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Datapoint Corporation, Attention Product Marketing
9725 Datapoint Drive, San Antonio, Texas 78284
(512) 699-7151.

The leader in dispersed data processing
Sales offices located in principal cities
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August, 1977
You know now that western peripherals is NUMBER ONE in Magnetic Tape Controllers for DATA GENERAL NOVA and PDP-11 minicomputers.

You should also know we make the best Disc Controllers for these minicomputers too.

For all NOVA's, NOVA-emulators and PDP-11's—Like our Tape Controllers, the Western Peripherals Disc Controllers are fully embedded. Engineered to take advantage of the latest in solid state technology, they offer the best combination of performance, reliability and cost. Features that make them preferred include: Total DG and DEC software compatibility, media compatibility, and accommodation of virtually any cartridge drive including front load, top load, or 10-high up to 100 megabytes.

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Data is a valuable resource. Without proper management, its usage becomes inefficient and impacts the productivity of your other corporate resources.

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SYSTEM 2000 is a versatile data base management system designed for users of IBM, CDC, Univac, and Amdahl computers. Working with a wide variety of applications, with data bases ranging from 300,000 to more than 1.5 billion characters, with non-data processing personnel as well as highly-skilled programmers, SYSTEM 2000 provides flexibility and efficiency in even the most complex environment.

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Looking Back in DATAMATION
On our 20th anniversary

July/August 1958
“Dp in Flight” might have been the theme of this issue, as two feature articles examined the use of data processing by the aviation industry. “Digital Computing at Saab” examined the use of computers in the manufacture of high-speed aircraft. Saab used an integrated automatic computing system from the earliest stages of aircraft manufacture, covering all the engineering phases, such as aerodynamics, thermodynamics, layout drawing, weights and structures, fitness for production, and other properties.

Trans Canada Airlines reported the operation of a Ferranti Transactor for reservations and for providing statistical data for future planning. The transactor allowed the system to accept a manual input, provided an answer more complex than a simple yes/no, and also was to be suitable for stock control, mail orders, freight services, and other general applications.

Japanese firms were showing an increased interest in computer installations. Remington Rand had delivered 28 Univacs, 22 120s, and 6 60s. IBM reported 10 orders for 650s, one for a 704 and one for a 705. A Bendix G-15D delivered to Japan National Railways in May already had brought about a 10% efficiency increase in the movement of commodities for the railroad.

August 1967
Our theme was “Soviet Computers,” and the theme article, “Soviet Computer Reliability,” reviewed the state of dp in the USSR. The article reported the industry suffering from quality control problems and a lack of capable personnel.

“The BESM-6 Computer” described the newest and fastest Soviet computer, with a claimed speed of one million instructions/second, and major improvements in peripheral equipment. The system had two sets of peripherals in order to achieve reasonable reliability, commented Paul Armbr in his guest editorial on the USA/USSR “computer gap.”

We reported on the Assn. for Computing Machinery (ACM) on the occasion of its twentieth anniversary. In 1947 there were fewer than 300 members; in our 1967 article we reported close to 20,000. Today there are 35,000 ACM members.
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"Itel's record installation time was outstanding, especially when ours was the very first Advanced System to be installed. And its performance has proven to be as impressive as its installation.

"With more than $1.7 billion in assets to manage, you can imagine the variety of complex tasks to which we put our EDP equipment. Of course, we knew we could expect performance from the system. Before replacing our IBM 370/155 with Itel's AS-5, we conducted extensive pre-installation tests to determine compatibility, reliability and error correction capabilities of the Advanced System. And all tasks were completed in equal or faster time compared to IBM's 370/158.

"Also contributing to our decision was the fact that the Advanced System would protect our investment in programming, documentation and personnel training. So, not only did we save on initial cost, but we're saving money in the long run, too.

