoms. At present there is considerable anxiety throughout the nation about the specter of a fishbowl environment and a lack of sensitivity to the problem on the part of information managers and system designers.

To further this educative function, it might be desirable to hold public hearings on a broad range of subjects, undertake technical and social science research projects, and act as a clearinghouse for information concerning activity in each of the many fields that bear on the question of governmental information policy. By use of these and other methods, the proposed agency could implement a principle analogous to that embodied in recent proposals before the Congress to create a Technology Assessment Board.

Preservation of Personal Privacy and Freedoms

Another basic ingredient for evolving a rational regulatory policy is that the agency must have authority to engage in rulemaking relating to the technical features, personnel qualifications, and administrative procedures employed by all data centers that handle significant quantities of personal information. If airplanes and pilots must be certified, if automobiles are required to meet safety standards and their drivers obliged to pass tests and obtain licenses, why shouldn't governmental data collectors, computer systems, and information managers be obliged to meet and be pledged to honor requirements relating to the preservation of personal privacy and constitutional based freedoms?

Regulation of Non-Federal Systems

Ideally, the agency's power should be broad enough to embrace the activities of non-federal information gatherers that might adversely affect the rights we are trying to protect. The regulators should be particularly attentive to the interlocking relationships that have begun to spring up between federal and local data handlers in the law enforcement field and the fact that many of the nation's major corporations maintain dossiers on millions of Americans. Close scrutiny of the latter category of data banks is becoming imperative because there is growing reason to believe that these files are exchanged both within the private sector and with law enforcement and surveillance groups at all levels of government. In short, once standards are established for federal systems, I believe that it eventually will become necessary to apply them to certain non-federal systems.

Information Ombudsman

To implement the controls and regulations ultimately adopted, the federal agency I am describing will have to provide a method for handling grievances brought to its attention by members of the public. One obvious method would be to give statutory authority to the information agency to investigate, direct correction, and award appropriate relief for any abuses brought to its attention by individual citizens. Through the use of these procedures, its ability to negotiate with the information managers, and its status as a governmental organization, the agency could play the role of an information ombudsman, a device that is well known in the law of several European countries and is beginning to be recognized in the United States.

A Citizen's Control Over Information Relating to Him

The agency also must develop and place heavy reliance on measures that provide the citizen some degree of control over personal information relating to him. The objective should be to develop procedures that give the individual a voice in the important transactions concerning his life history – transactions that often may drastically affect his economic and social well-being. Our society's traditional dedication to ideals of fair play and due process indicates that any set of rules regulating the handling of personal information should accord the individual, or someone who can represent his interests adequately, the right to receive notice and an opportunity to be heard before important decisions are made concerning his informational profile. The federal government should be held to no lesser standard.

The right to be heard must include the ability to rebut damaging evaluations, or to show that a particular information practice deters his exercise of rights protected by the Constitution, or to demonstrate that the data does not sufficiently further any legitimate government objective so as to warrant its retention, or to demand that recorded personal information conform to minimal standards of accuracy. In order to be meaningful, an administrative means of resolving conflicts between the citizen and the government must be expeditious and inexpensive.

An Agency Accessible and Responsive to Everyone

The effectiveness of an agency that is intended to protect individual citizens against information abuses obviously depends upon its ability to avoid becoming a captive of the governmental units and private interests that have a stake in the data networks and systems that are to be regulated. The tendency of the so-called independent regulatory agencies to be captured by the industries they supposedly stand vigil over is a disheartening, but not totally bleak, prior history from which to proceed. With proper staffing and well-chosen lines of authority, an information agency may be able to achieve the degree of independence needed to perform its vital watchdog role.

The other extreme must be avoided as well. A governmental agency cannot be permitted to become an island unto itself – neither responsive nor responsible to anyone, populated by technocrats whose conduct is shielded by their alleged expertise and the supposed importance of the governmental functions they perform. It must be accessible and be responsive to everyone. Above all, the agency's activities and its regulations must not be permitted to ossify. For the foreseeable future the key to effective regulation will be the ability to maintain sufficient flexibility and resiliency to adjust to changes in our technological and social environment. □

ENVIRONMENTAL POLLUTION: MORE PROBLEMS WITHOUT SOLUTIONS?

". . . what really happens to a city when a clean air policy is instituted? An easy answer might be that the people will eventually breathe more freely. The more searching questions, however, might concern the secondary results that such a policy would have on the economic, social and political atmosphere of the city."

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(Based on a paper presented as part of the technical program at the 1971 Spring Joint Computer Conference in Atlantic City, N.J.)

We are about to spend (so says the Federal Government) about 10 billion dollars over the next few years on a holy war to save the environment. The crusade, this time, is to fight pollution initially and to preserve our environment eternally.

We may or may not win, but past performance indicates that when the goal is universally agreed upon, the chances of success are greater. We have already spent double this amount to achieve our country's most flamboyant success of the past decade – leaving footsteps on the moon. This universally-acclaimed achievement, coupled with other large and well-known crash programs, such as the Manhattan Project and war production of airplanes and ships, gives credence to the American formula for problem solving – take research and technology, add publicity and stir, blending in large amounts of money as needed.

Research Fads

The formula seems to work well enough in the fields of science and technology. Unfortunately, when the social sciences try to use the same recipe, they usually come up with half-baked schemes. Despite their good intentions, social scientists in the past decade have been sent on crusades to banish poverty, segregation, unemployment, youthful alienation, mis-education, the urban dilemma, and others. Those impressive hula-hoops of research were discarded one by one – not because problems were vanquished, but because fickle public interest, policy focus and funding were supporting a new and better research fad.

Test Proposed Solutions

Upon us now is another cycle of extensive radio and T.V. coverage, newspaper stories, magazine pieces, journal articles and speeches covering every topic that can be even loosely tied to the environment – which may well include anything. My sincere hope has been that in this cycle, we decide what we want to do, plan carefully, and test our proposed solutions before we inflict them on our land and our people.

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My ten years in social science research has led me through the wasteland of many of the above programs with their policy statements, their resounding high hopes and all too few successes. This experience also suggests that my wish for environmental policy planning before the expenditure of large amounts of money for "solutions," is naive. Almost two years ago, a group of us, frustrated by rhetoric,

formed a company called Envirometrics. The name reflected our concern not so much for the physical milieu but for the total fiber of society.

Proliferation of R&D Groups

Today the name seems a possible error as dozens of others will attempt to become "Environmetricians" (as many of the past decade became, or are still becoming "Urbanologists"). The possible proliferation of so many R & D groups, added to those already in universities, all writing weighty treatises that define environmental problems and offer still weightier solutions suggests a pollution of our landscape greater than almost any form of smoke or raw sewage.

An Alternative

I would suggest a somewhat radical departure from many of our past research techniques. Let us keep the amount of repetitive, descriptive, paper-generating "research" to a minimum, particularly the variety which offers instant solutions to mammoth and complex problems. More importantly, I would suggest that we not rush into testing our dubious schemes on our people and our land before we test them in a laboratory. Such restraint is not only good research policy, it is also good economics – not to mention the humanistic benefits of minimizing the often horrendous social and personal costs of program failure.

The physical effects of environmental research can easily be pretested before solutions are actually tried out. The problem is how to test these physical solutions in the context of a total society. For example, what really happens to a city when a clean air policy is instituted? An easy answer might be that the people will eventually breathe more freely. The more searching questions, however, might concern the secondary results that such a policy would have on the economic, social and political atmosphere of the city.

Solution to Pollution Problem is Expensive

Once as I drove along the Massachusetts Turnpike from Springfield, Massachusetts to Albany, New York and looked at the river pollution caused by the paper mills, I thought that it was a shame that good trout waters were ruined because of a factory or two. The immediate solution seemed relatively simple. The State could pass a law requiring that the paper industry clean up its run-off before dumping it into the river. I understand that present technology is quite capable of accomplishing the cleansing. The problem is that the technique is so expensive that it is doubtful it can be afforded by these small paper companies. Strict enforcement of the law would probably close most of them. From the point-of-view of conservation, that would be a victory, as the rivers would eventually return to normal with help from the State Water Commission and fishing would be restored after restocking.

A minor flaw in the solution is that these paper mills are usually the only industry in the surrounding town. The closing of the mill means the closing of a whole community effectively.

Let's not try and judge the relative merits of the choice, one Clean River over one viable Community, since there is no value scale (at least one on which we would all agree) to use as a measure. Rather, this admittedly simple example suggests that rushing headlong into the solution of the environmental problems, before we examine the potential effects of policy, may have unexpected, deleterious effects. We may throw out the baby with the bath-water – even if our purpose was to get rid of the dirty water.

The Environment and the Policy Maker

Probably the single most difficult task of the policy maker is to extrapolate into the future the changes he would like to make to the current situation. This need to "predict" the potential results of policy decisions has led to the birth of numerous methodologies in the social sciences, all aimed at the same goal of being able to be "predictive." When pursuing the goal, most social science disciplines reduced the scope of the problem and claimed that they were only going to note the effects of a particular decision on one sector of the total milieu. This strategy makes the problems more manageable for the social scientist; unfortunately, it also often makes the results useless to the policy maker.

Others who recognized the need to look at the total milieu, rather than each of the parts, were faced with an equally interesting dilemma. Much of the detail used by those who focused on a single discipline was solid and appeared to represent reality. Unfortunately, the task of correlating all of these detailed factors seemed beyond normal ability. These early systems analysts solved the dilemma by deciding on a level of generality which would encompass most of these other disciplines compatibly, and yet be understandable. Regrettably, the level usually chosen was so gross that analysis of the effects of policy change was not possible. Recently modern systems analysts have suggested that we use the computer to help us remember more facts and to aid us in correlating the more detailed features of the various social science disciplines. In essence, the computer allows us to increase the level of detail when handling a total milieu rather than a particular part. In fact, the level might be sufficiently fine that the policy maker could use it to get a glimpse into the future.

The social scientist has, of course, not totally ignored the computer. Skipping applications which use the computer only as a number manipulator, let us concentrate on three major areas of computer usage: information retrieval, simulation, and gaming. In this article, I will try to explore only the essence of each.

Information Retrieval

It seems that only recently the urban social sciences have seriously considered basing their decision-making process on real data. Spurred by national interest, particularly in our decennial Census and Federally-sponsored research, state and local areas have turned to numerous software concerns to design information systems to store the vast amounts of data generated by various government departments and others, and to organize the data so that it is able to be retrieved on command by interested parties. The concept is obvious and necessary.

On the other hand, not all state and local governments have rushed to computerize their records. The reasons for this reticence differ but can generally be attributed to a lack of understanding or knowledge of the service, fear of having others acquire a detailed knowledge of particular sections of government, and cost.

The 1970 Census with its attendant publicity and availability of data over the next year should make the applications of information retrieval more widely known. Further, the Department of Housing and Urban Development has funded six cities, on a matching-grant basis, to build information retrieval systems which can be readily exportable to other cities. The effects of this six million dollar program will begin to show up in the next couple of years. Finally, the Census Bureau, in making its tapes readily available to a number of centers across the nation, should help to attract sufficient interest from private industry to make information retrieval or management information better known.

Resistance to the Computer

A second stumbling block, fear, is both serious and horrifying. This fear is not new nor confined to the civil service. Throughout the vocations, job security has been associated with the monopolization of knowledge or skills. We seem to be encountering the same resistance to computers with which manual workers met the introduction of mechanization. After many years, we have finally convinced most sectors of the community that the man-machine partnership has truly produced an industrial revolution; a revolution which has led to a society of material opulence unparallelled in man's existence. Now the professional and white collar worker is being asked to also accept a partnership with a machine, the computer. The resistance shown the computer is also as severe as the resistance to the mechanical machine of old. We can continue to expect a great level of resistance to the computer throughout the job community, helping to slow down its acceptance and its use in information systems for government agencies.

And finally, changing from hand-operated record keeping to computer is initially extremely costly. The organization of data, key punching, and so forth, of all necessary data to load such a system is often quite large. Further, the loading takes place while governments carry on "business as usual." The hiring of additional help, usually consultants, does mean high start-up costs. Further, the confusion caused by the switchover may reduce the efficiency of many government staffs as they carry out their day-to-day functions.

Such defects could be mitigated, however, by phasing in the information system over longer periods of time. A plan to computerize a state or local government, when carried out over some time by local talent (possibly using consultants only to design the system) has a greater chance of worker acceptability, is cheaper yearly, and interferes less with daily routine.

To summarize, the computer will be used more and more to aid us in keeping the large amounts of data we need to make better policy decisions. The computer revolution, however, has not been immediate nor its acceptance unanimous.

Simulation

Among the first uses of the computer as a decision-making aid were those associated with simulation in the physical sciences. The history of such uses is extraordinarily rich and too well documented elsewhere to be repeated here.

During the past decade or two, the social scientist has also attempted to use the computer to answer questions in the realm of "what if." Simulating a city, in whole or in part, is an extraordinarily useful tool for the urban researcher and policy maker. A successful replication of social reality in a computer-simulation would allow the people who must make decisions, both administrative and political, to make them better and to have more confidence in the expected effects of the policies they put forth.

At the same time such simulations can reduce the overall cost of attempting to bring about a given social change. A simulation can do this by pinpointing a policy which promises to be the most successful of a number of possible alternatives. Reducing the number of false starts would also help to lessen the amount of human suffering and inconvenience associated with social programs which are begun and then abandoned.

Simulation Techniques

The technique by which social scientists simulate their world is basically the same regardless of the problem.

1. They define the situation (of which the problem or interest area is a part). The definition usually includes a number of necessary limiting assumptions which define the strata of the real world the analyst is about to simulate.
2. They decide the level of abstraction to be used and the variables, which they believe to have sufficient bearing on the area to be stimulated.
3. They determine the method of simulating the problem so that the significant variables are related to one another and the relative effects on each other can be considered.
4. They gather the necessary data to load the simulation so that the current situation (as described by the model) can become the basis for future extrapolations.
5. They fine-tune the model so that, by some criteria or other, the user has confidence in the predicted results.

The process, therefore, is relatively straight forward and not impossibly difficult to program for the computer. In fact, the similarity among many types of simulation problems is so great that special computer languages, SIMSCRIPT and GPSS were developed to facilitate programming the simulation routines.

Success of Simulation

Unfortunately, the results of simulations have not been uniformly good. There appears to be some success with those that concentrate on a single problem which can be defined with measurable parameters. Probably the most successful examples in social science are transportation simulations where expected road usage, effects of road building on traffic load, and many other related problems are considered. Reputedly successful are those that predict use based on population projection and transportation routes.

Failure of Simulation

Failures, however, far outweigh successes. Many attempts have been made to simulate a total urban environ-

ment; most have been judged failures after running. Some never ran. The difficulties were many; horrendous complexity as well as lack of data, of basic research, of basic theory, and of money. Generally, though, the failures stem from the simple inability of the simulation designers to measure social, political and institutional parameters – descriptors of the environment which are indispensable but generally conceded to be non-quantifiable or at least very difficult to quantify.

Obviously, these general statements do not condemn simulations but emphasize their limitations. Unfortunately these limitations have been sufficiently serious that no new macro-simulations have been started which attempt to deal with all the various facets of the social milieu.

Gaming

The third major area in which the social sciences have employed the computer as a partner is in education and training. Gaming has been using computers for almost two decades. In many instances, builders of games have rebelled against simulation and thus, have been damned by simulation designers for not being able to use realistic numbers in their models.

Bluntly, regardless of whether or not a game builder uses simulation, the principal constraint of gaming models is not the degree of their realism nor the accuracy of their data base. Games are built so that people can play them, and learn various things from such participation. If the game gets too complex to play it loses its purpose and approximates reality only to the extent that there are people bright enough to comprehend the total environment represented in the game and to operate within its constraints.

Gaming has come a long way in the past several years. Early models (and some of the more simple-minded present ones) were designed to be learned rapidly, played manually, and teach little. They resembled a parlor game more than a serious educational tool and consequently, gave gaming an almost ludicrous reputation and relegated it to the primary and secondary grades. Recent models such as the GSPIA, METRO, CITY, Northeast Corridor, and INS have advanced the technique into a respected education-training tool for college level and adult audiences. The principal aim of these models is to create a more or less comprehensive decision-making milieu for players to operate in and on. Among the many goals sought by their builders, is to teach participants the interrelatedness of the social system and the hopelessness of making policy through the single focus of one discipline.

As gaming evolves over the next several years it will be used by many areas of social science. Its success as a stimulating educational tool has led designers to begin creating a laboratory for social scientists. This laboratory will create a simulated environment where educators and students can both learn about the real environment.

The Next Stage

Simulation techniques, gaming and management information systems are all useful in the search for understanding and organizing our State and local governments. They are, however, limited at present in their usefulness to the chief decision-maker. Rather than compound the confusion already generated by researchers in the three fields mentioned above, I would like to suggest a synthesis of all of them.

Operational Simulation

A few years ago, a group of us, then called Urban Systems Simulations, began work on a new form of urban gaming, operational simulation. At that time, there was general disagreement (there still is) on whether mathematical simulation, systemic gaming, or role-playing gaming was the "best" way to approximate and teach about urban area. We decided not to join the fight but to take parts of the three approaches and wed them. Today the staff, now Envirometrics, is proceeding with the development of a single, generalized model which can be used by any government to study all levels of the social environment – national to neighborhood – regardless of the location, cheaply and quickly.

Although we think these models represent the apex of modeling research, they have some definite limitations. These limitations generally are in the areas of validation and the usefulness of operational simulation as a policy tool. The limitations are, of course, not particular to these models but can be found in all games.

Even if we spend a large amount of money to actually replicate specific locations for gaming purposes, we should be very careful to understand exactly what we will have when we produce the final product. A game, or a more sophisticated operational simulation, representing a specific city, would be a desirable and useful tool in many ways. It would provide a continuing laboratory with which to teach local inhabitants, researchers, students, and professionals about their city; provide a focus for continuing forums concerning specific issues, such as a new school, road, tax policy, etc. It would also allow the policy maker to introduce a new concept into this laboratory and see at least one of the possible results of his idea each time a game was run. It is not, however, a useful tool for the administrator or policy maker who is concerned with the probabilities of the success and consequences of his actions.

The Need for Simulation

Modern administrators can no longer afford to implement policies until they have a greater idea of their consequences. Obviously, leaders have always had the responsibility for their actions. But today's technology makes their failure to use modern applications almost as big a crime as the surgeon failing to use modern techniques to diagnose and cure a patient.

A technique must be perfected which will suit the needs of the modern administrator. Simulation seems to fill this demand, except that it has an almost fatal weakness in areas of our environment which do not appear to be measurable in readily agreed-upon terms. The introduction of gaming techniques to simulation is a step toward solving this problem, as human players are substituted for math equations when decisions call for human intervention. Unfortunately, this tool is not satisfactory for the policy maker who wants to use simulation to ascertain the future ramifications of his decisions. Frankly, he cannot spare the time or the staff to run a game a sufficient number of times to generate statistically confident results.

A Modeling Compiler

While building the general gaming model mentioned above, the Envirometrics staff has begun the development of a modeling compiler. A compiler of this sort resembles

the already available programming languages in that it will interface with the user and the computer. The model is so constructed that the user can specify not only the data base but the specific equations he wants for his simulation. Further, the model builder will be able to change individual segments to specify more precisely a specific section of the model.

Each model produced with the compiler would only be one path through the very large number of possible alternative model designs. The ability to specify modules would mean that the model could be used for gaming or simulation purposes. Inputs, both exogeneous and endogeneous, could be added by human operators. The beginning points plus these inputs could be run in a simulated model generating a large number of possible outcomes for the locality in the next year – based on the inputs. These results should then be analyzed statistically so that the administrator knows what the "odds" are of a particular outcome if he pursues a specific set of policies. At that point he is able to decide if these outcomes meet his criteria. If not, he could readjust some of his decisions and test again. He could take the best probable outcome as a new beginning point and make his policy decisions on this data. Perfect? Hardly, but better by far than any other technique currently available.

Thus, a decision maker has at his disposal all of the power associated with today's modern computer hardware and software and combines it with his own experience and judgment. The more people he uses to provide decision data to the simulation the more certain he can be of the most likely results of his actions.

Summary

In summary, we need the best of all three areas to provide a tool for the policy maker:

We need the information capability of a sophisticated management information system, not only to provide the administrator with a high quality data base but also to serve as a base for the simulation.

We need the techniques developed in operational simulation, not only for the sophistication of the process itself but for the methods developed for dealing with people as decision-makers in a contrived environment.

We need the technique of machine simulation for its ability to generate large numbers of possible alternative futures with given data. Thereby we explore many of the outcomes that might happen to an administrator, given his particular policy decisions and those of his peers.

To conclude, the technique I suggest is not one which will provide instant results in terms of better cities, states, counties, etc. On the other hand, it will allow the policy maker to determine whether he really wants to pursue a particular plan of action – given the probable results suggested by a simulation of his area. Final testing of the technique will be expensive and time consuming. On the other hand, the Federal government promises to spend some $10 billion to improve the quality of our environment. Similar amounts were promised to save our cities, our poor, our land and so forth. Recently, we spent $20 billion to go to the moon. If we do not use our 20th Century technology to help solve our social and ecological problems before the 21st Century, the $20 billion spent for the moon shot may turn out to be the cost of basic transportation research – as preparation for an exodus from an uninhabitable earth. □

Davison and Honey – Continued from page 11

sequences of any controller on the city streets, and displaying the timing sequences on demand in the control centre. Software developments include a traffic simulator to enable the system programs to be rigourously checked, and to enable input data for detailed study of boundary conditions to be reproduced, especially when the additional schemes are being tested. A complete duplication of the system has now been ordered in which an automatic takeover of one computer from a faulty one will occur, with load shedding as necessary. As no auxiliary memory systems such as magnetic tape or disc are being used, system reload will be *via* paper tape, using automatic wind and rewind facilities, so that the diagnostic programs, and ultimately the system program reload, may be attempted.

In conclusion, to cater for the large numbers of vehicles which are required to be stored in the city centre during the working day, computer control of multi-storey car parks is being carefully studied. Vehicles will be monitored *en route* along the city ring road, and advised on the availability of parking facilities as they are approached. Vehicles entering the parks themselves will be advised on the floor and aisle status on each floor to eliminate the 'random walk' so often experienced by motorists in search of a space. Vehicles exiting the car parks will be carefully filtered into the traffic flow on the ring road so as to avoid congestion points and to maintain smooth, shock-free flow.