"Choosing the AS-5 was a good move—we've been thoroughly pleased with the Advanced System and with Itel every step of the way. We sincerely feel that Itel deserves every accolade possible for the quality and reliability of their Advanced System, and the quality and professionalism of their people."
"Incredibly enough, we made no software changes at all when we put the Itel Advanced System™ into production."

Dr. Clair G. Maple, Director of Computation Center, Iowa State University of Science and Technology, Ames, Iowa

"We're thoroughly pleased with the AS-5. Installation was completed with remarkable speed, and its performance has been outstanding. We're quite proud that Iowa State is the site of Itel's second Advanced System installation.

"We were initially receptive to the AS-5 because there seemed to be economic advantages involved. We saw the opportunity to replace the IBM 370/158 and to increase memory size, add secondary storage, upgrade our magnetic tape system and modify the CPU to a model III, all within a price range we could afford. And to be able to do all that without software modifications and without utilizing more space is positively remarkable.

"Here at the university, our Advanced System has between fifteen and twenty thousand users. It handles a wide range of activities—from course-related student programs to university-generated academic research. And its performance has been very impressive.

"In fact, we've been very favorably impressed in all areas of contact with Itel—from the outstanding performance of their products to the professional standards of their personnel and the excellence of the service they've given us."

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Data Products Group
One Embarcadero Center
San Francisco, California 94111
Telephone: (415) 983-0000

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CENTRONICS PRINTERS
Simply Better
letters

Distributors debate depiction
Your article, "Is the Paper Products Case the Tip of the Iceberg?" (March, p. 148), detailing the Hartz Mountain case of commercial bribery hits close to where your readership lives. The careful and accurate documentation of such purchasing irregularities could have been an excellent service to those engaged in data processing management. Unfortunately, the author's defamatory handling of the subject misdirected your readers and did serious damage to the character of the business forms distributor. For example:

1. The business forms distributor, in general, for some reason which we cannot fathom, has been made to appear untrustworthy and dishonest. Your tasteless illustration captioned, "Distributor is told what the low bid is and comes in below it," portrays him with the horns and tail of Satan, and yet Tabulating Stock Forms, Inc., the company giving in to the requests for kickbacks from the data processing v.p. Corey is not a distributor at all, but rather a direct selling manufacturer. Were you aware of this fact?

2. Frank Knox, the only authority actually quoted by author McCartney, was contacted by this association to ascertain his impression of the article. You may be certain that Mr. Knox was not informed that he would be quoted. Second, Mr. Knox did not say, "If a fellow's susceptible to any kind of illegal dealings with distributors, this is a bad place for him to be—at least from the company's standpoint." Why should he? Frank Knox worked for years for one of the country's largest and most successful distributor organizations. Third, morale drops in purchasing irregularities mentioned by Mr. Knox involved a distributor. Both incidents concerned salesmen from forms manufacturing plants, one of which had as a silent partner the assistant purchasing agent of the company being defrauded. Were you aware of this fact?

3. There are six unnamed authorities quoted, each maligning the distributor. Why? Who are they? You have allowed Moore Business Forms to be named in that article as an example of a supplier whose sales are from a list price and "no shenanigans." We respect Moore Business Forms and their policies, however, they surely use their "own trucks for delivery . . . buy their paper directly from the mill ..." and have a price list that is subject to flexibility in order to meet competition. These are not unusual practices in this industry . . . in other industries, yet author McCartney would have the reader believe that distributors who do the same are unscrupulous.

In order to instigate computer room fraud, according to one unnamed source, "you have to go through a paper or forms distributor." We should be most interested to hear any supporting documentation of this kind of a charge. People in your own industry must find this statement incredible.

And we would like to know who felt the need to praise Moore Business Forms in print, and be so quick to point the finger at the distributor? The facts are that Moore, like the majority of all forms manufacturing companies, acts as a distributor for products they cannot produce on their own presses. This is a standard practice in the industry. Did author McCartney know this and conveniently omit the fact? Why would the term "distributor" be used 14 times in a negative context, and "manufacturer" not once?