GLOSSARY OF TERMS

Tunnel route a designated signed route leading to the tunnel upon which movement and storage of tunnel bound traffic is catered for
Tunnel lane part of tunnel route which, under peak traffic conditions, is reserved for tunnel bound vehicles, and forms the only acceptable approach to the tunnel
Local lanes part of tunnel route reserved, under peak traffic conditions, for local (non-tunnel) vehicles; by the use of traffic islands, *etc* access to tunnel is made impracticable from these lanes
Local route a route for use by traffic other than bound for the tunnel
Block section of controlled road between two signalled intersections
Queue-jumping the unauthorised entry into tunnel queues from adjacent parallel local lanes
Inhibit the application by the computer system of a red signal on the tunnel-lanes, irrespective of state of main signals
Inhibit delay the time, as assessed by the computer, before the application of the inhibit signal should take place; this is continuously modified by the computer, according to conditions at any instant
Release removal by the computer of an inhibit signal, and reversion to main phase working
Release delay the time, as assessed by the computer (during an inhibit phase), before release of the inhibit signal should take place; this is continuously modified by the computer, according to conditions at any instant

References

1 City centre planning group, Liverpool City Centre Plan 1965.
2 Stockley N. H. and Evans A. J. R., *Traffic Engineering and Management in Central Liverpool*, Traffic Engineering Control, 1967, 8 (March).
3 Foote R. S., *Instruments for Road Transportation*, Report TBR 2-68, Tunnel and Bridge Dept., Port of New York Authority, March 1968.
4 Gazio D. C. and Foote R. S., *Surveillance and Control of Tunnel Traffic by an on-line computer*, IBM Research RC 2358, Jan. 1969.
5 Stockley N. H., Evans A. J. R. and Davison A., *City of Liverpool: Central Area Congestion Control System*, Proc. Instn. Civ. Engrs. 1969, 44 (Oct.).
6 Honey D. W., *Computer Applications in Road Traffic Control*, Journal Instn. Measurement and Control 2 (Sept) 1969. (Paper first read at the Symposium on 'Experiences with Software in Computer Control Applications, July 1969).

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D. W. Honey, MEng, MIEE, MBCS, was programming manager of the Data Processing Division, Automation Group, until joining the City Engineer's Department in July 1968. He is directly responsible for the computer complex and the implementation of new schemes and programs. He is at present researching into traffic delays associated with road tunnels as part of his general duties.

THE APPLICATION OF ELECTRONICS TO COMPOSITION AND PRINTING

Raymond A. Hay
Exec. Vice Pres.
Xerox Corp.
Rochester, N.Y. 14603

". . . One of the most dramatic of these new technologies – the application of electronics to composition and printing – presages a revolution of the same magnitude as that brought about by the invention of moveable type."

(Based on a talk given before a meeting of the National Newspaper Association, Rochester, N.Y., June 25, 1971)

New technologies already evident may be among the most significant and far-reaching changes facing any business today. One of the most dramatic of these new technologies — the application of electronics to composition and printing — presages a revolution of the same magnitude as that brought about by the invention of moveable type.

New Tools and Techniques in Printing

Since the introduction of the linotype and the rotary press, relatively few significant new technologies have appeared in the newspaper business. There have been important developments, of course, particularly in offset printing, and in the use of computers in typesetting. But these appear small compared to new tools and techniques on the horizon; and these techniques could very well revolutionize traditional concepts of the function and practices of newspapers.

Communications experts are predicting there will be broad usage of two major technologies by the 1990's. One of these technologies is high-speed electronic composing machines, coupled with electrostatic printing systems. These will be used mostly by high-volume publishers, although some applications are sure to be used in newspaper publishing.

The second technology will involve facsimile newspapers produced right in the home, or in a neighborhood communications center. Both systems can be faster and cheaper than current methods.

The facsimile newspaper may now seem only a remote possibility. But it holds a potential that should not be easily overlooked.

Facsimile through small-area cablecasting should appeal to medium and low-volume publishers.

Filling the Communications Vacuum

Today it is difficult to reach any large audience without coverage through media that blanket large areas. This has created a communications vacuum for more selectively defined audiences and geographic areas. This vacuum is now being filled by local and regional publishers. But the need to keep pace with population growth and residential expansion may well demand early involvement by newspapers in some of these new technologies.

Cable television may soon permit electronic shopping, and advertising which will concentrate on answering consumer questions about products. This selective shopping device could compel a reduction in the size of newspapers, 60 percent of whose present pages are devoted entirely to advertising.

Transmitting a physically smaller newspaper into the home by facsimile will be cheaper and faster than conventional methods. And it will be more convenient and useful to readers than some of our increasingly bulky newspapers.

Two-Second Newspaper Delivery

An RCA research program indicates these new communications channels are so cheap and efficient that time and distance may be less relevant to cost. This study notes that the contents of a newspaper can now be delivered in three days by second-class mail ... in one day by first-class mail ... in 40 minutes if transmitted by electronic signals over an ordinary telephone line ... and in 2 seconds over coaxial cable of the kind used in home cable installations.

Mechanical reproduction of a newspaper transmitted to the home probably would take more than two seconds to emerge from the facsimile unit. But a reduced-page edition would take a relatively short time.

This concise facsimile newspaper will clearly have a business advantage because the average reader has less time available for reading news, and he is becoming more and more demanding of precise product information from advertising. This latter point is evident in the growth of consumerism. Readers will give less time and attention to metropolitan newspapers and their bulk of unwanted information, particularly if there are alternative choices for obtaining needed or wanted information.

The possibility of widespread use of facsimile, home-produced newspapers poses another interesting situation for the newspaper industry. Newspapers themselves may have to decide whether they are printing plants or whether they should prepare to become analysts of daily political, economic, and social information.

I believe this decision may be forced somewhat — not only by technology, but by the change in emphasis demanded by the expansion and flexibility of cable television. The author Ben Bagdikian points out in his book "The Information Machines", that the distinction between printed and broadcast news will become more and more blurred as time passes.

A standard package of broadcast news will continue to have attractions, even as the printed package will. But beyond that, broadcasters will begin to feel a lack of depth in professional journalism talent.

The printed news system is still basically the main source for broadcasting today. However, widespread televised monitoring of public meetings will call for more detail and analysis than is presently exposed within the time limitations of commercial television.

Change and Challenge

I believe the consumer eventually will demand more depth. And he will get it from the organization which has the best talent and is the most effectively organized.

Today, this resource remains printed news ... and it may continue to be printed news if these organizations are the enterpreneurs who will meet the demand. Yet it could well be that if today's newspapers do not prepare for change, then the inevitable demand by consumers — the present subscribers of newspapers — may be met by new types of communications organizations.

This change and challenge should be taken seriously. If cable-TV broadens into a multi-media common carrier — and there is every indication that it will — hundreds of small information-gathering organizations will be able to afford to buy time to compete for the reader's or viewer's attention.

In his excellent treatment of this subject, Mr. Bagdikian predicts it will be as if each household had its choice of a dozen televised newsletters at any given time.

This viewpoint doesn't imply that print is dead or dying. It is not. But many of our old concepts of print are becoming outmoded. Newspapers and other publications are being forced to make a new place in the family of human communications for new ways of passing along information and ideas.

Also on their way out are many of the traditional ways newspapers gather and edit the news. Editors and reporters will have available not only the product of daily reporting — computerized and in microform — but specialized information now appearing only in periodicals and books. A reporter ultimately may be able to sit in the newsroom and monitor important public meetings — covering more events in less time. The editor may be able to replace a story lead or headline by cathode-ray tube and light pen.

As you may know, the Xerox company has had a facsimile product on the market for some years. This product — the telecopier — transmits and receives documents over ordinary telephone lines. Larger newspapers currently are using it for sports coverage, election results, and bureau networks. Smaller newspapers also may capitalize on the advantages of facsimile devices as their subscriber base grows and expands.

The Xerox telecopier received interesting national use during a recent Western Union strike. Many sportswriters at the U. S. Open Golf Tournament in Ardsmore, Pennsylvania, flashed their copy to home newspapers all over the country by telecopier. An interesting comment came from one reporter, who said: "I wrote a three-page story and it was on my sports editor's desk less than 15 minutes after I typed the closing sentence." Here is an example of how technology can really affect life-styles, for, to my knowledge, sportswriters are not universally renowned for this kind of rapid writing and filing! □

C.a NUMBLES

Neil Macdonald
Assistant Editor
Computers and Automation

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

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

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

Stuart Freudberg
Rensselaer Polytechnic Institute
Troy, N.Y.

NUMBLE 7110

```
          T H R E A D
        × B R E A K S
          R I A T W E S
        I R I I K W S
      E A K R I S H                BD = KW
    K W I T S I E
  W K A I N T I
I R I I K W S
= K B T S R W R A A K I S    6047  4292  8902  11489
```

Solution to Numble 719

In Numble 719 in the September issue, the digits 0 through 9 are represented by letters as follows:

D = 0	A = 5
C,K = 1	M,S = 6
E = 2	U = 7
F,H = 3	N = 8
L = 4	I = 9

The message is: Human life is like a candle.

Our thanks to the following individuals for submitting their solutions – **to Numble 718**: Marijoe Bestgen, Shawnee Mission, Kans.; Mary E. Brindamour, West Lynn, Mass.; T. P. Finn, Indianapolis, Ind.; Ken Kopacz and James Jurczyk, Cleveland, Ohio; William Loughner, St. Louis, Mo.; Curtis C. Morgan, Alexandria, Va.; and Abraham Schwartz, Jamaica, N.Y. – **to Numble 717**: James Godderz, Edison, N.J. – **to Numble 716**: Jud Gilbert, Tallahassee, Fla., and Jack Hausner, Brooklyn, N.Y.

ONE WORLD OF COMMUNICATIONS

Robert W. Sarnoff, Chairman
RCA
30 Rockefeller Plaza
New York, N.Y. 10020

"Of all the great enterprises that further civilized progress, communications is the most advanced in technology and the most retarded in law."

(Based on an address at the meeting of the American Bar Association, London, England, July 14, 1971)

Many of the laws, regulatory procedures, and legal and commercial agreements that cover most of the world's communications services are relics of the age of Marconi. They are hopelessly ill-adapted to the age of the satellite.

Of all the great enterprises that further civilized progress, communications is the most advanced in technology and the most retarded in law. No encompassing legal framework exists today to permit full utilization by the nations of the world of the benefits of modern communications technology.

The Dynamism of Technology

One reason is the astonishing dynamism of the technology itself. Progress seems to come in quantum leaps. Our most important communications instruments today are younger than many of our children — and far more precocious.

Within 20 years, we have moved from transistor radios to color TV to electronic computers to communications satellites. In a snap of the fingers of history, we have achieved what men have dreamed of for countless generations — the ability to reach instantaneously any one in any area of the earth with any form of information — and receive an immediate response. Now we are extending that reach to the vastness of space.

And progress continues to accelerate. The communications satellite is just beginning to demonstrate its versatility. Soon it will provide domestic and regional services of infinite variety. Within this decade, telephone and data traffic and network television will be passing through domestic communications satellites. In their ultimate form, these satellites will become powerful transmitting stations in space, able to provide direct broadcast service to individual receivers in the homes of the world.

In addition, overland transmission employing millimeter waves and lasers will make possible interconnected systems accommodating millions of two-way channels. And international satellites presently on the drawing board will provide 10 to 20 times the global wideband channel capacity currently available.

Satellite Channels

The marriage of computers and wideband communications offers the prospect of a worldwide system of regional data banks accessible through satellite channels to users everywhere. To an American lawyer of the 1980's, this could mean the receipt within seconds of electronically printed copies of laws, patents, regulations, or legal precedents from any part of the world.

Through time-sharing on satellite circuits, an entire new range of business and commercial services can be envisaged. A world stock market is one possibility. We might even see the daily double at Belmont paying off in Oslo, Karachi, or Dakar through a global system of off-track betting.

New communications services will continue to diversify vigorously, but they will not function as isolated entities. International broadcasting and message traffic, overseas telephone and data transmission, are all facets of a single worldwide pattern of information flow. They perform the same basic function of conveying intelligence over a distance. They use many of the same facilities. They share a finite spectrum of frequencies. They are all parts of one system.

Impediments to Progress

By definition, any workable system must be based on a body of rules or regulations. We in communications have plenty of rules and regulations, both national and regional. Often, however, they are unrelated, or conflict, or are outmoded. Their collective effect has frequently been to impede progress rather than further it.

The virulent form of nationalism that flowered in the 19th century and persists today also undercuts progress. It is already apparent in the planning of national and regional communications satellite systems for the decade ahead. Publicly, statesmen of different nations aspire to a universal agreement governing orbital placement and use. Yet, they show no willingness to defer their systems until such an agreement is reached.

Obsolete concepts and rules, as well as lack of agreement, impede progress within as well as among nations.

In the United States, for example, communications are regulated by the Federal Communications Commission under a statutory mandate hopelessly outmoded by current technology. As presently framed, the Communications Act cannot possibly provide the Commission with the regulatory guidance needed for the most complex and fast-changing technology ever known.

Discrepancies Among National Laws

On a global basis, wide discrepancies exist among national laws relating to copyright, ownership of material, and offensive or libelous statements. Present copyright conventions were written before satellites enabled unauthorized users to intercept and exploit program material. A non-actionable statement broadcast in one nation may be libelous when received in another.

There is no general agreement on freedom of access to satellite facilities even for material of a non-controversial or technical nature. Without such an accord, the free flow of global communications remains vulnerable to interruption at the whim of any government-controlled facility.

Finally, there is that perennial communications problem — the allocated use of the limited-frequency spectrum. Today's satellite frequencies, for ex-

ample, were allocated in 1963, a date comparable to the horse-and-buggy era in the compressed chronology of the space age. Recent advances in spectrum technology provide new opportunities for a world that can soon be populated by powerful multipurpose space systems as well as networking and direct-broadcast satellites.

When that occurs, the communications cauldron will really bubble. What frequencies shall be allocated for specific uses? Who shall determine what is broadcast? How can programs be excluded from any country or region — if, indeed, they should be? In what way can all countries be assured equal access to the new communications systems in order to satisfy their own information and programming needs?

Proposals for Action

These are complex sensitive issues. Today we are simply unprepared or unwilling to deal with them. Unfortunately, nothing in past history suggests that we will soon face up to the issues. My own experience and that of others are illustrative.

Nine years ago, I recommended establishment of a World Broadcasting Union to bring together the broadcasters of all nations in a cooperative move to eliminate the program, legal, and technical barriers hampering the full development of global television. Today, regional broadcasting unions exist nearly everywhere. Yet, with the need even more pressing, the world still lacks a unified organization.

Four years ago, I suggested an international agreement on principles that would assure the orderly introduction of future regional and global communications satellites. This would enable them to be interconnected freely with one another and with all other worldwide facilities.

Last year, I urged a fresh look at the total problem and proposed steps directed toward a global Common Market of Communications that would reject nationalist concerns and foster a worldwide flow of information.

And, two months ago, I spoke of the rise of multinational business as a result of world communications progress. I urged cooperation among nations in setting consistent ground rules to encourage the constructive advance of multinational economic activity everywhere.

A common thread runs through all of these proposals and many related statements from others in business and government. By its very nature, our technology demands a global environment. It cannot function effectively if narrow national perspectives continue to dominate the management of human affairs.

The Price of Failure

We are already being propelled toward greater economic unity by the rise of regional common markets, the spread of multinational enterprise, and expanding world trade. If we fail to support this trend with appropriate communications, the ramifications will be quickly and dramatically evident. The underdeveloped nations will be deprived of an opportunity to achieve within a decade a degree of economic and social progress that would otherwise take generations. Using a monetary yardstick, the price of failure will be an estimated $500 billion in unrealized world trade volume by 1980.

Carl Sandburg had a favorite story about a soldier of fortune who implored the Sphinx to give him in one sentence the wisdom of the ages. The Sphinx replied: "Don't expect too much."

In communications, I believe that we have failed to expect enough. Our technology confers upon us far greater power than we seem prepared to use.

In this generation, the legal profession has demonstrated its willingness and ability to tackle great issues — civil rights, court congestion, erosion of First Amendment freedoms. As yet, it has not concentrated the same attention on communications law. This is most unfortunate.

A New Initiative

Therefore, I propose a fresh initiative by the members of the American Bar Association. The first step would be referral of this pressing matter to an appropriate Association committee — either already existing or to be created. It should enlist the cooperation of lawyers everywhere to develop a suitable framework for a system of global communications. Among the steps that I recommend this committee consider are the following:

- A general conference of legal specialists from all countries to analyze the requirements for a global system and to form a working group for study and recommendations.
- Research by the working group into communications policies and needs, in consultation with specialists in related fields and with the various agencies now dealing with specific limited problem areas.
- A general conference to consider the working group report and to prepare a statement of global objectives and priorities for submission to the UN and to national governments for their action.

We in communications urgently need this attention. We require a whole new body of law, domestic and global, terrestrial and space, to give direction and cohesion to our technological progress.

I urge the distinguished members of the American Bar Association to give this project their highest priority.

Without such legal guidance, communications will continue on its present erratic course. There will be further technological breakthroughs, further spectacular but uncoordinated demonstrations of new services, further attempts by nations or blocs of nations to seize and exploit each development. As always, communications will be a pawn of power.

In the long run, the people of the world will be the losers. The bold lines of the chartmakers, forecasting vast gains in world commerce, will begin to droop. The promise of the new communications technology will remain just that — a promise.

If we truly believe in a constructive destiny for humanity, we cannot permit this. We must bring into full play the reason, discipline, and logic of the law. No other acceptable antidote to anarchy has ever been devised.

With the concerted help of the legal profession, I believe the goal of one world of communications is still attainable. Indeed, it is basic to the attainment of man's ultimate goals of lasting peace and progress. Surely the effort is worthwhile. □

"ESSENTIAL COMPUTER CONCEPTS FOR TOP MANAGEMENT" — COMMENT

1. Eugene S. Stark
70 Briarwood Circle
Needham, Mass. 02194

In reply to "Essential Computer Concepts for Top Management" (see the May, 1971 issue of "Computers and Automation") —

BULLFEATHERS !!! [sic]

I suppose that if the president of a corporation wants to carry on a correspondence he should learn Gregg, Pittman, Stenotype and Speedwriting. Then he should study metallurgy, electrical and mechanical engineering, machine shop techniques, the history of paper-making, touch typing and the rules of punctuation and spelling. What nonsense!

Evidently there must be more to the making of a competant [sic] D.P. professional than the knowledge you list. The executive who masters all of the topics you list still is not a D.P. man and won't be unless he gives up his other duties and gains about 10 years experience. Further, he is in danger of using his little knowledge in the making of poor D.P. decisions. Note how many ads suggest that computers are in-house before a Systems Analyst. Who decided on a particular computer before a system has been set up? Note the ads asking for D.P. Managers who can program in COBOL or FORTRAN as if this were a requirement for a D.P.M. Note the ads equating large, multi-processor shops with efficiency. Note the competant [sic] technicians who build larger and larger systems and hardware with no thought to economic justification.

Management must learn to include qualified D.P. professionals on the team and to rely on their D.P. judgment as they rely on their legal staff for legal decisions. There is no substitute for a qualified D.P. Manager on your side of the table. If help is needed it is in the area of training D.P. personnel in management. Years of observation have led me to believe that management material is mighty scarse [sic] among the D.P. group in general. I have never met a real [sic] good programmer whom I considered a good candidate for a D.P. Manager.

Since 98% or more of the present management group are unable to evaluate the qualifications of D.P. personnel, in this one area the use of consultants can be justified. Once you have your own "in-house D.P. Consultant" he can then help you get a real [sic] staff. Such a person should be able to work with the management team and assist in the formulation of workable, economically sound D.P. decisions.

2. From the Editor:

The short article in the May issue, "Essential Computer Concepts for Top Management", presented a tentative list of some 100 concepts that a member of top management should know and understand about computers. This list was proposed as a list to contain those concepts which a member of top management should desirably understand and which he could reasonably learn in a good short course on computers.

This list is divided into eight groups: 1. General Concepts / 2. The Computer / 3. Programming / 4. Programming in General / 5. Programming Languages / 6. Programming Operations / 7. Systems Analysis and Synthesis / 8. The Computer Department.

1. Top Management's Understanding. Presumably, Mr. Stark's position (expressed in his clear and explanatory epithet "bullfeathers") is that it is not necessary for a member of top management to understand a single one of these terms. Accordingly, he states that it is not necessary that a member of top management should understand any of the concepts in the list, such as computer, data processor, electronic data processing, reliability, communication, computing, computerized system, input, output, storage, central processor, programming, punched cards, magnetic tape, etc., etc., etc.

I cannot agree that a member of top management should not have the responsibility for understanding at least some of these concepts. In fact it is dangerous and misleading to imply that top management should not have to understand any of these hundred concepts.

Mr. Stark's position would be much sounder if he simply offered a shorter list of terms dealing with computers and data processing which he proposes that a member of top management should understand.

2. Data Processing Consultant. Mr. Stark advocates that a good data processing consultant should be part of the management team — and that the member of top management should rely on the consultant.

This might work well if all D.P. consultants were very capable and very wise — but this is not true. In fact, the run-of-the-mill consultant is not likely to be really capable and really wise.

In fact, every member of top management who is worth his salt knows that he himself has to dig into, study, and understand a certain very definite layer of information in each of the subjects (law, accounting, production, personnel, safety, computers, stenography, ...) for which he employs specialists to do most of the detailed work. This layer of information, which is both definite and limited in extent, is defined as the layer he needs to know and understand in order to decide wisely (and not be fooled or misled) on (1) the question of continuance of existing procedures, and (2) the adoption of recommendations for new procedures.

For example, a member of top management (who will not usually be a lawyer) must know enough about the law to know if the advice of the corporation's general counsel is sufficiently appropriate so that he should accept that advice, or whether he should check that advice by reference to another good lawyer.

Mr. Stark's position is fallacious in its logic and unwise in its business aspects.

ADVERTISING INDEX

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

COMPUTER SECURITY – SABOTAGE FEARS DISCOUNTED

(Based on a report by Mel Mandell in "The New York Times," May 9, 1971)

Computers are threatened, but not by outsiders in the dramatic and distracting fashion conjured up by some self-appointed experts in computer security. The main threat is from insiders.

For many months, these self-styled experts, who also sell security services or gadgetry, have been behind a scare campaign in the press and in talks at business and technical gatherings. They have been emphasizing what they call three major computer "insecurities." These are:

> That a radical conspiracy would attack many computers with bombs and other forms of sabotage.
>
> That computer rooms would be infiltrated by saboteurs with magnets, which are capable of scrambling data recorded on magnetic media such as tapes, discs and drums.
>
> That a "superspy" truck equipped with "sensitive receiving equipment" exists and is able to extract from a nearby computer room, via radio waves emitted by the equipment, the exact output of the line-printers inside.