White collar crime is not limited to theft, fraud, and bribery. Character assassination via irresponsible reporting can be much more costly to the ethical, honest distributor element in this industry than Corey's scheme was to Hartz Mountain Corp. It would have been a more professional decision to substitute supplier or vendor for "distributor" throughout the article and make the same points without defaming the marketing concept of the independent segment of the business forms industry. We believe you acted most unfairly by posing a constant sub rosa question as to the integrity of business forms distributors to your readership.

MEREDITH R. SMITH, JR., CAE
Executive vice-president
National Business Forms Assn.
Alexandria, Virginia

Mr. McCartney responds: Mr. Smith's disagreement with us appears to be more semantic than substantive. We used the word "distributor" in its broadest generic sense, which includes manufacturers' representatives.

No doubt, most distributors are ethical and honest. The vast majority of dp managers and purchasing executives are undoubtedly ethical and honest as well. But that's not the point. What is at issue is the fact that kickbacks and purchasing irregularities exist. Nowhere does Mr. Smith dispute this. Instead, he self-servingly points the finger at suppliers and manufacturers, many of whom, as he himself points out, also function as distributors. Perhaps if Mr. Smith and the association that employs him spent more of their collective energies scrutinizing the activities of the business forms industry, and less time trying to whitewash its image, the few unscrupulous people in the business could be weeded out.

Committee comments on Cobol
Mr. Beamish's Forum, "A Wish List for COBOL" (May, p. 294), brought up a number of valid and interesting points. Mr. Beamish and your readers may be interested in knowing that the CODASYL COBOL Committee (formerly the Programming Language Committee or PLC) has already dealt with several of his suggestions.

1. The topic of upper and lower array bounds has been discussed, but no conclusions were reached. There are currently no proposals on this subject on the committee's agenda. If anyone is interested, I suggest that they submit a proposal.

2. A proposal is currently being processed which would allow values to be set in tables. It is necessarily somewhat limited, but it would accomplish what Mr. Beamish wants. There is significant opposition to this proposal, however, most of it from users. In the meantime, the INITIALIZE statement will set such values dynamically.

3. A recently passed proposal adds additional terminators to all of the "one legged" conditionals, as well as to the IF, and adds a CONTINUE statement. This will solve all of the problems mentioned in item 3. The method was somewhat different, but we felt that it was the best of a large number of alternatives. For example, the IF SIZE ERROR was not attempted because it is known that size error checking is usually very inefficient, and it would be difficult to determine to which statement it applied. The form is COMPUTE . . . ON SIZE ERROR . . . NOT ON SIZE ERROR . . . END-COMPUTE.

4. The CONSTANT SECTION and SIZE were dropped in 1967. ALTER and SETS have also been dropped. The GOTO has not been dropped and probably never will be. It is well known that none of the structured programming gurus can agree on whether to use it or not.

5. A new statement called EVALUATE has been added to accomplish the same task as a PERFORM . . . DEPENDING ON. It is much more powerful and is relatively easy to use. It is decision table-oriented, so decision table fans are delighted. We compiler writers are sleeping soundly of late, since we are aware that implementation is not exceptionally difficult.

6. An in-line PERFORM has been added by extending the PERFORM and adding a terminator. It was felt that there was no reason to add a DO, which is not a very appropriate word anyhow. The changes are very simple and
letters

are so engaged in manufacturing. They
pear in the statute and is left for the
corporations.

temporary society, and could not rec-
generate electric power commercially
the same circumstance as the one that
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respect to more traditional business

Supreme
property taxes under the exemption
court rejected that exemption, not-
court well could have been moved to
generated from subconscious thoughts

I am going to nominate Edith Myers to
the next vacancy on the Massachusetts
Supreme Judicial Court. She is far
more sensitive to contemporary legal
issues involving the computer industry
than the present bench. In her article,
"Data Processing and Taxes" (May, p.
155), she reported that our court
exempted hardware owned by a time-
sharing corporation from personal
property taxes under the exemption
available to corporations engaged in
manufacturing. Unfortunately, our
court rejected that exemption, not-
withstanding the fact that the definition
of "manufacturing" does not appear
in the statute and is left for the
court to determine, and that the court
has determined that corporations that
generate electric power commercially
are so engaged in manufacturing. They
ruled that the statute, enacted during
the Great Depression, was intended to
grant that fundamental exemption
only to "mills and factories."

Apparently the court simply could
not appreciate the significance of the
users of computer technology to con-
temporary society, and could not rec-
ognize that the granting of the exemp-
tion was as normal an act as it is with
respect to more traditional business
corporations. It seems to me that the
court well could have been moved to
act more favorably if corporations in
the same circumstance as the one that
brought the case joined in the action to
indicate the general significance of the
question. This ostrich-like attitude is
all too common because many people
think that by keeping quiet they will
avoid the impact of various tax laws.
Experience at present with the sales tax
laws indicates the error of this ap-

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One more kind
Here is an 11th category of answer to
Norman Grabowsky's excellently an-
notated programming problem ("What
Kind of Programmer Are You?"
March, p. 134). This answer might
have been written by a programmer
using FORTRAN 77, which is the pro-
posed revision to the ANSI Standard.
The example uses the new character
data type and the new Block-if state-
ments (including the ELSE IF state-
ment, which avoids messy nesting
when it is not needed), as well as the
list-directed I/O.

```
INTEGER I
* "CHANGE THE VALUE OF I"
* (VALUE OF I MUST BE 1 OR 2)
IF (I.EQ 1) THEN
I=2
ELSE IF (I.EQ.2) THEN
I=1
ELSE
```

We stand corrected
As public relations counsel to Redac-
tron Corp., we wish to point out an
error in the April issue (p. 69). The
comparison of equipment cites Redac-
tron as having a printer with a speed of
45 characters per second. The printer
in the Redactron word processing sys-
tem actually has a speed of 55 charac-
ters per second.

M I C H A E L  S L A T E R
R o s l y n  W i l l e t t   A s s o c i a t e s
N e w  Y o r k ,  N e w  Y o r k

Down by the river
We are delighted to note that our com-
pany has risen in rank from 25th in
1976 to 19th in DATAMATION's 1977
listing of "The Top 50 U.S. Companies
in the DP Industry" (June, p. 64).

We must, however, express some
concern about the paragraphs purport-
ing to describe our company (p. 69).

First, our proper name is and always
has been Management Assistance Inc.

Second, if the address provided is
meant to be ours, please supply us with
dredging equipment or direct us to the
nearest underground tunnel. I'm afraid
you have us located under the East
River. Our address is 300 E. 44th St.,
New York, N.Y. 10017.

Third, in 1976, BASIC/FOUR business
computer systems contributed 50% of
total MA1 revenues; peripherals and
terminals contributed 20%; mainte-
nance and related services contributed
30%.

B R E N D A  J .  U D O F F
D i r e c t o r  o f  A d v e r t i s i n g
M a n a g e m e n t  A s s i s t a n c e  I n c .
N e w  Y o r k ,  N e w  Y o r k

Computer acquitted
I was surprised to see it stated that a
computer killed the better part of the
spaceship crew in "Forbidden Planet"
(‘Demon Seed: Computers in the
Flesh,” May, p. 47). In that picture,
the crew was attacked by a monster
created from subconscious thoughts
fueled by the planet's giant power sup-

It was not a computer involved in
the actual creation of the monster, but
rather the subconscious mind of the
professor. The confusion probably
comes from the intelligent robot char-
acter, "Robbie the Robot."