In September, 1970, the first of these threats was put forth at a news conference. When reporters asked to inspect the purported evidence, the security expert declined to show it. He suggested that the reporters required security clearance.

Perhaps the document was a reprint of a newspaper article entitled "The Technology of Computer Destruction." The article was published and has been widely reprinted — mostly by so-called consultants in computer security. But it is apparent that the article has not triggered a nationwide attack.

Although bombings have occurred and bomb threats, which are nearly as traumatic as the real article, have been directed at computers, these incidents have been limited to universities, large banks and giant companies widely identified as part of the Establishment or as suppliers of war material.

Smaller and less prominent organizations have been spared. An obvious cooling in bombings has set in since the March 6, 1970, destruction of the Weatherman bomb factory on 11th Street in Manhattan and the killing of one researcher in the damaging bombing at the University of Wisconsin.

Magnets are, indeed, dangerous in a computer room. So far, however, there is only one known instance of their use by saboteurs. This was in a radical-student attack on the computer center at the Dow Chemical Company, which had been publicly targeted as a supplier of napalm. In addition, some instances of accidental erasure of data by magnets carried by maintenance personnel have been reported.

When they talk of the magnet threat, the experts show that their expertise does not extend to simple arithmetic. One publication after another has picked up the statement that "... a magnet the size of a quarter can destroy a library of up to 50,000 tape reels in minutes." Making a broad assumption that it takes only one second of exposure per reel, then it would require a minimum of 14 hours (without coffee breaks) to "scramble" 50,000 tapes. The "expert" who first spread the story about the scrambling of 50,000 tapes has since admitted that it was "exaggerated."

The superspy truck á la James Bond is an invention of one of the most imaginative of the "experts." If line-printers radiated enough electromagnetic energy for their outputs to be picked up by antennas on a nearby truck, those line-printers could be put into orbit as communications satellites.

One "expert," asked about the whereabouts of such a truck, came up with a tale about the Air Force. He said that Air Force security officers had once tested the security of one of their own computers by backing a truck containing a line-printer up to a telephone pole and tapping a phone line between two computer installations. But that is plain wiretapping, not picking out of the cluttered radio-wave spectrum the exact signals from computer machinery housed in well shielded metal boxes.

There is a real threat to computers. It comes not from long-haired radicals, but from well barbered embezzlers. These highly destructive individuals (they rank among the leading causes of business bankruptcies) are a threat to computers because the data they must manipulate to cover up their depredations are stored in computers. This newly directed but age-old threat has to be contained by the same countermeasures that have always been prescribed: controls, checks, balances and the division of key responsibilities.

A lesser threat is the disgruntled employee. There are instances of fired computer-room employees who deliberately damaged tapes.

The attitude toward the external threat to computers should be realistic.

Robert V. Jacobson, president of Bradford Security Systems, Inc., a pioneer in the field, calls overblown security proposals the "amulets" of security. He refers to elaborate "man traps" and other costly systems recommended by some "consultants" who also peddle security systems. Like the charms offered by witch doctors, they give more the aura than the reality of security.

Before spending tens of thousands of dollars for "amulets," it is suggested that some of the simple deterrents that cost little or nothing be applied. These include:

Eliminating all unnecessary traffic through the computer room such as shareholders, Girl Scout troops, customers, delivery men and employees who have no responsibility for operating the machines; camouflaging the computer room instead of emphasizing it as a public showroom vulnerable to even a badly aimed brick; assuring reliability of supporting utilities, such as power, airconditioning, and firefighting systems; protecting against well identified hazards such as fire, dust, flooding and smoke; practicing "instant termination" with proper severance for computer-room employees, and arranging for proper back-up computer systems.

Dealing with the threat to computers is best handled in the words of a not-for-hire expert, Richard F. Cross, security officer of the Bank of New York, by " ... intelligent hiring practices, good motivation, a reasonable policy of promotion and proper procedures and discipline in the computer room ... If you neglect these basics, locking your computer inside a bank vault won't protect it and the vital data stored inside it." □

CAMPAIGN FINANCING: MONEY AND SECRECY

John W. Gardner, Chairman
Common Cause
2100 M St., N.W.
Washington, DC 20037

"Senator Russell Long once said, 'Investments in this area (i.e. campaign gifts) can be viewed as monetary bread cast upon the waters to be returned a thousandfold.' He was not exaggerating the rate of return. Campaign gifts run to a few hundred million in a presidential year. In return the politicians hand out tens of billions in political favors – tax breaks, lax regulations, import restrictions that benefit donors, lucrative defense contracts and so on. The taxpayer foots the bill."

The attached memorandum on campaign financing is being sent to you because of the importance of the subject and because we are concerned that the information contained in the memorandum might not otherwise be available to you. You are welcome to use the information in any way you choose.

Campaign Financing: Money and Secrecy

At this moment Congress is giving final consideration to a law to control campaign financing. Will they seize this chance to cut through the corruption that is making a mockery of the public process? Or will they preserve the system through which money buys elective office and the votes of public servants? We shall see.

Most Americans understand that the upward spiral of campaign spending has introduced an element of unfairness into political campaigns. And they don't like the idea that the chief advantage one candidate has over another may be financial.

But most don't fully understand the more basic reason for apprehension — the power of campaign gifts to corrupt our political life. They don't understand it because they aren't fully aware of the vast, shady game of barter and purchase that constitutes the seamy side of politics. Nor do they know what a large percentage of their tax dollar goes to support that shady game.

There are honest politicians, but they are finding it increasingly hard to survive. And there are campaign donors who give out of conviction. But most campaign giving is a blatant (and usually successful) effort to buy influence. Former Senator Albert Gore said ". . . Any person who is willing to sell his soul can have handsome financing for his campaigns."

Senator Russell Long once said "Investments in this area (i.e. campaign gifts) can be viewed as monetary bread cast upon the waters to be returned a thousandfold." He was not exaggerating the rate of return. Campaign gifts run to a few hundred million in a presidential year. In return the politicians hand out tens of billions in political favors — tax breaks, lax regulations, import restrictions that benefit donors, lucrative defense contracts and so on. The taxpayer foots the bill.

In January 1971 Common Cause sued the major political parties seeking to enjoin them from violating the campaign spending laws. The defendants moved to dismiss. On August 27, Judge Barrington Parker rejected the motion to dismiss, and in doing so, posed an extraordinarily difficult problem for the politicians.

By granting standing to the plaintiffs he put them in a position to engage in the process that the lawyers call discovery — taking depositions, gaining access to files and so on, a process that could expose to public view the whole ugly story of campaign financing.

And in granting standing to citizen plaintiffs suing to enforce campaign spending legislation, Judge Parker set a legal precedent — and opened up a new path of enforcement. For 31 years the only means of enforcement was action by the Attorney General; and the Attorney General never acted. Now, given the Judge's decision, enforcement action can be taken by the courts on citizen initiative.

Judge Parker's decision greatly increased the motivation of the politicians to pass new legislation. They certainly don't want to be stuck with the 1940 legislation if it is actually going to be enforced.

So what will they do now?

If they are statesmanlike they can pass strong legislation, and clean up the most scandalous and corrupting element in American politics today.

If they are cynical, they will pass a bill that looks good but is actually a sham.

The bill that has passed the Senate has many good elements but two disastrous weaknesses.

1. It contains no ceiling for contributions
2. It provides no real enforcement powers

Ceilings on Contributions

Since 1940 it has been illegal for one person to give a single candidate more than $5,000 in any calendar year. The Senate bill repeals that limitation.

The Senate action followed testimony by the Deputy Attorney General, the Chairman of the Senate Democratic Campaign Committee, and the General Counsel of the Democratic National Committee, all of whom, in effect, opposed ceilings on individual giving. The word had gone out that the President, presidential aspirants, and both major party organizations did not want a ceiling.

It may strike the citizen as strange that parties would live comfortably with a ceiling or individual contributions for 31 years and then suddenly move to repeal it. It may seem even more strange in view of the fact that an outraged citizenry is calling for reform and this is clearly a step backward.

(Please turn to page 32)

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THE SCIENCE OF INFORMATION MANAGEMENT, by Col. Carl J. Weinmeister, III (April 1971, p. 20)
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USING THE COMPUTER TO STEAL, by Harvey S. Gellman (April 1971, p. 16)
How computers are being used for fraud and theft. "The typical computer centre offers an open invitation to the thief or vandal; most computer systems are not presently protected against destruction, or unauthorized access or manipulation."

MAYBE THE COMPUTERS CAN SAVE US AFTER ALL, by Edward Yourdon (May 1971, p. 21)
A proposal for a privately owned and operated National Information Bureau which would serve as a central source of information for anyone on any subject of reasonable interest. — "If part of the average citizen's feeling of impotence and disillusionment is caused by a lack of organized and readily-available information, would it not be possible to put such information at his fingertips with a computer?"

COMMUNICATIONS MESSAGE SWITCHING — AN ANALYSIS, by Walter M. Aydelotte (July 1971, p. 8)
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Gardner — *Continued from page 30*

The explanation is that the parties lived with the $5,000 limitation for 31 years because they assumed it would not be enforced. Putting it more crudely, they assumed they could break the law and get away with it. (And indeed they were right as long as the only channel of enforcement was the Attorney General.)

When Common Cause sued to restrain future violations of 18 U.S.C. Sections 608 and 609 (the Sections governing limitations on gifts to candidates and spending by Committees) there was an immediate move in Congress to repeal Sections 608 and 609. The Senate bill embodies that repeal.

The House must correct this feature of the bill. It must not further alienate an already disillusioned public. The new legislation must include reasonable limits on individual contributions. The present limit should be increased, but certainly not repealed.

The court ruling will give new force to the argument advanced by Common Cause that such ceilings are enforceable, if the law is carefully worded, enforced by an independent agency, and reinforced by court action. (Nonenforceability has been the principal argument given by opponents of the individual gift ceilings.)

Enforcement Powers

The second shocking omission from the Senate bill is the absence of adequate enforcement powers. The Senate bill provides for an Independent Elections Commission which is good, but the commission lacks teeth. The House must provide that Commission with adequate enforcement powers, including the authority to issue "cease and desist" orders.

There is one final danger facing the bill. Some politicians are saying behind closed doors that the new bill should provide that only the Attorney General can bring suit under the terms of the legislation. Since no Attorney General in 31 years has brough suit, this would presumably ensure non-enforcement. And it would neatly close off the civil remedy opened up by Judge Parker. Judge Parker opened the door to enforcement of campaign spending by the courts on citizen initiative. It is hard to believe that any politician would be so synical as to slam that door in the face of an angry citizenry. But it is possible.

There is no more crucial issue before Congress this session. The public must demand campaign spending controls. It must tell Congress that it will be outraged by an attempt to torpedo such controls.

STANDS FOR AND AGAINST THE ANTI-BALLISTIC MISSILE SYSTEM

To: Patrick M. Cooney, R D 6, Carmel, NY 10512

From: Herbert R. J. Grosch, c/o National Bureau of Standards, Washington, DC 20234

You're right — there aren't many industrial or government experts on the sponsor list for "Computer Professionals Against the ABM".

The reason is simple: controversial people get fired!

Funny thing, though: people who take outspoken, controversial, "courageous" stands in favor of the ABM don't get fired. Perhaps you have an explanation, Pat — or is it classified?

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THE LIFE AND TIMES OF LAWRENCE TATE:
Computer Professional, IBM Engineer, Fired After Losing Local Court Action, Though Case Now On Appeal

Donald Fitzgerald
New York, N.Y.

"If corporations add their sentencing to the sentences imposed by courts of law, few people would risk speaking out on controversial community issues. . . . No profession, whose members are not largely self-employed, can hold its members accountable for socially or ethically responsible conduct unless, in return, that profession gives its members a measure of job security, by some variation or combination of those protective mechanisms already developed in other professions."

On July 29, 1971, IBM fired an engineer named Lawrence Tate.

Tate had been employed by IBM for more than 18 years, during which time he had participated in the development of 19 types of products, 15 while he was an engineering manager. He has been issued 13 U. S. Patents, several of which were further patented in major industrial nations of Europe and elsewhere. He served as a member of U. S. delegations to two agencies of the United Nations. He had for many years represented IBM on several U. S. standards committees and in negotiations with customers, vendors, governmental agencies, and common carriers. With both BSEE and MSEE degrees and 15 years of management experience, his salary was over $30,000 per year. He was on the Staff of the Assistant General Manager for Operations.

Why was he fired?

Starting in March, 1970, he and some other parents in Irvington, N. Y., began an effort to reform the operations of the local police department. In July, 1970, he and his daughter were arrested. On July 8, 1971, a jury in the local village court found Mr. Tate guilty of two misdemeanor charges. His daughter was also found guilty, of possession of one marijuana cigarette. All these convictions are being appealed to a higher court.

On Sunday, July 25, the Westchester-Fairfield Section Two of the Sunday News, "New York's Picture Newspaper", carried a full page story on Tate — see Exhibit 1. The following Thursday, Tate was called into his superior's office at IBM; the newspaper was lying on the desk, with each occurrence of the letters "IBM" circled — and Tate was notified that his employment with IBM was terminated at once.

This case raises a number of questions, about:

- the right of an employer to interfere in non-job-related activities of its employees;
- the right of an employer to act in a quasi-judicial manner, imposing punishment over and above that set by a court of law;
- the social responsibility of a large employer whose actions may silence or tend to silence its employees in community affairs;
- the right of an employer to seek to preserve the company's image in the eyes of its customers and the public, at the cost of rights of its employees;
- the interaction of an individual's freedom and responsibilities in his private life, upon his freedom and responsibilities in his professional life;
- the appropriate role of professional societies in such matters; and
- the vulnerability of people at all social levels to harassment and retaliation from the police.

History

The village of Irvington, New York, lies along the Hudson River in affluent Westchester County. With the adjoining village of Tarrytown, it is in the heart of the Sleepy Hollow countryside made famous by Washington Irving. In one of the many "hollows" carved out of the East bank of the Hudson, Washington Irving's home, Sunnyside, is preserved as a historic shrine. The street which leads into this hollow is called Sunnyside Lane and forms much of the boundary between Irvington and Tarrytown. In September, 1967, Lawrence Tate, with his wife and daughter, moved into a home on the Tarrytown side of Sunnyside Lane, less than a mile from the Washington Irving home. His daughter, Cindy, attended the Irvington High School since this school district includes part of Tarrytown.

The village of Irvington has a "split personality" — about half of the population of some 5,000 are life-long residents, while the other half are families of commuters. As in many suburban "bedroom communities", there exists an undercurrent of hostility between these two factions, especially on such matters as taxes and spending for schools and recreational facilities. But since the turnover in the commuter population in Westchester has been averaging near 20%, most of these typically well-to-do and well-educated residents have shown little interest in community affairs, and the local political scene is dominated by long-term residents.

Exhibit 1

WESTCHESTER-FAIRFIELD SECTION TWO

SUNDAY NEWS
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Largest circulation in WESTCHESTER-FAIRFIELD

New York, N.Y. 10017, Sunday, July 25, 1971

Teeners' Host and His Daughter in Drug-Raid Drama

By ELLEN FLEYSHER

Lawrence Tate wears crisp white shirts, blue suits with narrow lapels and ties you wouldn't remember.

At 45, with wavy short hair, the executive with IBM for 18 years looks as if he could win a "Mr. Straight America" contest hands down.

You would hardly expect this Westchester County resident to communicate with, or maintain rapport with teenagers of the "now" generation. But he does.

Justice Ralph Bettman

You'd scoff at the idea that maybe a dozen kids refer to him as "Dad" or "Larry." But they do.

Throughout his separation which recently culminated in divorce, Tate's house in Tarrytown has been a sort of meeting place-crash pad for area teenagers—friends and acquaintances of his 17-year-old daughter, Cindy, whose custody was awarded to her father by the courts.

"Better the kids are here than in the streets," says Tate, who insists he has one hard-and-fast rule in his ranch-style home at 63 E. Sunnyside Lane:

Drugs are taboo.

His Home Raided

Yet, in the wee hours of July 31, 1970, a team of 14 police and undercover agents, armed with a no-knock search warrant signed by a county judge, staged a narcotics raid on the Tate home.

The raiders, drawn from the Irvington and Tarrytown police departments and the Westchester sheriff's office, reported they found heroin, amphetamines, marijuana and narcotics paraphernalia. All the guests—12 young people plus a West German industrialist who happened to be visiting Tate—were arrested along with Tate and Cindy, but the industrialist clearly an outsider, was promptly released on Tate's request.

The raid catapulted Tate and his daughter into the headlines and into a long and arduous court battle that reached a climax recently with the conviction of father and daughter on misdemeanor charges. This Wednesday they face sentencing before Tarrytown Judge Ralph Bettman but, Tate vows, the battle is far from over.

According to the IBM executive, the July 31 raid was just part of a larger conflict between the Tate family and the police of Irvington.

It began on March 20, 1970, with a noontime raid in Irvington, where 10 Irvington High School students, among them Cindy, were having lunch, Irvington police said the 10 were loitering with the intent to use drugs.

Calls Cops Blunderers

According to Tate, the village later made an offer to withdraw the complaints against the students, with the understanding a court order would seal all police and court records of the incident. Tate refused the offer and chose to meet with Irvington police on the issue on April 23, 1970.

"They told me Cindy was using drugs, but I knew better," he said: "They told me I had to do something. Then I told them they had engaged in misconduct through a blundering and stupid error. They didn't like that conversation."

Parents of two other students joined Tate in fighting the village through actions for false arrest, but the other parents, claiming financial hardship and nervous stress on their children, dropped out. On June 17, 1970, Tate filed suit, seeking $125,000 in damages. The suit is pending.

Cindy, who pleaded innocent to the loitering charge stemming from the March 20 arrest, was the only one of the so-called "Irvington 10" to go to court. The charge was dismissed last Jan. 8 when a jury could not agree on a verdict.

But in the meantime, there was new trouble for Cindy and her father, arising out of the midsummer 1970 raid on their home.

Calls Home Raid Retaliation

"It is my belief the July 31 raid was in retaliation for the lawsuit I filed against Irvington for Cindy's March 20 arrest," said Tate. "It was meant to intimidate me and stop me from pursuing the lawsuit."

Irvington police refused to discuss the events of March 20 and July 31 largely because of Tate's pending liti-

Most of Tate's guests July 31 took a quick way out; they paid a $10 fine for disorderly conduct. Tate once more demanded and got his day in court.

The trial began late this spring and dragged on for five weeks before it ended early this month, with a six-man jury deliberating three and a half hours before convicting both father and daughter. Tate was found guilty of obstructing governmental administration and maintaining a criminal nuisance, both misdemeanors. Cindy was found guilty of possession of marijuana.

On the obstruction charge, police testified that Tate yelled at the arresting officers, used vile language and theatened a few of them: "I'll have your job." The executive also interfered with the handcuffing of his young guests for the trip to the police station and blocked a police search of his daughter unless he was present, it was testified.

NEWS photo by George Mattson

Lawrence Tate pets family dog, Annette, which is held by daughter, Cindy.

But the critical element in the case was what was found in the house. Officers in the raiding party said they detected a strong odor of marijuana in the house. One said he found a package of papers commonly used for rolling marijuana cigarets on the kitchen table, near where Tate was seated.

Considered the most damaging evidence against Cindy was the testimony of a woman undercover agent who said Cindy passed her carrying a well known brand cigaret pack, disappeared briefly into a storage room and came back moments later, hands empty.

The witness said she entered the storage area and found apparently the same pack, the contents of which were identified by police technicians as marijuana.

The defense sought to explain how and why any drugs might have been found in the Tate home. For one thing, it was claimed, Cindy had invited two girl acquaintances to stay at her home for "just a few days" while they lined up jobs and accommodations in New York. Tate said he did not know the girls at all but let them stay on Cindy's plea that otherwise they would be "forced to sleep in the woods."

Guest Accused as Seller

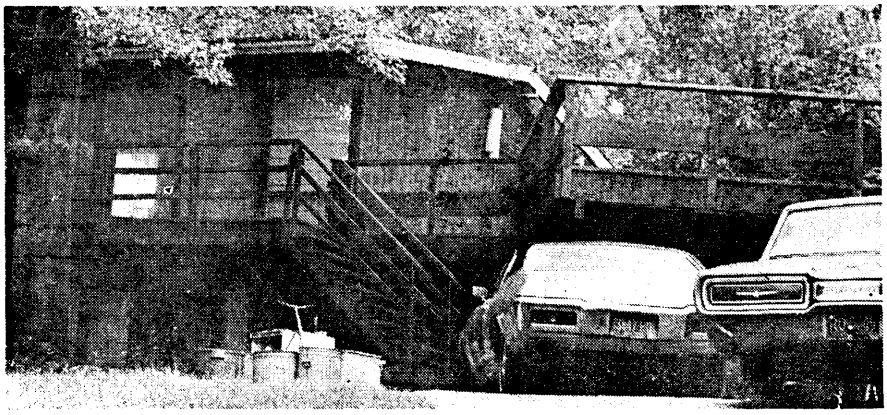
On the night of the Tarrytown raid, it came out, one of the two girls allegedly sold drugs to an undercover agent. And still another house guest that evening—a youth unknown to Cindy but brought along by a mutual acquaintance—admitted to being a heroin addict and admitted he owned heroin and narcotics paraphernalia found in the house. Whatever Tate's house rule against drugs, it appeared to have been breached that night.

After the trial, Tate stood behind his judgment on letting the two girl acquaintances of Cindy stay in his home. "Those girls would have had to sleep in the street if it hadn't been for us," he said. "I'd do the same thing tomorrow and I hope Cindy would be sensitive enough to do the same thing, too."

At the trial Tate produced an impressive array of character witnesses including John McPherson, an IBM vice president; Dr. Charles DeCarlo, president of Sarah Lawrence College, and Ted Merrill, an editor with Business Week magazine.

"Larry is such an honest and straightforward person that people jump to his defense as I did," Merrill said later. "I'll tell you this: If someone said Larry was doing something he wasn't, he'd take it all the way to the Supreme Court."

It appears that Tate will have the chance to do so.



The Lawrence Tate home at 63 E. Sunnyside Lane, Tarrytown.

Tarrytown has a population of over 12,000 and includes a large automotive assembly plant. Unlike Irvington, it has a black "ghetto" area and numerous bars, restaurants, and movie theaters. It is on the same rail commuter line to New York City, but the commuter fraction of its population is much smaller than Irvington's. Tarrytown has a police force of 26, while Irvington's is kept at about 21 or 22.

The First Police Raid

During the school lunch hour on March 20, 1970, Irvington police raided an apartment near the Irvington High School. This apartment had become a lunch-time gathering place for a number of young people including the owner's daughter and her friends; both parents worked during the day and the school cafeteria had been shut down because the school was on an austerity budget. Among the ten young people arrested in that raid was Lawrence Tate's daughter, Cindy — the first of several encounters of the Tate family with police. Most of the ten, including Cindy, were charged with "loitering with intent to use dangerous drugs".

The search warrant for this raid had been obtained on an affidavit by Detective Sergeant John McSharry of the Irvington police, based on an uncorroborated report by one high school student that drugs could be purchased at that apartment. The police investigation report consisted of a tabulation of the time of entry and departure of several high school students, all during school lunch hour, with no mention of drugs. Cindy was mentioned as entering twice during about a month of police surveillance. The inventory of items found during the search of the apartment showed microscopic samples of marijuana, and the police concluded their search by using a vacuum cleaner.

Irvington officials met with parents of the arrested students; the officials offered to "cancel the arrests" and seal both the court records and police records by court order, if the arrested students would obtain some kind of counseling. Several of the parents were furious, but all except two accepted cancellation of the arrests. The police harassment of young people was, by then, well known in Irvington, but nobody had done anything about it. Mr. Tate started visiting the Irvington court, watching the proceedings as the court processed an average of 15 to 20 defendants each week, but it was four months before he saw the first defendant over 21 years old. On June 17, 1970, Tate and another parent, determined that their children were not going to grow up in this "miniature police state", each filed a Notice of Claim against Det. Sgt. McSharry and the village of Irvington. This reserved their right to sue for false arrest, and Cindy and the other youth entered pleas of "not guilty".

Starting shortly after June 17, both Cindy and the other youth were subjected to harassment by the Irvington police. But the boy moved to New York City to attend college; so Cindy took the brunt of it. She got a speeding ticket; her car was repeatedly followed and stopped as many as four times in one day, ostensibly to check the same license and registration. On one evening, an off-duty Irvington policeman, dressed in civilian clothes and driving a private car with a girl, stopped Cindy's car in Tarrytown by trying to run it off the road. He made a citizen's arrest of the boy who was driving, claiming two traffic violations, neither of which is an arrestable offense.

Cindy's trial for the March 20 arrest started in December 1970 and concluded in the early morning hours of January 8, 1971. The microscopic samples reported on the search inventory were too minute for chemical analysis, but some seeds were identified visually as marijuana. However, both McSharry and Irvington Police Chief James Sansevera testified that hashish wrapped in tinfoil was found in a "bookbank", even though McSharry had recorded in the inventory the contents of this "bookbank" without mentioning any hashish or tinfoil, and nobody had been charged with possession of any drugs. It was also brought out in the trial that the Village Prosecutor, Chief Sansevera, and four other policemen had intimidated a defense witness. No drug use or intent to use drugs was shown, and the students were due back in school within a few minutes after the start of the raid. The jury could not agree on a verdict and the charge against Cindy was dismissed. Failure to reach a unanimous verdict of guilty indicates strongly that the prosecution had failed to prove guilt beyond a reasonable doubt.

The Second Police Raid

But even before Cindy's trial, the Tates had developed new difficulties with the police: their home was raided on July 31, 1970, shortly after midnight. The search warrant was again based on information from McSharry, of the Irvington police, even though the Tate home is in Tarrytown. He described a single period of surveillance, on the night before the raid. Cindy and her friends who were in the home at the time all insist that no illegal act had been committed. At any rate, everybody including McSharry agrees that several large windows were left open and uncovered, with no attempt at concealment.

Police also stated that there had been three months of prior surveillance, all by Irvington police. This was apparently unproductive, as nothing from this period was mentioned in obtaining the warrant. But just three months and one week earlier was the date of Mr. Tate's meeting with Irvington officials, concerning their false arrest of his daughter on March 20. Thus, Irvington police initiated and maintained surveillance of the Tate home, in Tarrytown, from the time they first learned that their raid of March 20 was going to be contested.

Lawrence Tate had been away from his home for most of the evening of July 31, the evening of the raid, meeting a friend at La Guardia Airport and having dinner with him. He and his friend, Director of Engineering of a corporation in West Germany, returned about 45 minutes before the raid. Upon his return, Cindy told him that four youths, strangers to her, had been admitted as friends of a friend while she had also been out of the home. One of these strangers turned out to be a heroin addict, who supported his habit by selling drugs; so drugs were found in the home.

Justice in the Courts?

The trial of Cindy and Lawrence Tate started on June 8, 1971, in the village court of Tarrytown. Cindy

was charged with "possession of dangerous drugs" and "possession of narcotic implements". No drugs or implements were found on anybody, since the police were slow in starting the search of people in the home. No investigation was made to determine who possessed or knew of any drugs or implements; all were charged against Cindy as the only young person who lived in the home. The drugs and implements were all found downstairs, and both Cindy and Lawrence Tate were upstairs. The charge related to implements was dismissed at the end of the prosecution case. The heroin addict appeared as a defense witness and testified that he alone possessed the package containing the narcotic implements and the heroin (3 grains), and that the Tates had no way of knowing that he had brought drugs into their home. One marijuana cigarette was found, the source of which is unknown. The evidence linking this to Cindy was entirely circumstantial; the prosecution failed to establish the required chain of evidence. There were also direct contradictions in this police testimony; and attorneys for the Tates have stated that the evidence is legally insufficient to support a conviction.

Lawrence Tate was charged with "criminal nuisance" (i.e., knowingly maintaining a premises where people gathered to use or possess drugs). There was no testimony that Mr. Tate knew of any drugs in the home, which is an essential element in the proof of "criminal nuisance". Also, his friend from Germany had been released after police determined that he "could not have known what was going on", although police testimony placed him at the kitchen table with Mr. Tate for the entire time after they entered the home.

Tate was also charged with "obstructing governmental administration" (i.e., interfering with the search), based on his verbal objections to certain police actions. But the police testified that they completed the search to their satisfaction in about 25 minutes (9 rooms plus 3 baths). Mr. Tate's attorneys have stated that his actions in protesting to the police and protecting legal rights and property, with no physical violence, do not under the law constitute a crime.

Although all charges related only to incidents on the night of the raid, the court allowed the prosecutor to delve back through several years, introducing extraneous but possibly prejudicial testimony that Cindy was allowed to bring friends into her home, play records, drink beer, and have parties. But the court was very restrictive on the testimony of several defense witnesses, even on matters directly related to the charges. However, strict prohibition of drugs was repeatedly confirmed, and it was brought out that Mr. Tate had given evidence on drug sources to Federal Narcotics Agents, re-affirming his strong convictions against the use of drugs.

The defense produced an impressive array of character witnesses, including: Mr. John C. McPherson, an IBM Vice President; Dr. Charles DeCarlo, President of Sarah Lawrence College; Mr. Theodore B. Merrill, an Editor of Business Week; the friend from Germany; and several IBM employees and neighbors from Irvington.

On July 8, 1971, after hearing 36 witnesses, a six-man jury returned a verdict of "guilty" on all charges then remaining. Decision on a defense motion, to set aside the jury verdict as contrary to law and the evidence, was reserved until the date of sentencing. The trial was concluded on August 11 when the judge denied that motion; and Lawrence Tate was fined $1,000 and sentenced to one year of probation, while Cindy was sentenced to three years of probation.

The Notice of Appeal and certification of judicial and legal errors were promptly filed.

Drugs and Politics

Lawrence Tate and other parents publicly criticized the situation in Irvington, to the point where the Village Board coerced the local newspaper into printing a retraction. The mayor of Irvington was criticized, during his campaign for Congress, for: the failure of the anti-drug program; failure to enlist the aid of parents; lack of recreational facilities; grossly exaggerated and prejudicial use of pre-trial publicity in police press releases; misdirecting police action against users instead of the sources of drugs; and using the false police raid on March 20 as publicity for the mayor's political campaign. Local police are supposed to be non-political; but the police chief reports to an elected member of the village board. Tarrytown police made a series of about 30 drug arrests within a few days before the village elections in late March, 1971, although their newspaper release stated that the evidence had been obtained by January. This, plus an earlier series of arrests of heroin pushers, had brought the subject of drugs into public attention in Tarrytown shortly before the start of the Tate trial.

In November, 1970, Chief Sansevera and Det. Sgt. McSharry were charged with "interfering with the administration of justice". After a hearing before the Irvington Village Board, both were reprimanded and acquitted. Chief Sansevera was also charged with acts of delinquency which would "seriously impair and affect his general character and fitness for office". He was suspended without pay for 15 days. More recently, Sansevera has again been suspended without pay since July 1, 1971, pending a hearing on three additional charges. None of these charges have been related to the Tate case.

As criticism of the police became more widespread, their harassment of young people became more subdued. There was a third raid in August 1970, in which eyewitnesses said the police twice attempted to "plant" a marijuana cigarette. Since then, Irvington has abolished its Detective Division, and the number of cases before the village court has declined dramatically.

Harassment and Countersuits

After the raid on the Tate home, harassment by stopping Cindy's car continued, coupled with police spreading gossip, telling a number of people that they shouldn't visit the Tates. The other youth who had contested the March 20 false arrest finally dropped out of the contest after Cindy's trial had resulted in acquittal. At that point, the police had directed their evidence and testimony at Cindy and would have had difficulty redirecting it, in a later trial, against another defendant. But he and his parents abandoned the near-certain acquittal and lawsuit because the worry and harassment had contributed to his need for

psychiatric care, and he was not prepared to face a trial. Cindy has required hospitalization for an ulcerous condition, indicating the extreme strain on these young people.

A few weeks after the second raid on July 31, Tarrytown Detective DelGrande, who was the arresting officer in that raid, filed a petition against Cindy in Family Court. This petition described her arrest on July 31 and would have had the effect of trying the case twice, both on criminal charges and as a basis for taking Cindy's custody away from her father. The judge in Family Court said that the grounds were insufficient for this action, so DelGrande filed an amended petition. This contained one legally significant claim, that Cindy had been truant for more than 42 days in one school year; but the school records showed no truancy. The judge refused to consider the proposed "emergency" intervention in the Tate home and ordered the detective to document the claims in his petition. He was unable to do so (since his sworn petition was false); so this case lay dormant for months. After an abortive attempt to re-open the case during Easter vacation, when school witnesses on truancy would have been unavailable, a judge dismissed the amended petition for failure to prosecute, failure to document the claims as provided by law and ordered by the court, and on the merits (i. e., a summary dismissal, without taking testimony, preventing a re-opening of the case).

In addition to the Notice of Claim filed against McSharry and Irvington for the first raid on March 20, Lawrence Tate also filed two Notices of Claim against DelGrande and Tarrytown — one for the second raid on July 31 and one for the amended petition in Family Court. These three Notices of Claim establish his right to sue the villages of Irvington and Tarrytown and their agents for a total of $875, 000. The harassment was finally stopped, at least until this writing, when on June 4, 1971, Tate filed a petition for an injunction, seeking a court order to stop the harassment and other abuses of police power. All four of these countersuits are pending in the courts.

Justice in Corporations?

This case is exceptional both in the massive extent of the police action and the massive legal counterattack. But the implications of the precedents established are much more general.

Anyone with children of high school or college age must know the risk of drugs being brought into their homes, either by their own children or their friends. Anyone who has tried to fight a traffic ticket must know something about the quality of justice in local village courts. If the charge is more serious than a traffic ticket, not many people could afford the costs of obtaining justice by an appeal, especially if they lose their jobs in the process. If corporations add their sentencing to the sentences imposed by courts of law, few people would risk speaking out on controversial community issues. This silencing of responsible citizens can only encourage corrupt police to act with impunity. It would also serve to convince the more radical elements that nobody else will act, and that they have been left to their own devices.

Balanced against this condition is the very real need of a corporation to maintain its desired image in the eyes of its customers and the public. In some lines of business, this is a necessity if the company is to be viable. In the case in point, many IBM employees are frequently in customers' offices in the design and maintenance of computer systems, and these people may have access to customers' most confidential information. But this can not justify extrapolation of criteria for one critical job to all other employees; if all corporations did the same, it would for example prohibit rehabilitation of convicts and any sentencing would become a life sentence to unemployment.

A number of people, including journalists, engineers, and lawyers, have reviewed the legal documents and the evidence in this case. To the writer's knowledge, all have reached the same conclusion: that Lawrence Tate and his daughter are the victims of police harassment and retaliation. This conclusion also is evident in all recent publicity. The IBM corporation had full access to all of this information, as the case developed. Perhaps IBM does not trust its customers to reach that same conclusion, or to consider it reasonable for a company to stand behind its employees in these circumstances, at least as far as an appeal.

Thus, the total effect on IBM's corporate image must include several factors: the non-job-related nature of the problem, the fact that there was no customer contact in Tate's last assignment, the decision as to just when "innocent until proved guilty" ends, the recruiting image in colleges as more young professionals demand more freedom and individuality in their private lives, and, finally, the actual reaction of IBM's customers and the public to IBM's action.

We, as members of the engineering and scientific professions, have been criticized in recent years for failing to consider the social consequences of our technical activities. We have been told that we should speak out on such matters. We have been told we should even challenge our own employer if we are, for example, directed to design an unsafe product. But according to the precedents set in this case, we cannot now safely speak out against the social consequences of somebody else's non-technical activities. We are still in the formative stages of such an evolution in the profession, but no measure of social responsibility can be imposed on the individual without a corresponding burden on his employer.

Engineers, computer programmers, and scientists do not have a really strong professional society such as exists in the medical field. Nor do they have any equivalent to tenure as in the teaching profession, nor is there even any portable pension plan. Thus, these professions are poorly equipped to enter into any new era of individual social responsibility, and anybody who ventures to act alone is vulnerable. As existing trends continue, the various professional societies will have to re-evaluate their roles. No profession, whose members are not largely self-employed, can hold its members accountable for socially or ethically responsible conduct unless, in return, that profession gives its members a measure of job security, by some variation or combination of those protective mechanisms already developed in other professions.

PICTORIAL REASONING TESTS, AND APTITUDES OF PEOPLE

"There undoubtedly is a place for non-verbal, non-mathematical testing, which is not culture-limited, not occupation-limited, and not background-limited — and which would enable finding and employing many useful people (including computer programmers) who do not have American, middle-class backgrounds."

Neil Macdonald
Assistant Editor
Computers and Automation

Tests at Employment Interviews

One of the subjects which we at Computers and Automation work on from time to time is aptitude tests: tests of adaptability; tests of proofreading capacities; tests of ability to program a computer; etc. The organization that publishes Computers and Automation (Berkeley Enterprises) is small (about 3 full-time people, 10 part-time people, and a DEC PDP-9 computer). Consequently, we need to find tests that tell us significant information about a person at the time of the employment interview. Then we can make a good decision right then, and not waste his time or our time employing someone who proves not to meet the job requirements.

Some useful people are not particularly verbal, at home with words. Other useful people are not arithmetical, not at home with figures or numerical reasoning. Many aptitude tests rely on items that are verbal or mathematical. So such tests are likely to miss some useful people who lack formal training in verbal or mathematical subjects. This is not desirable.

We would like to find tests that measure capacity: to observe; to adapt; to reason; to program a computer; etc. We desire tests that do not rely on previous formal training in verbal or mathematical subjects. Perhaps pictorial reasoning tests would meet these requirements.

Pictorial Reasoning Tests

One commercial supplier of aptitude tests offers a pictorial reasoning test of 80 items. Each item consists of a row of five pictures. The instructions are (essentially):

> This is a test to see how carefully you can observe and reason. In each row find the four pictures that are alike in some way, and then write (in the answer column) the letter of the picture that is not like the others.

I have tried this test on about ten people; and I have observed that some undoubtedly clever people get low scores because they can imagine many ways in which each picture is not like the others.

Ambiguity

For example, consider Figure 1 (which is an altered copy of an item in the instructions for the commercial test). Clearly, each square is different from all the others in that a different number appears in that square. However, the answer given is B, since in B "the number is located in the center of the square, instead of in a corner". But I would consider Figure 1 "basically ambiguous"; for example, the square that contains 8 is unlike each of the other squares, for they contain numbers different from 8.

For a second example, consider Figure 2. After looking at these five squares for a couple of minutes, I might nominate

- A because it shows the only figure with 3 sides;
- B because it shows the only figure with sides at right angles to each other;
- C because it shows the only figure which has given its name to a famous building in Washington, D.C., where the U.S. Defense Department is located;
- D because it shows the only figure with 6 sides;
- E because it shows the only figure with a number of sides equal to two more (instead of one more) than the number of sides in the figure to the left of it (this statement is logically incomplete, but it is a statement which a person could give).

Unambiguity

Presumably, a "well-constructed" pictorial reasoning item consisting of five pictures will be definitely unambiguous. Consider Figure 3. Each of A, B, C, and D is alike: each holds a circle. Square E is different: it holds a cross. Probably nobody would produce a "wrong" answer for this item: in fact it may be too "simple": it would not make distinctions between people.

Consider Figure 4. A and E are clearly alike. B and D are clearly alike. C is clearly different. Perhaps nobody would produce a wrong answer for this one either; perhaps it also is too simple.

Consider Figure 5. This item is the same as the item in Figure 2 — except that the triangle in A has been turned ninety degrees. Consequently, now there is exactly one picture that is not symmetric about a central vertical line. So we can reasonably maintain that picture A is clearly different from all the others. Perhaps everybody would agree about this too — and so this item also would be too simple. (In Figure 2, there were two pictures not symmetric about a central horizontal line, the triangle and the pentagon.)

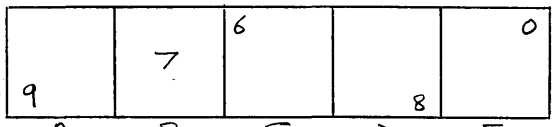


Figure 1

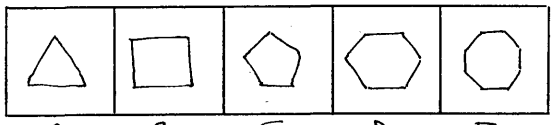


Figure 2

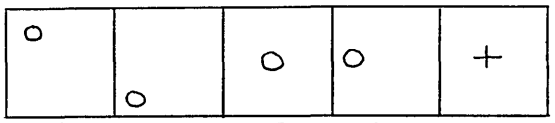


Figure 3

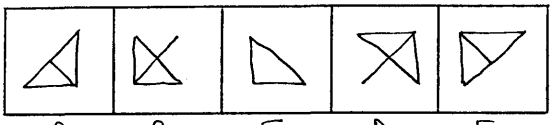


Figure 4

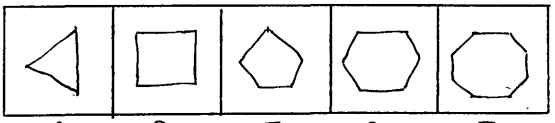


Figure 5

The Statement of the Problem

We are now ready to express our problem as follows:

1. Construct some observing and reasoning tests that are not biased towards word knowledge or arithmetical knowledge.

2. Use pictorial items, making sure either (1) that each item of five squares has a single reasonable answer A to E, — or (2) that "F" for "defective, basically ambiguous" is accepted as a sixth answer.

3. Find out the relation of the answers that a person actually gives on the test with the kind of person that he is.

4. Find out if such a test as this distinguishes, for example, good computer programmers.

The name which constructors of tests use for Step 3 is "validation". Ordinarily, validation is accomplished by taking a group of people, finding out something about them, giving the test to them, and seeing what results are produced.

Exploration

But in this case we would like to do something different from validation, more like exploration.

We would like to ask you — you being any interested reader of Computers and Automation — to take the test shown in Figure 6, and send us your answers. At the bottom of the test are a few questions to tell us something about the kind of person that you are. Since you are reporting on yourself, there may be of course a little bias present — but for purposes of exploration, this is not likely to be serious. From enough answers from enough readers, we might discover some interesting information about what sorts of traits tests of this type may be measuring.

Note that all the figures in this article have been drawn freehand and not too carefully. It is a myth, in my opinion, that asserts that all figures in all publications should be drawn professionally: one can do a great deal with an author's free hand, approximate drawings, and the reader's eyes to interpret them; and such drawings make the gap between the author and the reader far less formidable.

After you have taken the test (it may be copied on any piece of paper) we would like to ask you (if you are interested) to try it on your friends, and send us those results too, for study and correlation.

A Game

Furthermore, it is possible for you to play a game of "Testing Pictorial Reasoning" with your friends: make up your own test; make copies of it; and try the tests on your friends. (And, if you like, send us a copy and the results.)

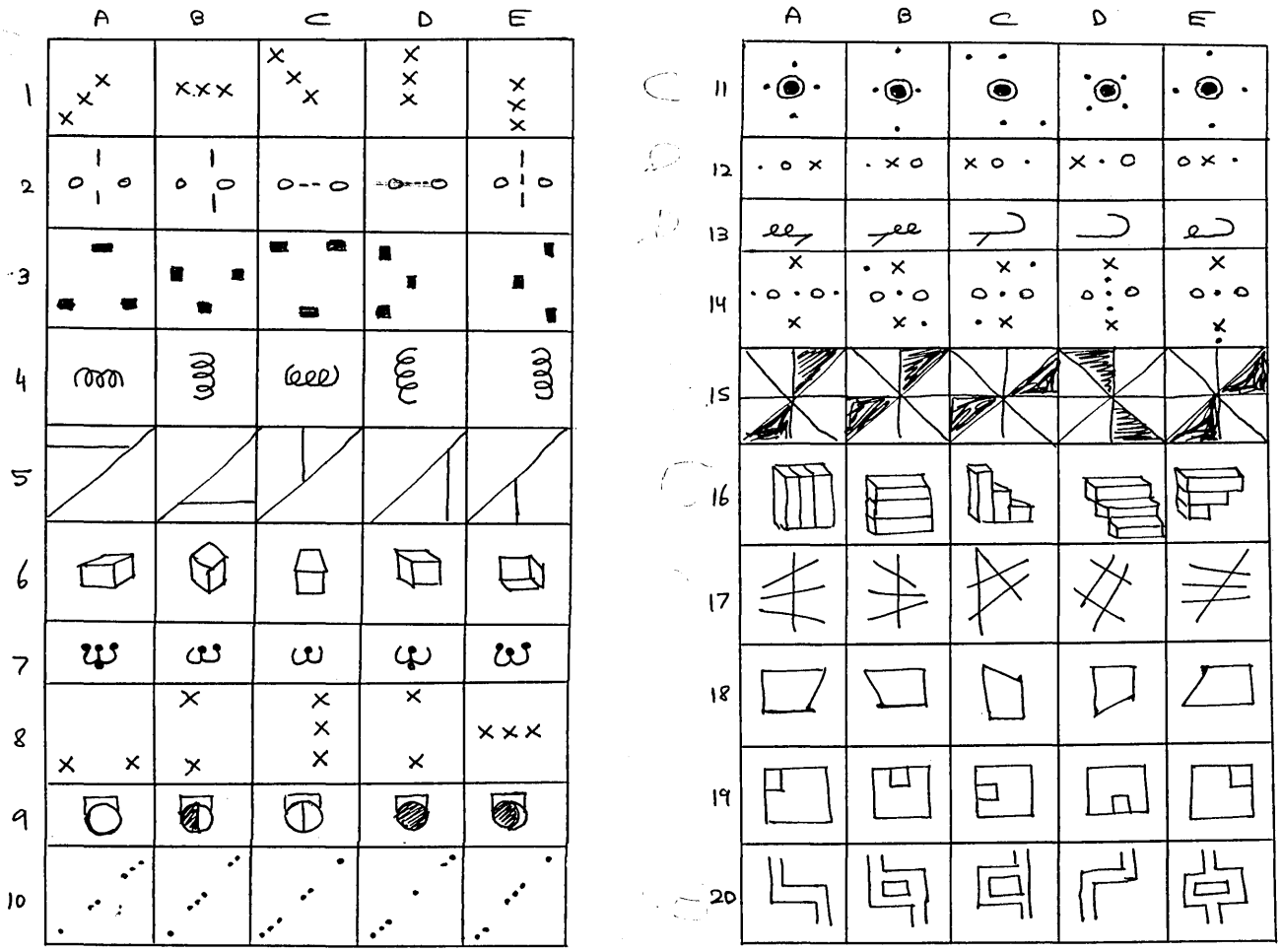
The central question we are seeking to investigate is this: If we collect this sort of information about people, what correlations might we discover?

Other Verbal, Non-Mathematical Tests of Aptitudes and Characteristics

There are, of course, many other ways in which observations of people in testing situations and in actual daily-life situations can be made, and deductions about people can be drawn. In our small business the first week of employment of a new person is usually like a crucible (though without heat). This preliminary period reveals a great deal about a new employee — how fast he can learn, how well he observes, how soon he can turn out useful work — often information not guessed (unfortunately) from what was found out in the employment interview. In fact, we have been looking for a personality test as useful as the commercially-supplied adaptability test that we use; but so far we have not found any.

PICTORIAL REASONING TEST — C&A No. 1 — *(may be copied on any piece of paper)*

1. The following Pictorial Reasoning Test (Figure 6) is a test to see how carefully you can observe and reason. It is not timed — but most people use about ten minutes.
2. In each row, find the four pictures that are alike in some way, and find the one that is not like all the others and write its letter as your answer.
3. If you become convinced that no picture is essentially unlike the others, write F (for "defective" or "fatally ambiguous") as your answer.



Answers: Insert in each blank one letter out of A, B, C, D, E, or F, designating your choice.

1 ____	5 ____	9 ____	13 ____	17 ____
2 ____	6 ____	10 ____	14 ____	18 ____
3 ____	7 ____	11 ____	15 ____	19 ____
4 ____	8 ____	12 ____	16 ____	20 ____

Survey Data: 1. Name_____ 2. Title_____

3. Organization _____

4. Address _____

	Average?	Good?	Excellent?	Not your field?	Other? (please specify)
5. In computer programming, are you:					
6. In systems analysis, are you:					
7. In managing, are you:					

8. What fields (not mentioned above) are you fairly good in (or even expert in)? _____

9. What other capacities do you have? (Please don't be bashful — but be objective) _____

10. Any remarks? _____

(attach paper if needed)

When completed, please send to: Neil Macdonald, Survey Editor, Computers and Automation, 815 Washington St., Newtonville, Mass. 02160

(Please turn to page 56)

The Assassination of President Kennedy — Declassification of Relevant Documents from the National Archives

"The people of the United States have a right to know, to find out the truth about the lies they have been told."

Richard E. Sprague
Hartsdale, N.Y.

The precedent-setting ruling on the Pentagon Papers by the U. S. Supreme Court produced the revelation that "Secret" and "Top Secret" government documents prove that the American people have been deceived and lied to about Vietnam and U. S. involvement for many years.

One of the immediate reactions of an American citizen is: "How many other lies have been told by our governing officials, which would be exposed by declassifying and publishing other classified documents?"

Resting in a special area in our National Archives are a group of Secret and Top Secret documents pertaining to the assassination of President John F. Kennedy in November, 1963. Publication of these papers should reveal a great deal about that assassination. They may contain the facts about a conspiracy, the names of some of the conspirators, information about the planning for, and the backing of the conspiracy, and, most importantly, proof that the American public have been told many lies about the assassination by the Warren Commission and by others.

The documents fall into two categories: (1) Warren Commission executive session minutes; and (2) reports submitted to the Commission by government agencies. The former documents were classified top secret by the Warren Commission itself, and are listed partially in Reference 5. The latter category includes reports from the FBI, CIA, and Secret Service, classified Secret or Top Secret by each agency. The Commission did not actually see most of these documents because they were assembled in the Archives after the Commission disbanded. Reference 6 gives a list of the titles of these documents, the agency involved, and the document number. The classifications are all Top Secret, Secret, or Confidential.

How do we know the documents may be revealing?

As in any complex web of information about a subject, correlation of some data with other data, provides a value judgment of validity or significance. In the complex case of the assassination of President Kennedy, it is necessary to correlate the titles of the documents, dates, and names of the classifying agencies against a vast body of evidence about the assassination.

The National Committee to Investigate Assassinations[1] (NCTIA) has gathered together a vast amount of evidence extant and has performed such a correlation against the classified documents. The sources for the evidence gathered are:

- Warren Report
- Twenty-Six Volumes of Hearings and Exhibits of the Warren Commission
- Warren Commission Documents in Archives (About 10 times the size of the 26 Volumes)
- Senate Investigation Files (Senator Ed Long, Subcommittee, 1967-68)
- NCTIA Investigations
- Books and articles

The work of correlating this vast amount of information is tedious; it requires many people and man-hours. Two computer systems are being developed to help researchers and committee members with the analysis.

Enough work has already been done to illustrate the probable significance of the classified papers. Here are a few examples:

Lee Harvey Oswald's Relation to the FBI

Thesis: Oswald was a paid FBI informer and the Warren Commission probably covered up this fact.

Many meetings of the Warren Commission are still classified Top Secret. (See Reference 5.) The dates of many of these sessions follow immediately after sessions described in a book[2] by Gerald Ford, one of the Commissioners.

At these sessions beginning January 21, 1964, Ford says the Warren Commission was concerned because Wagonner Carr, Texas Attorney General, told them that he had information about Oswald being a paid informer for the FBI. The classified sessions would, no doubt, be very revealing on this subject.

The Commission wound up merely asking J. Edgar Hoover whether Oswald was a paid informer or not. Hoover said no; and that ended the matter as far as the public record (including Ford's book) is concerned.

The NCTIA however has developed several correlated pieces of evidence, including recent statements from one of the FBI agents Oswald reported to in his informer role. Collectively, this evidence shows that Oswald was indeed being paid by the FBI to infiltrate various pro-Castro and anti-Castro groups as well as the JFK assassination team. He reported his findings to three different FBI agents, two in New Orleans and one in Dallas. He attended several meetings in Mexico City where the assassination was planned. He reported to the FBI that President Kennedy was to be assassinated in Dallas just a few days before that happened.

On the day before the assassination and on the morning of the assassination, the special agent in Dallas that Oswald reported to, was trying to find him in order to obtain more information from him.

A record exists that the FBI received the information from Oswald about the forthcoming assassination, but the FBI did nothing about it except for the futile attempts of the agent to find Oswald. The record is in the form of a TWX message which appeared on November 17, 1963, on the FBI teleprinter in New Orleans relayed from Dallas via Washington, D. C. William S. Walters, FBI security clerk in New Orleans, retained a copy and gave it to District Attorney Jim Garrison of New Orleans.

With this type of correlative evidence and the relationship of the Secret Executive Session dates to Waggoner Carr's visit, it is a fairly good bet that the sessions were classified because the Commission discovered some of the other evidence and did not want it known that Oswald was an FBI informer.

However, even if this is not the case, the public is entitled to know what went on in those sessions. The chances that declassifying them now and publishing them will endanger our national security after nearly eight years, are slimmer than "endangering national security" by publishing the Pentagon Papers has been.

One of the classified sessions worried the Commission so much they went to the extreme of forcing the stenographer to destroy his notes. (See Reference 5.)

In addition to the Commission's secret sessions, various classified FBI documents no doubt would reveal Oswald's informer status. Reference 6 includes document 941, "Telephone numbers on 47th page of Lee Harvey Oswald's address book/Washington, D. C." This document may reveal that Oswald had placed in his book the phone numbers of the three FBI agents to whom he reported as a paid informer.

There are a total of 40 documents classified by the FBI concerning Oswald. Most of them are labelled "Lee Harvey Oswald" and a city such as Chicago or Washington. This would tend to indicate either a series of reports about Oswald from various FBI offices, or perhaps multiple copies of an FBI directive to various offices. In any event, the FBI was certainly trying to keep something about Oswald from the public's eyes. To date the FBI has succeeded.

Oswald's Knowledge of the U2

Thesis: Oswald had access to knowledge about the U2 high flying planes.

Another subject the public is entitled to know about is document number 931, Reference 6, classified secret by the CIA.

The title is "Oswald's access to Information About the U2." This title takes on added significance when correlated with evidence about Oswald's training for espionage work while at Atsugi Air Force Base in Japan and statements by Francis Gary Powers in his new book.[3]

There is every indication from available evidence that Oswald and Powers met in Italy prior to the U2 overflight. There is also a heavy weight of evidence showing that Oswald was trained by the CIA for spy work before his trip to Russia.

The secret documents whose titles refer to the relation of Oswald and Russia, and which were classified by the CIA, undoubtedly would also be very revealing on this subject. See Table 1.

Table 1

List of Secret Documents Relating to Oswald and Russia

Comm. Doc.	Agency	Subject / Place
300	CIA	re Recent Soviet statements of Lee Harvey Oswald
321	CIA	Chronology of Lee Harvey Oswald in the USSR / Washington, DC
528	CIA	re allegation Lee Harvey Oswald interviewed by the CIA in the USSR
631	CIA	re CIA dissemination of information on Lee Harvey Oswald / Washington
680	CIA	Oswald chronology in Russia
691	CIA	Oswald chronology in Russia
692	CIA	Reproduction of CIA official dossier on Lee Harvey Oswald
698	CIA	Reports of travel and activities: Lee Harvey Oswald and Marina
844	CIA	re Lydia Dimytruk, Russian acquaintance of Marina Oswald / Washington, DC
871	CIA	Photos of Oswald in Russia / Washington, DC
928	CIA	Lev Setyayev and Lee Harvey Oswald contact with USSR citizens / Washington, DC
990	CIA	Khrushchev and Drew Pearson discussion re Lee Harvey Oswald / Washington, DC
1041	CIA	Allegations re Intelligence Training School in Minsk, USSR / Washington, DC
1216	CIA	Memorandum from Helms entitled "Lee Harvey Oswald" / Washington, DC
1552	CIA	Soviet use of kidnapping and assassination; Soviet press reaction

(Abstracted from Reference 6)

The Warren Commission may be off the hook on this problem, since they did not see most of those documents. They were filed in the Archives long after the Commission disbanded. On the other hand, it seems likely that

Allen Dulles, former CIA Director, and John J. McCloy, connected closely to intelligence forces in the past, would have been informed or would have taken pains to find out about Oswald's CIA connections.

Again, the public is certainly entitled to see those documents and to judge for themselves.

Mark Lane

Seven of the secret documents are all FBI reports on Mark Lane, author of the best seller, "Rush to Judgment". See Table 2.

Table 2

List of Secret Documents Relating to Mark Lane

Comm. Doc.	Agency	Subject / Place
489	FBI	Mark Lane, Buffalo appearance / Buffalo
694	FBI	Various Mark Lane appearances
763	FBI	Mark Lane appearances / Los Angeles
1380	FBI	Mark Lane / New York
1457	FBI	Mark Lane and his trip to Europe / Washington, DC
1487	FBI	Memo entitled Mark Lane, James Delaney Garst / Washington, DC
1522	FBI	Mark Lane

(Abstracted from Reference 6)

All these documents are classified by the FBI. It is extremely difficult to see why any report about Mark Lane should be classified. The usual excuse given for classifying information about an individual is that it is for his own protection. Mark Lane needs no protection now, and never did with respect to anything the FBI may have discovered. He was attacked so ferociously on every score by every government agency and many researchers or spokesmen for the Warren Commission (Charles W. Roberts and Lawrence Schiller[4] are two examples) that there could have been nothing at all left to protect by the time the Warren Commission issued its report, and certainly nothing left at this date.

There can be absolutely no reason for classifying any document pertaining to Mark Lane. He would be the first to agree that this is the case. Again, the public is entitled to know.

Harold R. Isaacs and Marylyn Murrett

Document 1080 is titled "Information on Harold R. Isaacs and Marylyn D. Murrett / Boston," classified by the FBI. Harold R. Isaacs is a well known author, World War II reporter in Asia for Newsweek, and for several years now, an MIT professor working on political projects funded by the CIA.

Marylyn Murrett is Oswald's cousin. Evidence gathered by the NCTIA indicates she was involved in espionage activities in Russia and Asia.

In this case it is essential that no implication be made that Isaacs was involved in the assassination plot.

Exhibit A

Excerpt from "The Kennedy Conspiracy"
Paris Flammonde, New York,
Meredith Press, 1969, p 29

The Winnipeg Free Press reported that an FB man, Merryl Nelson, had checked out a story told by a local businessman whose name was withheld for "security reasons" until November, 1967. At that time Maclean's, a leading Canadian magazine, ran a more complete coverage of the fascinating incident.

The informant, an obviously sincere and sensible Mennonite, and father of four, named Richard Giesbrecht, related a conversation he overheard on Feb. 13, 1964, in the Horizon Room, a cocktail lounge in the sweepingly modern Winnipeg International Airport. The nature of the conversation led the thirty-five year old businessman, who was at the flight terminal to meet a client, to quickly conclude the two participants had knowledge regarding the assassination of the President. The more he listened, the more he became certain of his suspicions.

He described one of the men as having "the oddest hair and eyebrows I'd ever seen. The eyebrows were wide and sort of streaky. The hair was very shiny and it started quite far back on his head." Geisbrecht thought this one of the pair resembled Stan Laurel "when he gets that look as if he's going to cry," and he recalls he wore heavy rimmed glasses. Giesbrecht now says this man was David W. Ferrie.

Ferrie indicated he was concerned over how much Oswald had told his wife about the plot to kill Kennedy. Additionally, they discussed a man named Isaacs, his relationship with Oswald, and how curious it was that he would have gotten himself involved with a "psycho" like Oswald.

Isaacs seemed to have allowed himself to be caught on television film near the President when Kennedy arrived in Dallas, and, at the time the conversation was taking place, was under the surveillance of a man named Hoffman, or Hochman, who was to "relieve" him and destroy a 1958 model automobile in Isaacs' possession.

However, in order to clear Mr. Isaacs completely, it is desirable to prove that he was not the Isaacs referred to by David Ferrie in a conversation with another assassination plotter at the Winnipeg airport in 1964. This conversation was overheard by Richard Giesbrecht, a Canadian, reported at the time to Canadian newsmen, and later to Jim Garrison. See Exhibit A.

The Winnipeg Isaacs was deeply involved in the assassination according to Ferrie, who was also involved. Isaacs was at Love Field when JFK's airplane landed, and furnished a car for use in the assassination escape plan. He appeared on TV at the airport and this worried Ferrie for fear he might have been recognized

by someone. The implication is that his face would be recognizable by someone who should not know about his presence there.

In this case, the public, as well as Harold Isaacs are entitled to know what Document 1080 contains.

Oswald in Mexico

The NCTIA has developed evidence which indicates that the planning of the assassination of President Kennedy took place at a series of meetings in Mexico during the summer and fall of 1963.

This evidence shows that Oswald attended some of these meetings and was in Mexico, not once, but at least three times. The evidence also indicates that the CIA was well aware of Oswald's trips at the time they occurred. On one occasion they photographed him and his "CIA baby sitter" (the person to be sure that Oswald was performing promptly) entering the Cuban Embassy in Mexico. This photograph was eventually cropped by the CIA. Oswald was chopped out of the photo, which was then given to the FBI, and used to see if Marina Oswald could identify the "baby sitter." She did not actually see the photo but the NCTIA has been able to identify and interview the man.

Document 1287, "Re Lee Harvey Oswald and affidavit concerning cropped picture / Washington, DC", classified secret by the CIA, undoubtedly would confirm this. The cropped picture was reproduced by the FBI and is included as Odum Exhibit #1 in Page 691 of Volume XX of the Warren Commission Hearings. No mention was made in the Hearings about the identity of the man in the photo, or its original source. The public has a right to know what document 1287 contains.

That the FBI and the CIA were well aware of what took place in Mexico is indicated by 23 classified documents connected with Mexico and Mexico City. See Table 3.

The Warren Report, the Hearings and Exhibits probably seek to cover up what these classified documents undoubtedly reveal. The Commission's official public position is that Oswald took only one trip to Mexico to try to obtain a Cuban visa.

At least one member of the Commission must have been suspicious even though he may not have known the complete truth. Senator Richard Russell said in a three-part television interview conducted in his home state and broadcast before his death: "I always wondered why Oswald took all of those trips to Mexico".

Russell knew there had been more than one trip and was very skeptical about the Cuban visa explanation. He also said he had always believed there had been a conspiracy, and he still believed it until he died.

Other Documents

There are many other documents in Reference 6 whose significance can be detected from the title and other known evidence. One or two more examples will serve to illustrate the point.

Table 3

List of Secret Documents Relating to Oswald and Mexico

Comm. Doc.	Agency	Subject / Place
78	FBI	Lee Harvey Oswald's Mexican trip
347	CIA	Activity of Lee Harvey Oswald in Mexico City
384	CIA	Activity of Lee Harvey Oswald in Mexico City
426	CIA	Interrogations of Silvia Duran and Husband in Mexico City
442	State	Telegrams between State Dept. and the U. S. Embassy, Mexico City
721	FBI	Oswald's trip to Mexico
726	CIA	Actions of Silvia Duran after first interrogation / Washington, DC
751	FBI	Lee Harvey Oswald: re Mexican trip / Washington, DC
785	FBI	Oswald in Mexico; 7 photos attached /Washington, DC
872	FBI	Oswald's travel in Mexico / Washington, DC
873	FBI	Oswald's travel in Mexico / Washington, DC
874	FBI	Oswald's travel in Mexico / Washington, DC
880	FBI	re Oswald safe deposit box, in Laredo, Houston / Washington, DC
910	FBI	Inquiry into Oswald's Mexican trip / Washington, DC
944	CIA	Mexican control of US citizens travel to Cuba / Mexico
1000	CIA	Mexican interrogation of Gilberto Alvarado / Washington, DC
1007	FBI	Oswald's Mexican trip; entry and departure / Washington, DC
1008	FBI	Oswald's Mexican trip; hotel registration / Washington, DC
1029	FBI	Oswald's Mexican trip / Washington, DC
1037	FBI	Mexican aspects of Oswald investigation / Washington, DC
1038	FBI	Mexican aspects of Oswald investigation / Washington, DC
1180	FBI	Mexican aspects of the investigation / Washington, DC
1545	CIA	Activity of Lee Harvey Oswald in Mexico City / Washington, DC

(Abstracted from Reference 6)

Document 1427, FBI: "Re maintaining contact with Albert Alexander Osborne / Washington, DC" becomes very interesting when one digs into Mr. Osborne's identity. He was on the bus with Oswald travelling from Texas to Mexico City. The Commission and the FBI would have us believe it was a coincidence and that they just struck up an acquaintance on the bus. But Osborne turns out to be a very shady character with a long intelligence-style past and the alias of John Howard Bowen. Evidence gathered from the Exhibits and other sources indicates that Osborne was involved in the Mexican meetings.

Document 729, FBI: "Allegation that Oswald was in Montreal, summer, 1963 / Washington, DC." The reader is struck by the fact that an allegation about Oswald if unfounded, would seem to have no reason to be classified Confidential. This document becomes interesting when coupled with several airline, hotel, and other records showing that David Ferrie and Clay Shaw took several trips to Montreal together during the summer of 1963. Indications are that they were arranging for a form of financial and intelligence support for the assassination.

The Basic Lie

The declassification and publication of the classified assassination documents is essential for the American public. The Warren Commission, the FBI, the CIA, and the Dallas Police fabricated and expanded upon a basic lie to the extent that it became necessary to stamp Secret or Top Secret on over 200 documents to cover up the fact that they were lying.

The basic lie is as follows: Lee Harvey Oswald killed John F. Kennedy and Patrolman J. D. Tippitt on November 22, 1963 using his own rifle to fire three shots at the President, from a sixth floor window of the Texas School Book Depository Building. Two of the shots struck the President and Governor Connally and one shot missed, striking the south curb of Main St. in Dealey Plaza. Oswald used his own pistol to kill Tippitt in Oak Cliff, several miles away from Dealey Plaza.

The mountain of evidence gathered to date including photographic as well as ballistics, medical, and eyewitness testimony proves the above conclusions reached successively by the Dallas Police, the FBI, and the Warren Commission to be lies. Oswald can be shown to have fired no shots that day. Photographic evidence alone, proves that no shots were fired from the sixth floor window on that day, and that certain members of the police faked evidence in the window, on the sixth floor, and elsewhere, in order to frame Oswald as the lone killer . (See Reference 7.)

Evidence proves that Kennedy was killed by a shot from the grassy knoll in front of him, and that other shots were fired from the Dal Tex Building and the grassy knoll. Evidence shows that two other men shot Tippitt and not Oswald.

The classified documents may or may not reveal all of this, but it is highly likely that they will support the evidence showing conspiracy.

These documents are not needed to prove conspiracy; but nevertheless, the public has a right to know. If the documents reveal nothing at all about Oswald's innocence, his informer role, or the conspiracy, then why should they remain classified? If they do reveal something, then there is all the more necessity for declassification.

The people of the United States have a right to know, to find out the truth about the lies they have been told.

References and Notes

1. National Committee to Investigate Assassinations, 927 15th St. NW, Washington, D. C. 20005

2. Gerald R. Ford, "Portrait of the Assassin", New York, Simon & Schuster, 1965.

3. Francis Gary Powers, "Operation Overflight", New York, Holt Rinehart & Winston, 1970, pp. 357-8.

4. Charles W. Roberts, "The Truth About the Assassination", New York, Grosset & Dunlap, 1967; also, Lawrence Schiller, "The Scavengers and Critics of the Warren Report", New York, Dell Books, 1967.

5. "Original facsimile record of bills charged to the Warren Commission to pay for the stenographic reporting of sessions of the Commission", stamped Top Secret, published as Exhibit 2, in "The Second Conspiracy", by Richard E. Sprague, Computers and Automation, July 1970, pp. 35-36.
   This exhibit was photographically reproduced. The second line-space of this record shows that on January 22, 1964, the Warren Commission held a meeting in "D. C. ", and then the line is crossed through by another line and the handwritten notation appears "no write-up — reporter's steno notes confiscated by the Commission".

6. "Confidential and Secret Documents of the Warren Commission Deposited in the U. S. Archives", by Neil Macdonald, Computers and Automation, November 1970; list, pp. 45-47; introduction, p. 44.

7. "The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence", by Richard E. Sprague, Computers and Automation, May 1970, pp. 29-60.

Privacy, Human Values, and Democratic Institutions — I

"... The generalized use of the computer as a means of social control threatens to destroy ... very probably all the present rights of the individual ..."

Congressman Cornelius E. Gallagher
U.S. Congress
Washington, D.C. 20515

(Gallagher testimony before the Committee on Rules, on Resolution to create a Select Committee on Privacy, Democratic Institutions, and Human Values, Wednesday, May 4, 1971)

Mr. Chairman, and members of the Committee on Rules, it is a great pleasure for me to be here this morning to offer testimony on my resolution to create a Select Committee on Privacy, Human Values, and Democratic Institutions.

The Use of a Computer as a Means of Social Control

Let me begin my remarks with a statement from one of America's most perceptive social observers and a man who is deeply aware of the lag between technological change and society's response. Robert Theobold has written:

"Whether increasing violence and social disorder can fairly be laid at the door of the computer is, however, peripheral to the possibility of the development of a police state ... "

Mr. Theobold continues: "... the generalized use of the computer as a means of social control threatens to destroy at least the right of privacy, and very probably all the present rights of the individual ..."

He then pleads for laws to be developed which will utilize the wonders of computer technology without the clear threat he sees to all of our rights.

This, Mr. Chairman, is exactly what my proposed Select Committee is ultimately designed to accomplish. Since the hearings I held with my Privacy Inquiry of the House Committee on Government Operations into a proposed national data bank in 1966, I have been very concerned about the inability of the people's representatives to grapple with technological change. For the computer, with its enormous ability to collect and retrieve information, was totally unknown when our Bill of Rights was framed and, unfortunately, its total impact on our system of government is the source of considerably more noncongressional worry than it is a subject of investigation within the Congress.

The Invasion of Privacy

When we called attention to the computer's ability to invade privacy in 1966, it was a very new concept. Now, we have seen Senator Ervin's hearings with his Constitutional Rights Subcommittee disclosing example after example of the power of technology to assemble mountains of information on the lawful activities of our citizens. Since my 1966 hearings, I have frequently pointed out specific threats in the credit reporting industry, the marriage of sophisticated photographic methods with the computer, and the increased instances of almost lawless personal record-keeping permitted by the new technology.

All of this, however, has been concerned with specific cases, and let me say I could speak for several hours with example after example of the new technology. But let me refer to one of the most recent, and one of the best books, on this subject. Professor Arthur R. Miller writing in his splendid The Assault on Privacy says that a broad view of the entire problem is necessary and he endorses my request for a fully funded, fully staffed committee.

I believe the Committee will soon receive, or has received already, letters from Professor Miller, Dr. Alan Westin, who heads a National Academy of Sciences' group considering computerized data banks and civil liberties, journalists who have covered this area, and professionals from the computer community. Indeed, it might fairly be said that everyone recognizes the threat except those who will have their power stripped away: Members of the Congress of the United States.

Anticipatory Democracy

Interestingly, each review of the many books on privacy looks to the Congress to assert the human values, and to try to measure and hopefully guide the massive change technology is forcing upon us. In Irving Toffler's phrase, we will all suffer Future Shock.

Toffler also says that we must begin to practice anticipatory democracy; that is, we must create a government whose institutions are knowledgeable enough about change to have some ability to direct that change.

Computer Power in the Executive Branch

Not only do we in the Congress have no formal mechanism to assure "anticipatory democracy," the growth of computer power in the Executive Branch is denying us the exercise of our constitutionally mandated "participatory democracy." We in the Congress are in real danger of becoming solely a ceremonial body, of becoming a supine figurehead on a

ship of state, steered by the Executive Branch's computers, which is heading straight for the rocks.

Rising Tide of Frustration

Not only are we not representing ourselves in the policy making area, but we are allowing those who have reposed their trust in us, our constituents, to gradually be stripped of a feeling of participation. The rising tide of frustration and powerlessness we see all around us is due, to some degree, to the fact that every proposed piece of legislation sent to us from the Executive Branch or that we develop ourselves, calls for the gathering of more personal information by the Federal Establishment. If we can make sure that every law we pass contains safeguard for that information, and perhaps more important, if every concerned legislative committee insists that the collection of information is fully justified, we will be able to assure our constituents that we are playing a meaningful role.

Science Fiction Surrounding the Computer

It will not undermine the potential threat of the computer to point out that many current computer applications just do not work. In some cases the down time is as high as 60% and one pertinent role of a Select Committee would be to strip away the science fiction surrounding the computer and to insist that the computer industry develop more accurate systems. But in the area of genetic engineering, there simply is no science fiction. Almost every form of life will someday yield to the test tube and a managed environment for conception, growth, and lifelong manipulation is within the predictable future. Coupled with the use of chemical technology to alter life-styles, moods, and attitudes of our citizens, we are creating a radically different sort of society from that which you and I know. Yet, the Congress continues to be almost indifferent.

Technocratic Elite

America is a mixture of dozens of different cultural and ethnic heritages and yet often those who manipulate the new technologies believe that everyone must be a mirror image of themselves. We are in the process of creating a technocratic elite who produce programs of massive impact but who do not consider fully the ramifications of their actions beyond short term successes.

Common Folk Become Docile Clients or Deviants

A man very different from Robert Theobold, indicating the range of philosophies concerned, has commented on this problem. One of the prime proponents of the new life style, Paul Goodman, said:

"Human beings tend to be excluded when a logistic" (that is, a computer-oriented) "style becomes universally pervasive, so that values and data that cannot be standardized and programmed are excluded, when function is adjusted to the technology rather than technology to function ... when there develops an establishment of managers and experts who license and allot resources, and which deludes itself that it alone knows the only right method ... then common folk become docile clients, maintained by sufferance, or they are treated as deviant."

And, unfortunately, it could well be said that the Congress itself is often a docile client of an all knowing technocratic elite.

Pollution of the Political Atmosphere

And this power is not only in the Executive Branch, Mr. Chairman. Academies devise psychological tests which mirror their own pre-conceptions of what constitutes decent behavior; businessmen exchange data on social, moral, and economic life of citizens only allowing them limited access to information which determines their ability to get credit, insurance, or employment; medical and school personnel administer behavioral modification drugs to grammar school children, sometimes without analyzing the socially inspired reasons for what they term "learning disabilities;" Federally sponsored research reports launch plans which are buried deeply within the bureaucracy until they burst forth on an astonished and fearful citizenry; congressional committees approve efficient and economical schemes without being able to develop information which allows a just consideration of the long range impact on our shared values. The list is endless.

I might describe what is happening, Mr. Chairman, by saying that we all now recognize that the pollution of the physical atmosphere is the result of some technologies, but that we are unaware of the pollution of the political atmosphere. Technology's tools spearheaded by the computer, have so accelerated the pace of change that we are in grave danger of losing our form of government. Certainly, in so many areas, the House of Representatives has already lost its relevance.

And so, Mr. Chairman, I implore this Committee to approve the Select Committee on Privacy, Human Values and Democratic Institutions. It would be a major aid to our constituents, our Constitution, and our Congress.

SELECT COMMITTEE ON PRIVACY, IN THE HOUSE OF REPRESENTATIVES

Congressman Cornelius E. Gallagher
House of Representatives
Washington, D. C.

On May 18, the House Committee on Rules approved my Resolution to create a Select Committee on Privacy, Human Values, and Democratic Institutions. A vote on the Floor of the House will be forthcoming soon.

As the attached documents disclose, Senator Ervin, and Congressmen Anderson and Horton, clearly see the threats which the new technology poses to privacy. But, unfortunately, this vision is not shared by a majority of my colleagues here in the House.

I am, therefore, asking that you do what you can to convince your own Congressman or others who could be influential, of the importance of the issues in regard to privacy. I hope you share my conviction that privacy is as fragile as it is essential to the continuation of a free America.

Since the cancellation of my Privacy Inquiry by the Government Operations Committee, the Congress has been denied the kind of insights and actions we generated. A Select Committee would have a full staff and full funding and would be fully able to confront each threat as it emerges and could help the Nation find coherent policy. I urgently solicit your aid.

Privacy, Human Values, and Democratic Institutions — II

"Individuality is an absolute necessity for the survival of democracy — without privacy and free expression, no free nation can remain free."

Congressman Frank J. Horton
House of Representatives
Washington, D.C.

(Text of Congressman Horton's testimony before the Committee on Rules in support of a proposal to establish a Select Committee on Privacy, Human Values, and Democratic Institutions)

The Computer Has Made Man not Wiser but More Clever

Mr. Chairman, I ask your indulgence for a few minutes in order to place my discussion in its philosophical perspective. Our forebears, some hundreds of thousands of years ago, conducted themselves under primitive conditions and acted with a savagery we would consider appropriate for animals. Time improved that, with fire, the wheel, steel and gunpowder, the steam engine and the industrial revolution. But let us consider for a minute what man has wrought. The bulldozer and dynamite have made him stronger; he can literally move mountains. The plane and car have made him swifter. The furnace and air conditioner have changed the "weather" he must live in. Telescopes enable him to see objects so distant, that their proximity must be measured in light years. And the computer has made him not wiser — but more clever, extending memory, evaluation and calculation to a degree almost incomprehensible.

A Public Outcry to Ban Automobiles

This technology has taken its toll. C.P. Snow, the British philosopher, can remember the public outcry to ban automobiles after the first fatal accident in London. But humans became regarded as less unique, and the auto stayed — despite 60,000 auto deaths a year, in this country alone. Life expectancy in smog-ridden New York City is statistically less than elsewhere in America. The cost has been an aesthetic one also. As the writer put it, "You may fly ... but the birds will lose their wonder. And the clouds will reek of gasoline."

Prohibitive Costs

Fortunately, we have reached a point in which some of the costs have been found prohibitive and corrective steps have been taken. Automobiles must be developed which will not poison our air. Food preservatives, an excellent concept, have been found harmful and are closely controlled. Industries must curtail pollutant operations.

A Machine which Can Memorize More and Better Than We Could in a Hundred Lifetimes

This revolt against the abuse of man, against unguided and uncontrolled technology, has recently turned to the computer. A machine, no larger than this table, which can memorize more and better than we could in a hundred lifetimes, has been found a threat to the quality of life and society that we hold dear. Why? Because privacy has and continues to be abused as man failed to discern the computers' effect on our lives. The horror stories are legion, and they range from political surveillance — to the information on file at credit bureaus, which — accurate or not — is freely available to almost anyone.

The Job of the Government is to Identify the Problems of Society

The job of government — any government — Mr. Chairman, is to identify the problems of society and then go about solving them. I submit that the matter of privacy and human values, and democratic institutions is a matter of concern to most Americans, the thus, a legitimate subject of study for America's leaders.

A Function of Assessing

The Committee envisioned in this legislation would not have a regulatory role. It would, however, have an attentive function in assessing the unintentional, unconscious, but nevertheless growing threat to one of our basic freedoms — privacy. Our nation was based on the revolutionary and unique notion that a man's thoughts, his private affairs, and his activity were his own business insofar as they did not pose danger to others or to the public welfare. But America has since approached middle-age, with attendant changes in outlook.

Government Officials Demanding to See the Private Papers of Newsmen

In today's age, we see government officials demanding to see the private papers and notes of newsmen. We are told that there is no inherent right of privacy, that individuals, including any Senator or Congressman, can — theoretically, be placed under surveillance without his rights infringed. We are asked to trust in the "self-restraint" of the government in these matters.

Erosion of Freedom

I submit, Mr. Chairman, that this erosion of freedom is a matter of great importance, especially its deteriorating effect on our privacy, our uniqueness as individuals. It is imperative that a committee undertake a study of where this development is taking us as a society. You will note, Mr. Chairman, from my previous remarks, that there will be a great deal of disagreement on the questions alone before we can even begin to seek answers. But the study must be undertaken if we are to transfer to our grandchildren and theirs the quality of life and the heritage of personal liberty and individual uniqueness we received from our forebears. For individuality is an absolute necessity for the survival of democracy.

Privacy and Free Expression

Without privacy and free expression, no free nation can remain free. There are three specific areas I would like to cover and then I would be glad to try to answer any specific questions the Committee may have. The three areas are (1) the essentially bipartisan nature of the work of the proposed Select Committee; (2) the particular necessity at this point in time for such work to be mounted here in the House of Representatives; and (3) the reason why this work would permit the House of Representatives to remain relevant to current national problems by what I would regard as a most significant act of internal reform by creating this Select Committee.

Wide Support

First, few issues with which I have been associated have drawn support from a wider spectrum of philosophies and political views. My presence here today as well as my words demonstrate that one Republican strongly supports this concept and I feel I can speak for many of my colleagues on my side of the aisle when I say there is no partisanship involved.

National Data Bank

When I was a member of Congressman Gallagher's Privacy group in the House Government Operations Committee, our hearings in 1965, 1966 and 1968 were held during Democratic Administrations. The hearing into the proposed National Data Bank was especially revealing, because we learned that the top political advisors in those Administrations had little or no knowledge of what was being proposed in the middle levels of the bureaucracy.

Huge Immovable Bureaucracies

As President Nixon has learned since he has assumed his position, administrations inherit both huge problems and huge, immovable bureaucracies. We found in our work with the privacy study that programs which threaten privacy are advanced by people who are largely indifferent to partisan politics, who propose to spend millions of public dollars, and who are seldom if ever identified in the same way men in public life are held accountable for their decisions.

Visibility for Proposals

It may well be that a major task of the Select Committee would be to give visibility to certain bureaucratic suggestions before they become issues which could divide Republican from Democrat and liberal from conservative.

A Select Committee would, I feel, bring us together to preserve the common good rather than create any partisan arguments.

President Nixon in a recent news conference said that this Administration would take no actions to infringe on the right of privacy. I believe Mr. Nixon, just as we believed Mr. Johnson, but the Federal Government is so large that neither of the Presidents could be sure. One task of the proposed Select Committee would be to make independent evaluations of proposals which could threaten what any President wants for his country.

When we held our hearing into the computer and invasion of Privacy in 1966, we called attention to a threat to America which the distinguished southern Senator, Sam J. Ervin, recently laid out in truly appalling detail. The insights of the Privacy Inquiry were indisputably proven during Mr. Ervin's hearings.

I am sure that Mr. Gallagher, in his statement, has shown how we could remain relevant as an institution if the House were to establish this Select Committee.

The "Threatening" of Basic Human Rights

I just want to add an additional point, and this has to do with reforming our procedures. The Nation is now in turmoil and many of our constituents, rightly or wrongly, feel that their basic human rights are being threatened.

We have in this Congress three permanent Committees which work to guard our society against crime and disorder, worthy pursuits which can, on occasion, step too far toward limiting the privacy rights of our citizens. These committees are: Committee on the Judiciary; the Select Committee on Crime; and the House Internal Security Committee.

Insistence on Reform of this House

Let me immediately say that I do not share the view that these Committees consciously help to restrict individual rights in America. But one of the central messages of those who insist we reform this House is that we are not equipped to deal with the rising demands of those who demand a fuller expression of their basic humanity. It seems to me that one Select Committee looking into privacy could balance the perspective of the House, which must watch over both the personal safety and individual rights of Americans.

Enabling Voices to Be Heard

Naturally, a Select Committee would not undermine the work done by other Committees in the House, but it would permit what are now only powerless cries of frustration to be funneled into a formal channel and it would permit other voices to be heard as we arrive at our decisions.

The Computer May Have a More Powerful Impact Than the Printing Press

Many observers contend that the computer will have a more powerful impact on society than did the printing press. I think the major thrust of the Select Committee in conducting continuing investigations of existing and proposed computerized information systems, both those within Government and in private hands, will allow democracy to flourish along with this essential new means of record keeping. Neither Congressman Gallagher nor I are against the computer, but we do share the view that it must be used carefully, under controls, and in full consonance with the Bill of Rights. We have no present means within the House, or indeed within the Congress to receive expert advice and to conduct knowledgeable investigations in this field. The Select Committee would put that expertise here within the House, rather than having it all within the Executive Branch.

In my opinion, what we are discussing is allowing the Congress to remain responsive to current concerns. I hope that you will look with favor on the creation of a Select Committee on Privacy, Human Values, and Democratic Institutions.

ACROSS THE EDITOR'S DESK

APPLICATIONS

CHECKLESS PAYROLL SAVING HOSPITAL DOLLARS & TIME

At Sarasota's Memorial Hospital in Florida, a computerized checkless payroll system is reported reducing payroll preparation and administration costs more than 25%. After four and a half years and more than 100 checkless paydays, hospital management, employees and financial institutions consider the automated system an unqualified success. (The hospital deposits its entire $280,000 bi-weekly payroll in 14 different banks designated by its employees.) Under the checkless system the hospital operates virtually a "hands-off" pay system from the time an employee clocks into the hospital in the morning until his pay is money in the bank. Participation is mandatory for the hospital employees.

H. Jack Floyd, associate executive director of the hospital, played a major role in the inauguration of checkless paydays in January 1967. Mr. Floyd described the system this way:

Each employee is issued an identification card with his name, picture and Social Security number when joining the hospital staff. On coming to work he simply inserts the card into a time clock that transfers the information to a "slaved" card punch in the hospital's computer room. The process is repeated when an employee leaves work. After a card has five in and/or out punches, it is fed into the hospital's Honeywell 1250 computer.

At the end of a pay period the computer prepares a payroll deposit roster for each of the banks participating in the program, which is delivered to the banks with the hospital's check. On payday, employees receive a Payroll Notice of Deposit which provides them all pertinent pay information, as well as information on vacation time accrued and sick time. These latter entries are the result of the hospital's having programmed personnel policy regarding time in, time out, maximum vacation time, application of sick leave, etc., right into the computer. (Software has been developed by Memorial's EDP staff with the assistance of Honeywell software specialists from its Tampa, (Florida) DP operation office.

Use of the computer isn't new to the 515-bed hospital, which considers itself the first hospital in Florida to install a computer back in 1962. Today Sarasota Memorial operates on about a $200,000 annual EDP budget and is using computer communications to attack cost problems on a wide scale. "We're firm believers in getting full utilization of the capabilities of our computer," Mr. Floyd emphasized. "We've used the Model 1250 for four years now without being down for as long as 24 hours because of problems...."

PROPERTIES OF CHEMICAL COMPOUNDS PREDICTABLE WITHOUT ACTUAL MEASUREMENTS THROUGH USE OF COMPUTER

Two scientists from the University of Utah have developed a completely new technique for predicting the properties of chemical compounds without the time and expense of actual measurements. Reporting at the national meeting of the American Chemical Society, Dr. Richard H. Boyd, professor of chemical engineering, and Dr. Shirl Breitling, assistant research professor of materials science and engineering, said they have learned how to use a computer to predict the precise shapes and many of the properties of molecules. The new technique eliminates the necessity for such measurements as X-ray and electron defraction, infrared analysis, heat of formation and heat capacity.

The researchers first devise a model of a molecule that makes up the atomic structure of the compound under study. These are fashioned out of plastic tubing and brass fasteners. Then the atomic ends of the molecule are touched by a computer-attached stylus. A button is pressed to record the positions of the atoms in the computer. The energy functions of the molecule, including natural bond lengths, angles, force constants, and other known factors are also fed into the computer, providing what Dr. Boyd called the "converged structure" in a numerical print-out.

Since a complex series of numbers is difficult to interpret, the researchers went one step further and worked out a graphic display program with the computer science department. Using the University of Utah's graphic research facilities, the two scientists used the computer to produce still pictures of the molecules, as well as moving pictures of how they change shape. One of the chief benefits of the technique is that chemistry students now can observe three-dimensional pictures of molecules, including motion pictures.

"One of the most exciting applications of the new technique is that compounds which have never before been made can now be calculated through the computer," said Dr. Boyd. "We are confident the technique will enable engineers to design chemical plants to produce compounds with predictable properties, polymers for better plastics and hydrocarbons for better petroleums, etc." He also pointed to future shortcuts in developing better materials for artificial organs, pollution-free gasolines and other materials with better balanced molecules.

LINGUISTICS RESEARCHER PLANS NAVAJO LANGUAGE TEXTBOOKS WITH HELP OF COMPUTER

A computer will help bridge the language and learning gaps encountered by Navajo-speaking Indian youngsters when they enter school and are faced with a foreign language — English. Dr. Bernard Spolsky, a linguistics researcher at the University of New Mexico (Albuquerque), is using an IBM System/360, Model 67 computer to analyze the Navajo language and catalog the knowledge Indian youngsters

— Dr. Bernard Spolsky, shown talking with a Navajo girl

possess on entering school. He believes that the young Navajos — 90% of whom reach first grade knowing no English — would learn English better if they were taught to read and write their native language first. "Before we can prepare adequate educational materials, we must know what the Indian child understands of his own language," Dr. Spolsky said.

Dr. Spolsky trained adult Indians to conduct tape-recorded interviews with more than 150 children of the 120,000-member Navajo nation to determine what instructional approach should be taken in the children's native tongue. Each interview was transcribed onto punched cards and analyzed by the university's computer. The system produced an alphabetical index (2,673 pages long) of all words used in the interviews, noting for each the sentence in which it was used and the frequency of use. The frequency listing, telling which Navajo words the first grader understands, is the starting point for preparing educational materials.

The study will result in elementary school textbooks written in Navajo. The old Dick-Jane-Spot texts — which have accompanied millions of Americans through the primary grades — will be replaced with more meaningful Indian counterparts.

The federal government has taken an interest in Dr. Spolsky's skill with the IBM system and funded the study.

DEFECTIVE AUTOS ROUTED OFF STREETS, INTO REPAIR SHOPS, WITH AID OF COMPUTER

As the result of an IBM computer that's helping route defective vehicles off Washington, D. C. streets and into repair shops, the more than 100 million automobiles traveling the nation's highways in the mid-70s will be safer and emit less pollution. The computer is part of an experimental vehicle inspection station developed by the District's Department of Motor Vehicles under a $2.4 million contract with the Department of Transportation (DOT) and a $40,000 contract with the U.S. Environmental Protection Agency (EPA).

Information gathered by the System/360 Model 50 during the five year experiment will be used by DOT to increase the effectiveness of automobile manufacturers' recall campaigns and, ultimately, to set new safety standards for the industry. And EPA will use the same data to find ways that excessive engine emissions can be eliminated.

In operation since late April, the inspection station has spotted defects in several hundred cars traveling District streets. When anyone of the 250,000 cars registered in the District comes in for its yearly inspection, its first stop is at a video display terminal connected to the computer. An attendant types in the auto's make and registration number. Stored in the computer are recall notices on more than 11 million cars reported to DOT by the manufacturers. If the car is among the 11 million or has been involved in an accident that resulted in damages of $200 or more, the information is instantly displayed on the terminal's screen and printed on a vehicle inspection form.

Defective autos go to a special lane where, along with normal tests, they're put on a dynamometer which runs them at speeds of 25, 40 and 60 miles per hour and checks engine performance, transmission, exhaust emissions and brakes at each speed. Next, the suspension and steering systems are checked. In some cases, brake drums are removed for internal inspections, then re-assembled and tested again. Results of the tests are fed back into the computer where they're available to the Department of Motor Vehicles, DOT and EPA. If no problems are reported by the computer, the auto goes through one of four regular inspection lanes that test seat belts, glass, tires and other safety components.

The program has been well received by District residents who feel that, for the first time, they're getting an objective look at the car they're driving, at no additional cost to them.

UPI EDITORS WILL TRADE PENCILS FOR COMPUTERS

Editors at United Press International news service are trading their pencils for computer systems to edit news stories flowing in from throughout the world. UPI is developing a system for editing and distributing news that will eliminate most manual rewriting and result in faster, more efficient news reports to newspapers and broadcasters.

Stories filed by UPI correspondents and bureaus will be fed into an RCA computer. The computer will automatically produce an abstract of each story, including an item number, slug line, first paragraph and length. The abstract will be printed out on teleprinters at the desks of key editors at UPI headquarters in New York.

An editor can select a story to edit, have it displayed on a video data terminal, and using the terminal's keyboard, can correct the copy, making additions and deletions just as he now does with a pencil. The story then will go back into the computer for dissemination to UPI's client newspapers and broadcast stations.

The system will begin initial operation in the Spring of 1972, when UPI's primary national news wire is converted to the computer operation. The computerized wire will operate in parallel with the manual wire for about a month during a testing period to insure uninterrupted service to clients. By mid-1972, nearly all other UPI wires will be linked to the system. In each case, the manual wire will run in parallel for approximately two weeks.

EDUCATION NEWS

ATLANTA BAPTIST COLLEGE OFFERING DEGREE CREDITS TO HONEYWELL GRADUATES

College credits for classroom courses conducted by an industry-operated school are being offered by Atlanta Baptist College (Georgia) as of the 1971-72 Fall quarter. Dr. Monroe F. Swilley, Jr., president of ABC, announced that the college completed arrangements with Honeywell Inc. to allow 30 full college credits toward a bachelor's degree for all graduates of the Honeywell Institute of Information Sciences.

The agreement will make the young four-year college the first institute of higher learning in the Southeast and one of the first in the nation to make this type of arrangement with a computer institute for such credit transfers. Similar plans in operation involve the University of Minnesota in Minneapolis, Southern Methodist University in Dallas, and Pepperdine University in Los Angeles, the latter in cooperation with Honeywell. (see Computers and Automation, September 1971, p. 42.)

Simultaneous with the credit transfer announcement came word that Honeywell also had been awarded a contract to set up and manage a formal computer science program as regular courses within the framework of ABC's business administration curriculum.

U.S. COLLEGE HELPS KOREA ESTABLISH GRADUATE CENTER

Polytechnic Institute of Brooklyn (New York), a science-engineering college, is helping Korea overcome one of its biggest obstacles in the way of industrialization — a shortage of scientists and engineers. Last summer, Polytechnic Institute supervised the initial development stages of Korea's first centralized graduate school of science and engineering, which expects its first students in the fall of 1972. (Now, most Korean students who want to study science and engineering on a graduate level must go to the United States or another country.)

KAIS grew out of a study by Prof. KunMo Chung, a native of Korea and an associate professor of electrophysics at Polytechnic Institute's Long Island Graduate Center. Prof. Chung has been named Vice-President for Academic Affairs of the new institution, and he also is a member of Polytechnic's KAIS Task Force with responsibility for program development and faculty recruitment for the new college.

Plans call for an initial class of approximately 40 M.S. students in two fields of study. By 1975, there will be seven fields of study offered in programs leading to the Master of Science degree, the Engineer degree and the Doctor of Science degree. Financing for KAIS comes from the Republic of Korea and the U.S. Agency for International Development (AID).

"INTERNSHIP IN INDUSTRY" ALLOWS TEACHERS TO KEEP PACE

Honeywell Information Systems is conducting an "internship in industry" program to allow teachers to keep pace with rapidly changing industrial technology. The program was set up to help ensure that what students learn will be pertinent to the solution of topical problems. Faculty members who teach and have curriculum development responsibilities for technological subjects at vocational and technical institutions are invited to participate in the sessions.

The "internship in industry" program includes lectures and laboratory work on the production and maintenance of computer equipment, principles of computer programming, computer industry trends and career opportunities within the computer industry. Sessions are held at Honeywell's field engineering training center in Newton, Mass.

RESEARCH FRONTIER

VOICE-CONTROLLED DEVICE GIVES "COMMAND" PERFORMANCES

Engineers at Bell Laboratories in Holmdel, N.J., are investigating an experimental device that can dial a telephone number when given spoken commands. Voice control of the device is achieved through a simple form of integrated circuitry that converts sound waves into electrical pulses to open and close the electromechanical switches necessary for obtaining a dial tone, executing dialing, and terminating a call. Previous voice-controlled devices required the use of an elaborate system of electronics in addition to the aid of a computer to function efficiently. By comparison, say its developers, Meb Awipi, Cliff Hoffman and Gerald Soloway, the experimental device is simply constructed and easy to operate.

A small circular display of ten lamps labeled with the numerals zero through nine is used along with the voice control device. The lamps light in numerical sequence. Any voice utterance spoken in coincidence with a lighted numeral will activate that number. Speaking the numbers "one", "three", and "five" as the corresponding numerals light up in this order will enable the device to store in its memory all of the digits in a typical telephone number. As the numbers are spoken, the corresponding lamps remain lighted in the display for a slightly longer interval to indicate registration in the device's memory.

When a special command is given, the memory in the voice control device transmits stored digits as a series of electrical pulses to telephone dialing circuitry. A telephone number remains in the memory even after it is dialed and can be reused any time the dialing command is given. It is automatically erased when a new number is stored.

A similar voice control device may one day provide "hands-free" telephone service for motion handicapped persons. Also in the future, the device could possibly be used to operate more sophisticated electrical equipment or machinery.

MISCELLANEOUS

CIGARETTE SMOKE AIDS COMPUTER TESTING

An unusual machine that "smokes" cigarettes a whole pack at a time is helping IBM engineers test and evaluate the effects of smoke on computers. At IBM's General Systems Division Product Test Laboratory, Rochester, Minn., the machine's two cylindrical "lungs" automatically "puff" and "exhale" smoke into the test chamber where a machine is subjected to the dense smoke.

Because IBM's small computers, such as System/3 and System/7, are being operated in industrial facilities and warehouses as well as business office environments, new methods such as the cigarette smoking machine are used to insure product reliability. (Larger computer systems are normally housed in climate-controlled rooms, and isolated from various pollutants and contaminants.) The Product Test Laboratory also uses the test chamber to subject computers to high concentrations of dust as well as cigarette smoke.

MEMORY DISCS

These discs may look like phonograph records of the future — and they will record more information than you'll find in a library of long-play records. They are, however, computer memory discs. Each side of the aluminum discs can hold

the equivalent of nearly three 80,000-word books. In the picture, a quality control technician at Reynolds Metals Company's McCook, Ill., plant is shown as he checks surface flatness to within thousandths of an inch. Reynolds estimates that more than 6 million pounds of aluminum will be used for memory discs this year — enough to make more than 8½ million discs containing 4¼ trillion words.

IBM "SELECTRIC" II TYPEWRITER AND THE NEW TECH III RIBBON

The IBM "Selectric" II Typewriter is the most recent addition to the family of word processing equipment offered by IBM's Office Products Division, Franklin Lakes, New Jersey. Among the new features of the machine is a dual pitch mechanism which enables the typist to switch from 10-pitch (ten characters per inch) to 12-pitch (twelve characters per inch) simply by moving a lever. Other new features include an express backspace and a half backspace.

A new IBM Tech III Ribbon, also featured with the typewriter, is enclosed in a snap-in/snap-out cartridge. This long-life ribbon is manufactured under a patented process which creates a tough polymer (plastic film) saturated with fluid ink. With average use the new ribbon needs to be changed approximately five times a year, compared with 64 changes needed with previously-existing carbon film ribbons used on IBM "Selectric" Typewriters.

NEW CONTRACTS

TO	FROM	FOR	AMOUNT
Burroughs Corporation, Detroit, Mich.	Minister of Education, New Zealand Government	Five B6700 systems and two DC1200 systems for use throughout New Zealand universities; systems will handle DP requirements of all universities serving some 50,000 students; first system scheduled for Auckland Univ., Oct. '72; network completion by August '73	$3.75 million
Univac Division of Sperry Rand, Blue Bell, Pa.	Deutsche Beamten-Versicherung, Wiesbaden, West Germany	A UNIVAC 1106 system for maintenance and updating of customer policies, basis for management information system, other actuarial and administrative tasks	$3.4 million (approximate)
Logicon, Inc., San Pedro, Calif.	Air Force Space and Missile, Systems Organization (SAMSO)	Engineering evaluation, validation and software development for the Air Force Minuteman intercontinental ballistic missile program for use by the Strategic Air Command (SAC)	$1.1 million
Shintron Company, Inc., Cambridge, Mass.	Medfax Communications, Inc., New York, N. Y.	QIX 504 graphic facsimile transceivers; delivery in early 1972	$1.1 million
Hazeltine Corp., Greenlawn, N. Y.	Philco-Ford Houston Operations, Houston, Texas	A large quantity of fully interactive digital displays to be used by NASA for mission operations information	$1,058,000
Incoterm Corp., Marlborough, Mass.	Air France	Installation of complete computer display network at Orly Int'l Airport (outside Paris); calls for seven different configurations of the SPD 10/20 for applications such as passenger check-in, baggage control, boarding pass printing and message switching	$1+ million
Systems Engineering Lab., Inc., Fort Lauderdale, Fla.	National Aeronautics and Space Admn. (NASA), Lewis Research Center, Cleveland, Ohio	A SYSTEMS 86 computer system to be used for jet engine testing	$940,000 (approximate)
Systems Engineering Labs., Inc., Fort Lauderdale, Fla.	City of Los Angeles, Calif.	Real-time command and control system for the Los Angeles City Fire Department	$672,000 (approximate)
Computer Technology, Inc.	LTV Federal Credit Union, Dallas, Tex.	Development, implementation and operation, by CT, for an "on-line, real-time" data processing system for the 22,000-member credit union (5-year contract)	$500,000 (approximate)
Computing and Software, Inc. (C&S). Los Angeles, Calif.	City of New York Housing and Development Administration (HDA) New York, N. Y.	Designing and initiating processing of a computerized system to administer HDA's rental adjustments on over one-million city apartment dwellings under current rental control legislation	$400,000 (approximate)
Digital Development Corp., San Diego, Calif.	Control Data Corp., La Jolla Systems Div., La Jolla, Calif.	Supplying head-per-track disc memory systems for use in message switching applications in CDC computer systems	$375,000+
LMC Data, Inc., New York, N.Y.	E. I. DuPont DeNemours Co., Wilmington, Del.	A master contract under which various divisions of DuPont family may elect to lease DP equipment of the card handling type	$120,000 (approximate)
SofTech, Inc., Waltham, Mass.	U.S. Naval Weapons Laboratory, Dahlgren, Va.	Implementation of the AED System on the Control Data 6000 Series of computers	$105,000
Cipher Data Products', San Diego, Calif.	Word Processing, Inc., Hagerstown, Md.	Dual cassette recorder systems for use in Word Processing's text editor, the Editron System	$100,000
Cambridge Memories, Inc., Newton, Mass.	U.S. Naval Electronics Command	Development of a low-cost, block-oriented random access memory (BORAM) for future use on board naval ships and aircraft	$95,000
Boeing Research & Engineering Div., Seattle, Wash.	U.S. Navy	Computer software evaluation of executive computer programs being developed to govern command-and-control programs aboard nuclear attack submarines and surface ships	$88,400
Logica Limited, London, England	Funded by about 70 of world's leading commercial banks, including 25 major U.S. banks and banks in 10 European countries	A study of new computer network to provide facilities for international payment transfers between banks throughout Europe and U.S.; will develop computer programs to aid network design and for cost analysis of system; simulation model will be developed for evaluation of characteristics of alternative system designs	—
Ultronic Systems Corp., Mount Laurel, N.J.	Trans World Airlines, New York, N.Y.	Computer communications equipment which will initially handle PARS messages between TWA's real-time computer center and major reservation offices throughout the country	—
Honeywell Information Systems, Wellesley Hills, Mass.	Social Security Administration	Lease of 15 central Keyplex processing systems to replace existing keypunch machines covering 587 stations at 10 locations in eight cities throughout the United States	—
First Data Corp., Waltham, Mass.	National Institutes of Health	Establishment, maintenance, and operation of specialized remote-access, time-shared system in support of NIH research activities in Chemical/Biological Information-Handling Program	—

NEW INSTALLATIONS

OF	AT	FOR
Burroughs B2500 system	Union National Bank of Lowell, Mass	Applications including an Item Processing System (IPS); installment and commercial loans; demand deposit, mortgage and trust accounting, foreign letters, general ledger, etc. (system valued at over $1 million)
Burroughs B6700	Data Resources, Inc. Lexington, Mass. (2 systems)	Helping financial and other business institutions relate their corporate planning, cash flow analysis, loan and deposit forecasts, portfolio decisions, etc., to economic development (system valued at over $2 million)
Control Data 6400 system	Jutland Telephone Co. Aarhus, Denmark	Administrative functions and calculating scientific, technical and engineering problems leading to development of advanced communications networks. (system valued at $1.7 million)
Digital Equipment PDP-10 system	Interprovincial Pipe Line Co. Edmonton, Alberta, Canada	Supervising and monitoring network of remote pumping stations; replaces existing computer of another manufacturer
Honeywell Model 58	A. J. Etkin Co., Oak Park, Mich.	Payroll, programming labor and material costs, accounts payable, inventory of tools and equipment and cost reports
Honeywell Model 635 system	Mitsubishi Corp., Tokyo, Japan (2 systems)	Jointly operated time-sharing service, by Mitsubishi and Mitsubishi Office Machinery (Honeywell Bull licensee in Japan), for both company use and as commercial service (system valued at about $4 million)
IBM System/3 Model 10	Belmont Springs Water Company Belmont, Mass.	Management reports, route analysis, inventory control, daily reports and general ledger
IBM System/3 Model 10	Blue Channel Corporation Port Royal, S. C.	Aiding the independent fisherman in managing his finances; later will determine trends in crab catches along the southern South Carolina coast
IBM System/3 Model 10	Efco Products, Inc., Poughkeepsie, N. Y.	Uses ranging from tracking production to scheduling truck deliveries of the bakery supply firm
IBM System/370 Model 135	Florida Times-Union and Journal Jacksonville, Fla.	Control of ad production in newspapers; also accounting activities associated with direct billing as well as a wide variety of other accounting functions
IBM System/370 Model 145	Fifth Third Bank, Cincinnati, Ohio	Expanded computer operations including a Central File for bank customers; includes all internal bank accounting functions, commercial/mortgage/installment loans, savings and checking accounts, etc.
IBM System/370 Model 155	Group Hospitalization, Inc., Washington, D. C.	Expanding services for Blue Cross and Blue Shield subscribers
IBM System/370 Model 155	Spiegel, Inc., Chicago, Ill. (2 systems)	Speeding the processing of over 4 million orders annually; system handles order entry, credit authorization and a large number of other applications
IBM System/370 Model 155	Virginia National Bank Norfolk, Va. (2 systems)	Processing 710,000 accounts daily from a statewide network of 113 branches
IBM System/370 Model 165	Fireman's Fund American Insurance Companies, San Francisco, Calif.	Core of firm's nationwide DP operations; implements automated processing system for homeowners and automobile policies; replaces two smaller computers (system valued at $3.5 million)
NCR Century 100 system	Banco Nacional de Fomento, Asuncion, Paraguay	Demand-deposit applications, loan processing and payroll preparation
NCR Century 100 system	Corporacion de Obras Sanitarias (CORPOSANA) Asuncion, Paraguay	Handling various accounting and statistical problems for CORPOSANA which is in charge of all water and sewage services in Paraguay
NCR Century 100 system	Western Merchandisers, Amarillo, Texas	Complete inventory listing, weekly, identifying the artist, title, manufacturer, vendor, retail price and dealer's cost for each recording in stock
NCR Century 200 system	American Bank and Trust Co. Orangeburg, S. C.	Meeting its expanded data processing requirements
UNIVAC 1106 system	Nippon Kangyo Kakumaru Securities Company Tokyo, Japan	Applications which include keeping records of shares and certificate transactions, sales on credit bond business, customer records, and investment information service and records of deposits for safekeeping (system valued at $1.9 million)
UNIVAC 9200 system	Grange Mutual Life Company Nampa, Idaho	Insurance premium billing, commissions, production and persistency reporting, accounting
UNIVAC 9200 system	Jaffe Shoe Corp., Seville, Ohio	General accounting, inventory control and sales analysis
UNIVAC 9200 system	Lester Industries, Bedford Heights, Ohio	A specialized payroll program dealing with piece rates, invoicing and an efficiency analysis program
UNIVAC 9200 system	Louisville Title Insurance Co., Louisville, Ky.	Billing of agents for premiums, policy inventory and general accounting
UNIVAC 9200-II system	Silver Eagle Trucking Co. Portland, Ore.	Revenue accounting, freight billing, sales statistics, administrative data and payroll processing
UNIVAC 9400 system	Museum of Science and Industry, Chicago, Ill.	Performing function for Chicago Park District, i.e., keeping track of equipment and services needed to maintain 500 parks and many ball fields, swimming pools, gymnasiums, bandstands; also as educational exhibit for visitors

MONTHLY COMPUTER CENSUS

Neil Macdonald
Survey Editor
COMPUTERS AND AUTOMATION

The following is a summary made by COMPUTERS AND AUTOMATION of reports and estimates of the number of general purpose electronic digital computers manufactured and installed, or to be manufactured and on order. These figures are mailed to individual computer manufacturers from time to time for their information and review, and for any updating or comments they may care to provide. Please note the variation in dates and reliability of the information. Several important manufacturers refuse to give out, confirm, or comment on any figures.

Our census seeks to include all digital computers manufactured anywhere. We invite all manufacturers located anywhere to submit information for this census. We invite all our readers to submit information that would help make these figures as accurate and complete as possible.

Part I of the Monthly Computer Census contains reports for United States manufacturers. Part II contains reports for manufacturers outside of the United States. The two parts are published in alternate months.

The following abbreviations apply:

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

SUMMARY AS OF SEPTEMBER 15, 1971

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)		NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Part II. Manufacturers Outside United States								
A/S Norsk Data Elektronikk	NORD-1	8/68	2.0		0	56	56	31
Oslo, Norway	NORD-2B	8/69	4.0	(S)	0	5	5	13
(A))Sept. 1971)	NORD-5	-			0	0	0	1
A/S Regnecentralen	GIER	12/60	2.3-7.5		0	40	40	0
Copenhagen, Denmark	RC 4000	6/67	3.0-20.0		0	16	16	3
(A) (Apr. 1971)								
Elbit Computers Ltd.	Elbit-100	10/67	4.9	(S)	-	-	225	50
Haifa, Israel								
(A) Feb. 1971)								
GEC-AEI Automation Ltd.	Series 90-2/10/20							
New Parks, Leicester, England	25/30/40/300	1/66	-		-	-	13	X
(R)	S-Two	3/68	-		-	-	1	X
(Jan. 1969)	130	12/64	-		-	-	2	X
	330	3/64	-		-	-	9	X
	959	-/65	-		-	-	1	X
	1010	12/61	-		-	-	8	X
	1040	7/63	-		-	-	1	X
	CON/PAC 4020	-	-		-	-	0	X
	CON/PAC 4040	5/66	-		-	-	9	-
	CON/PAC 4060	12/66	-		-	-	5	-
International Computers, Ltd. (ICL)	Atlas 1 & 2	1/62	65.0		0	6	6	X
London, England	Deuce	4/55	-		0	7	7	X
(A)	KDF 6-10	9/61	10-36		0	58	58	X
(July 1971)	KDN 2	4/63	-		0	1	1	X
	Leo 1, 2, 3	-/53	10-24		0	59	59	X
	Mercury	-/57	-		0	13	13	X
	Orion 1 & 2	1/63	20.0		0	17	17	X
	Pegasus	4/55	-		0	30	30	X
	Sirius	-/61	-		0	22	22	X
	503	-/64	-		0	16	16	X
	803 A, B, C	12/60	-		0	83	83	X
	1100/1	-/60	5.0		0	22	22	X
	1200/1/2	-/55	3.9		0	68	68	X
	1300/1 /2	-/62	4.0		0	196	196	X
	1500	7/62	6.0		0	110	110	X
	2400	12/61	23.0		0	4	4	X
	1900-1909	12/64	3-54		0	2000	2000	C
	Elliott 4120/4130	10/65	2.4-11.4		0	160	160	C
	System 4-30 to 4-75	10/67	5.2-54		0	160	160	C
								Total: 400
Japanese Mfrs.	(Mfrs. of various models include: Nippon Electric Co., Fujitsu,							
(N) (Sept. 1970)	Hitachi, Ltd., Toshiba, Oki Electric Industry Co., and Mitsubishi Electric Corp.)						Total: 4150 E	Total: 800 E
Marconi Co., Ltd.	Myriad I	3/66	£36.0-£66.0	(S)	0	37	37	9
Chelmsford, Essex, England	Myriad II	10/67	£22.0-£42.5	(S)	0	17	17	12
(A) (Jan. 1970)								
N.V. Philips Electrologica	P1000	8/68	7.2-35.8		-	-	60	60
Apeldoorn, The Netherlands	P9200	3/68	-		-	-	300	50
(A)	P9200 t.s.	3/70	-		-	-	4	3
(July 1971)	P800	9/70	-		-	-	9	60
	ELX1	5/58	12.0		-	-	22	-
	ELX2/8	3/65	6-21		-	-	27	-
	DS714	-/67	-		-	-	27	8
	PR8000	1/66	-		-	-	23	-
Redifon Limited	R2000	7/70	-		0	12	12	6
Crawley, Sussex, England								
(A) (Sept. 1971)								
Saab-Scania Aktiebolag	D21	12/62	7.0		0	38	38	-
Linkoping, Sweden	D22	11/68	15.0		0	29	29	2
(A) (June 1971)	D220	4/69	10.0		0	11	11	6
Selenia S.p.A.	GP-16	7/69	10.9	(S)	0	71	71	26
Roma, Italy								
(A) (July 1971)								

THE SCIENCE AND TECHNOLOGY DIVISION OF THE NEW YORK PUBLIC LIBRARY TO CLOSE ITS DOORS ON JANUARY 1, 1972

Edmund C. Berkeley, Editor
Computers and Automation

The New York Public Library, 5th Ave. and 42 St., New York, N.Y., has announced that it will be forced to suspend all public service as of January 1, 1972, in its Science and Technology Division because of lack of adequate financial support.

This is the division that includes computers and data processing, and all the periodicals serving the field of computers and data processing.

"This cutback is part of a library-wide program caused by reduced government budget allocations and increase of costs." The Library is short over $1,000,000; the necessary expenditure cuts can only be achieved by "curtailment of public service." "Curtailment of public service", I have learned, includes "curtailment of private service" (there is none) and equals "curtailment of all service"! Acquisition and cataloging of materials is to continue as usual so that the ST Division will be able to function adequately again if and when funds are again available.

The New York Public Library is one of the four greatest libraries of the world — the other three being the Library of Congress in Washington, the British Museum in London, and the Bibliotèque Nationale in Paris. Inquiries directed to the New York Public Library, and research taking place there, arise from all over the United States and the world. (Other great libraries such as those of universities are essentially not open to the public.)

The suspension of public service implies that at least 300 readers from all levels of professional and lay life will be turned away each day; at least 100 telephone reference questions will not be answered each day; letters with reference questions from all around the world will have to be returned unanswered to their senders; etc.

To me, this closing is an unmitigated horror. I have used this great library often, for over 45 years. Currently in the newspaper I have read how Defense Secretary Laird has explained to the U.S. Congress that $390 million dollars per year is being spent in Laos for illegal, unauthorized, concealed warfare, bombing, etc., that kills thousands and thousands of Asians. And yet the United States government cannot find even one million dollars to keep this great library open!

All our readers are invited to send contributions (and also suggestions and ideas) to:

Temporary Committee for the N.Y. Public Library
c/o Computers and Automation
815 Washington Street
Newtonville, MA 02160

In this emergency, no contribution is too small for this most worthwhile purpose. (Please make checks payable to the New York Public Library.)

Macdonald — *Continued from page 40*

It may be that handwriting reveals personality (which I believe is likely to some extent) — or that creases in the palm of one's hand reveal one's past and future life (which I cannot believe) — or that combinations of the locations of the planets and the zodiacal constellations imply specific varieties of good advice to apply in one's life (in which implications I have no belief whatsoever).

But there undoubtedly is a place for non-verbal, non-mathematical testing, which is not culture limited, not occupation limited, and not background limited — and which would enable finding and employing many useful people who do not have American, middle-class backgrounds. Perhaps the readers of C&A and their friends and acquaintances might well be a good area to discover and explore such tests.

Participation

If you think this is interesting, and would like to participate in this survey, send us what you do on this test. We will respond either in the pages of C&A by reporting, or to you individually.

We plan to publish additional tests like this one from time to time. □

NAME OF MANUFACTURER	NAME OF COMPUTER	DATE OF FIRST INSTALLATION	AVERAGE OR RANGE OF MONTHLY RENTAL $(000)	NUMBER OF INSTALLATIONS In U.S.A.	Outside U.S.A.	In World	NUMBER OF UNFILLED ORDERS
Siemens	301	11/68	0.75	-	-	82	C
Munich, Germany	302	9/67	1.3	-	-	28	C
(A)	303	4/65	2.0	-	-	70	C
C(July. 1971)	304	5/68	2.8	-	-	63	C
	305	11/67	4.5	-	-	93	C
	306	-	6.5	-	-	-	C
	2002	6/59	13.5	-	-	39	C
	3003	12/63	13.0	-	-	32	C
	4004/15/16	10/65	5.0	-	-	99	C
	4004/25/26	1/66	8.3	-	-	54	C
	4004/35	2/67	11.8	-	-	185	C
	4004/135	-	17.1	-	-	-	C
	4004/45	7/66	22.5	-	-	248	C
	4004/46	4/69	34.0	-	-	10	C
	4004/55	12/66	31.3	-	-	22	C
	4004/150	-	41.0	-	-	10	C
	4004/151	-	51.5	-	-	22	C
	404/3	-	1.9	-	-	-	C
	404/6	11/69	4.1	-	-	10	C
							Total: 298
USSR	BESM 4	-	-	-	-	C	C
(N)	BESM 6	-	-	-	-	C	C
(May 1969)	MINSK 2	-	-	-	-	C	C
	MINSK 22	-	-	-	-	C	C
	MIE	-	-	-	-	C	C
	NAIR 1	-	-	-	-	C	C
	ONEGA 1	-	-	-	-	C	C
	ONEGA 2	-	-	-	-	C	C
	URAL 11/14/16 and others	-	-	-	-	C	C
						Total: 6000 E	Total: 2000 E

CALENDAR OF COMING EVENTS

Oct. 4-6, 1971: International Electrical & Electronics Conference & Exhibition, Automotive Bldg., Exhibition Park, Toronto, Ontario, Canada / contact: Conference Office, 1819 Yonge St., Toronto 7, Ontario, Canada

Oct. 4-7, 1971: 26th Annual ISA Instrumentation-Automation Conference & Exhibit, McCormick Place, Chicago, Ill. / contact: Daniel R. Stearn, Public Relations Manager, Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222

Oct. 6-8, 1971: Conference on "Two-Dimensional Digital Processing", Univ. of Missouri-Columbia, Columbia, Mo. / contact: Prof. Ernest L. Hall, Dept. of Electrical Engineering, Univ. of Missouri-Columbia, Columbia, Mo. 65201

Oct. 10-12 1971: First Annual ASM Southwest Division Conference (sponsored by Assoc. for Systems Management, Div. Council 18), Jung Hotel, New Orleans, La. / contact: Albert J. Krail, 636 Baronne St., New Orleans, La. 70113

Oct. 12-14, 1971: Input/Output Systems Seminar '71, The Regency Hyatt House-O'Hare, Chicago, Ill. / contact: C. A. Greathouse, Exec. Director, DPSA (Data Processing Supplies Assoc.), P.O. Box 1333, Stamford, Conn. 06904

Oct. 14-20, 1971: Interkama '71, Dusseldorf, Germany / contact: I. A. Stader, Dusseldorfer Messegesellschaft mbH — NOWEA — 4 Dusseldorf, Messegelande

Oct. 18-20, 1971: 27th Annual National Electronics Conference and Exhibition (NEC/71), Pick-Congress Hotel, McCormick Place, Chicago, Ill. / contact: NEC, Oakbrook Executive Plaza #2, 1211 W. 22nd St., Oak Brook, Ill. 60521

Oct. 18-20, 1971: International Computer Forum & Exposition, McCormick Place-On-The-Lake, Chicago, Ill. / contact: International Computer Forum & Exposition, Oak Brook Executive Plaza #2, 1211 West 22nd St., Oak Brook, Ill. 60521

Oct. 20-22, 1971: ACM/IEEE Second Symposium on Problems in the Optimization of Data Communications Systems, Palo Alto, Calif. / contact: Dr. P. E. Jackson, Room 2B-434, Bell Laboratories, Holmdel, N.J. 07733

Oct. 21-22, 1971: ADAPSO 33rd Management Conference-Annual Meeting; 1st Software Management Conference (concurrently), Brown Palace Hotel, Denver, Colo. / contact: Association of Data Processing Service Organizations, Inc., 551 Fifth Ave., New York, N.Y. 10017

Oct. 22-23, 1971: First National Computer Art Symposium, The Florida State University, Tallahassee, Fla. 32306 / contact: Randolph B. Luttrell, Coordinator, Computer Art Symposium, The Florida State Univ., Center for Computer Assisted Instruction, Tallahassee, Fla. 32306

Oct. 25, 1971: Second Annual SIGCOSIM (ACM Special Interest Group on Computer Systems Installation Management) Symposium, Washington, D.C. / contact: I. Feldman, Wiley Systems, Inc., 6400 Goldsboro Rd., Bethesda, Md. 20034

Oct. 25-29, 1971: IEEE Joint National Conference on Major Systems, Disneyland Hotel, Anaheim, Calif. / contact: Institute of Electrical and Electronics Engineers, Inc., 345 East 47th St., New York, N.Y. 10017

Oct. 25-29, 1971: Systems Science & Cybernetics Conference & 1971 ORSA (Operations Research Society of America) Meeting, Disneyland Hotel, Anaheim, Calif. / contact: Dr. Michael W. Lodato, Xerox Data Systems, 701 So. Aviation Blvd., El Segundo, Calif. 90245

Oct. 29, 1971: Sixth Annual ACM Urban Symposium, New York Hilton Hotel, New York, N.Y. / contact: Gerald M. Sturman, Parsons Brinckerhoff, 111 John St., New York, N.Y. 10038

Nov. 1-2, 1971: Computer Science and Statistics: Fifth Annual Symposium on the Interface, Oklahoma State University, Stillwater, Okla. / contact: Dr. Mitchell O. Locks, Oklahoma State Univ., Stillwater, Okla. 74074

Nov. 3-5, 1971: 25th IEEE Northeast Electronics Research and Engineering Meeting (NEREM), Sheraton-Boston Hotel and the John B. Hynes Auditorium, Boston, Mass. / contact: IEEE Boston Office, 31 Channing St., Newton, Mass. 02158

Nov. 4-5, 1971: 1971 American Production & Inventory Control Society (APICS) International Conference, Chase Park Plaza Hotel, St. Louis, Mo. / contact: Henry F. Sander, American Production & Inventory Control Society, Inc., Suite 504 Watergate Bldg., 2600 Virginia Ave. N.W., Washington, D.C. 20037

Nov. 7-11, 1971: 34th Annual Meeting of the American Society for Information Science (ASIS), Denver Hilton Hotel, Denver, Colo. / contact: Miss Sheryl Wormley, ASIS, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036

Nov. 16-18, 1971: Fall Joint Computer Conference, Las Vegas Convention Center, Las Vegas, Nev. / contact T. C. White, AFIPS Headquarters, 210 Summit Ave., Montvale, N. J. 07645

Nov. 30-Dec. 3, 1971: Systems '71, Munich, Germany / contact: Andre Williams, BIC-938, Commercial Exhibitions Div., U.S. Department of Commerce, Washington. D.C. 20230

Dec. 7-10, 1971: Applications of Simulation, Waldorf Astoria Hotel, New York, N.Y. / contact: Joseph Sussman, MIT, 77 Massachusetts Ave., Cambridge, Mass. 02139

Dec. 16-18, 1971: IEEE Conference on Decision and Control (including the 10th Symposium on Adaptive Processes), Americana of Bal Harbour, Miami Beach, Fla. / contact: Prof. J. T. Tou, Univ. of Florida, Gainesville, Fla.

Feb. 2-4, 1972: 1972 San Diego Biomedical Symposium, Sheraton Hotel, Harbor Island, San Diego, Calif. / contact: Norman R. Silverman, M.D., San Diego Biomedical Symposium, P.O. Box 965, San Diego, Calif. 92112

Mar. 20-23, 1972: IEEE International Convention & Exhibition, Coliseum & N. Y. Hilton Hotel, New York, N. Y. / contact: IEEE Headquarters, 345 E. 47th St., New York, N. Y. 10017

April 5-8, 1972: "Teaching Systems '72", International Congress, Berlin Congress Hall, Berlin, Germany / contact: AMK Berlin, Ausstellungs-Messe-Kongress-GmbH, Abt. Presse und Public Relations, D 1000 Berlin 19, Messedamm 22, Germany

April 25-28, 1972: Conference on Computer Aided Design, Univ. of Southampton, Southampton, England / contact: IEE Office, Savoy Place, London W.C. 2, England

May 15-18, 1972: Spring Joint Computer Conference, Convention Ctr., Atlantic City, N.J. / contact: AFIPS Headquarters, 210 Summit Ave., Montvale, N.J. 07645

May 16-17, 1972: IIT Research Institute Second International Symposium on Industrial Robots, Chicago, Ill. / contact: K. G. Johnson, Symposium Chairman, IIT Research Institute, 10 West 35 St., Chicago, Ill. 60616

May 22-26, 1972: Fifth Australian Computer Conference, Brisbane, Australia / contact: K. Arter, Honorary Secretary, Australian Computer Society, Inc., P.O. Box 63, Watson, A.C.T. 2602 Australia

May 24-26, 1972: Second Annual Regulatory Information Systems Conference, Chase-Park Plaza Hotel, St. Louis, Mo. / contact: William R. Clark, Missouri Public Service Commission, Jefferson City, Mo. 65101

MORE ABOUT THE FRONT COVER PICTURE

Pictorial Reasoning Puzzle - To produce "Puzzle" a random number generator was used to place the figures in the order shown and to choose the particular number to be repeated. "Puzzle" was programmed in FORTRAN IV on a CDC 3300. The plotter was a Calcomp 765 Digital Zip Mode plotter. For more information, see page 5.

Who's Who in Computers and Data Processing

A CONTINUING PUBLICATION:
FIFTH EDITION AND SUPPLEMENTS ——→ SIXTH EDITION

Who's Who in Computers and Data Processing is published jointly by Quadrangle Books (a New York Times Company) and Computers and Automation.

In view of the financial depression in the computer field, the Who's Who will until further notice be published as the FIFTH EDITION plus a number of SUPPLEMENTS.

The First Supplement (26 pages, over 1,000 entries) was published in the June 1971 and July 1971 issues of Computers and Automation. The Second Supplement will be published in the next few months. Each supplement consists of entries that update existing information, and entries of capsule biographies for computer professionals not previously included.

Every supplement is free on request to each purchaser of the set of the Fifth Edition (3 volumes, hardcover, over 1,000 pages). This edition contains over 15,000 capsule biographies of computer professionals. Price, $75.00, including all supplements as issued.

If you wish to be considered for inclusion in the Who's Who (or if information for you has been previously published and requires updating), please complete the following form or provide us with the equivalent information.

WHO'S WHO ENTRY FORM
(may be copied on any piece of paper)

1. Name? (Please print)_____

2. Home Address (with Zip)?_____

3. Organization?_____

4. Its Address (with Zip)?_____

5. Your Title?_____

6. Your Main Interests?

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

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

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

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

_____
(attach paper if needed)

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

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

    b. Where is it installed: Organization?_____

    Address?_____

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

    d. Any remarks?_____

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

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

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

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

Name and Address

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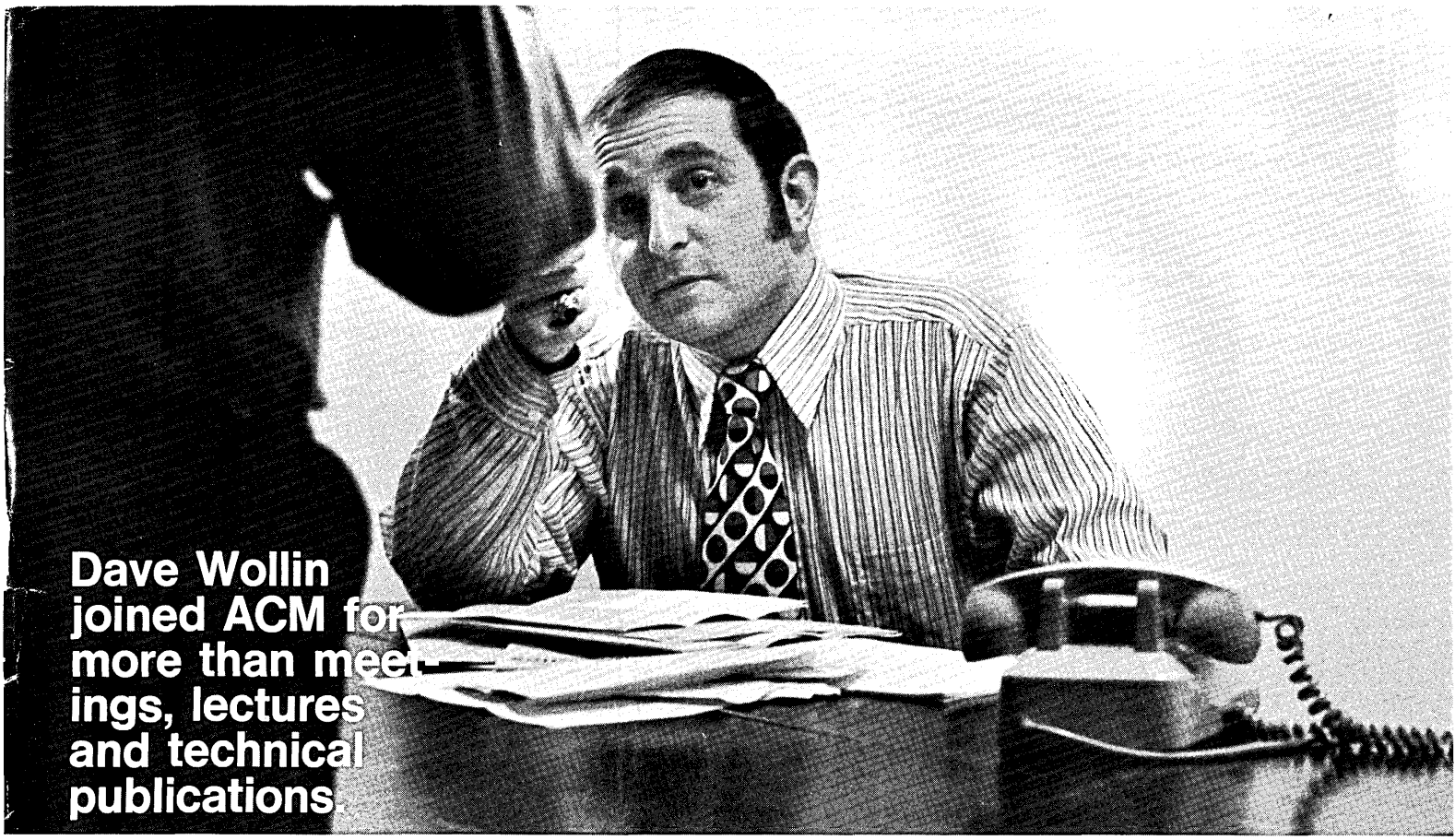
(attach paper if needed)

When completed, please send promptly to: Who's Who Editor, Computers and Automation,
815 Washington St., Newtonville, Mass. 02160



As "Grass Roots" Goals Committee Chairman, he's battling the blame-the-computer syndrome.

David Wollin, B.S. Engineering Science, is a Senior Systems Analyst with a ticket reservations systems service, developing application software. He joined ACM in 1966, fresh out of college. "After four years, I wanted more involvement as a computer professional," says Dave. "More than meetings, lectures and technical publications. ACM seemed sort of clannish. I felt the average member wasn't encouraged to participate.

"Last October I wrote ACM President Walter Carlson with some specific suggestions. Now I'm heading the newly-formed "Grass Roots" Committee. Our job is to critique ACM's proposed goals on membership development, special interest activities, EDP curricula and public education. And come up with other goals we think are just as important.

"This effort could mean a lot in the next few years. I've wanted to speak up on some things that have been bugging me. Things I see ACM taking a stronger stand on. Like people blaming mistakes on the computer. The need to cut down on hard copy to avoid waste. The privacy issue. The whole question of the computer's impact on society, I guess."

Dave is only one of 27,000 members of ACM, the oldest and most respected professional association in the computer field. He's enriching his career. Making a contribution to the computer profession. And being heard.

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ALL OF US WANT TO PROVIDE FOR OUR FUTURE AND OUR CHILDREN'S FUTURE—

What future?

We, the whole earth-load of us, face appalling problems all coming to a head within a few years:

Nuclear missiles, targeted on "the enemy" and on us;
Global pollution of air, soil, and water;
Rapid depletion of fossil fuels and other natural resources;
Runaway population growth (3.7 billion now, 6.5 billion by 2000 A.D.);

in short, age-old human attitudes threaten to destroy us.

The national governments have shown themselves so far — year after year — unable to solve these new, world-wide problems, unable to provide real security for any of us. Therefore a world government is essential for human survival.

What about the UN?

The UN has made outstanding contributions to the health and well-being of people all over the world — but the UN is not a government. And it is not responsible to us as individuals, but only to national governments, which often use it to jockey for power.

The Emergency Committee for World Government has a new approach .... which includes a "by-pass" principle: in the case of world-wide problems, such as war and pollution, every person in the world would owe his highest allegiance directly to the world government, thus by-passing his national government. (This would be, in effect, a most constructive kind of loyalty to one's own country.) And the world government would have authority only over individuals, likewise by-passing the national governments.

Is a world government practicable?

What is essential for human survival had better be made practicable. Through the mass media and all sorts of forums, we the people must get world-wide discussion going .... on the urgent need for world government, on how such a government can be realistically planned, and how it can get off the ground. To do this will take information, time, and money. Will you help? What better way could there be to provide for your own and your children's future?

"By-passing" and other principles are explained, with diagrams, in the pamphlet, *Emergency World Government*, by Dr. J. H. C. Creyghton. Send $1.00 for a copy, postpaid, on approval. Write to the address nearest you.

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