R O B E R T  M E R S H O N
P r o j e c t  M a n a g e r
I T T  F i n a n c i a l  C o r p o r a t i o n
C h i p p e w a  F a l l s ,  W i s c o n s i n

```
Can your Uniscope debug itself? Our Harris 8210 can.

Our Harris* 8210 terminal emulates your Univac** Uniscope® at a very reasonable price. It also does things your Uniscope never dreamed of.


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Harris terminals. They could stop what's bugging you. Call or phone for details and a demonstration. Harris Corporation, Data Communications Division, Daniel Webster Highway South, Nashua, NH 03060. 603-885-6685.

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Data General’s new Commercial Systems CS/40 models. They don’t keep you waiting because they work the way business works. Interactively.

Multiterminals, no waiting. CS/40 puts data processing power right where your people need it, when they need it. In a distributed network or as a stand-alone system handling multiterminal applications or multiple single terminal applications or both. So some users could be updating inventory, while others enter orders, check payables, and process the payroll. All at the same time. And managers can still access the system any time.

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Why wait any longer?
Mail to: Data General, Westboro, MA 01581
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☐ Send me your brochure and have your sales representative call.
☐ Quick, I’m getting ready to purchase. Call me pronto.

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Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361.
NEW YORK'S COSTLY BLACKOUT

Blackout price tag: A source close to the underwriting side of the insurance business estimates that claims filed as a result of dp-related damages—damaged disc drives, lost data, data that had to be reprocessed, added work shifts, work that had to be fielded out to service organizations—could easily run into the millions of dollars. And that doesn't take into account damages that users have not yet had time to fully assess, or business lost because systems were down, the source said. Wall Street alone was out a big bundle because of lost commissions resulting from missed trading time. (See related story on page 131.)

THE IBM 3033: ONE OF A SERIES

Some IBM competitors and leasing companies think IBM has other 3033-like processors up its long white sleeves, such as the 3032 and 3031. They think the announcement date is imminent. The 3032 machine, they say, is a four megabyte machine having roughly the same performance as a 370/158 AP with the same memory ration, but for 31% less ($1.6 million vs. $2.3 million for the 158). The 3031 processor, they say, shapes up as having the computing power of a 370/158-3 with 4MB of memory, though equipped with only 2MB which would help reduce the price by nearly half, a full 43% of the cost of the 158-3.

Compute power ratings for these models and others, based on the price of a 360/65 being equal to 1.0 show that the anticipated 3031 rates at 1.4, the 3032 at 2.4, the 370/168-3 is in a tie with the Amdahl 470V/5 at 4.4, the 168AP, the 3033, and the 470V/6 deadlocked at 7.5, and the Amdahl 470V/7 being the king of the hill at 9.8. A user who helped research the figures decided that, at least for their needs, a 1MB 360/65, currently available for about $350,000 was the best solution.

SIBLING RIVALRY

Pacific, Pioneer, and Orbit are not NASA projects, but code names for three new IBM products. At least two seem to be indicative of the love-hate relationship between the General Systems and Data Processing divisions. Orbit is rumored to be the replacement for DPD's 3790 communications system—a hastily conceived response to competition that suffers from inflexibility and use of aging technology. A developing competitor for the 3790 is the GSD's Series/I, but we hear the Series/I will be used in Orbit, due out early next year without all the features of Series/I because of the constraints of the Systems Network Architecture (SNA).

While use of SNA is corporate policy, we understand General Systems is fighting pressure to limit its mini to that standard since a major market in networks is IBM users who don't want to go the SNA route. An SDLC hardware adaptor has been developed for the mini, but the software hasn't been announced yet, presumably because of the argument over whether it will be tailored to SNA.

Pacific is an extension to the upper end of GSD's System/3—bigger and with more disc capacity than the 3/15. GSD already is encroaching on DPD's 370/115 and 125 territories. Pacific is expected to be announced by year end. Speculation has it Pioneer is the name for the anticipated System/36.

THE VENDOR BEWARE!

Caveat emptor is dead—at least in Australia where a new trade practices act went into effect July 1. And computer vendors have picked up their marbles and won't play anymore. Since early July, IBM, Burroughs, NCR, Univac, Digital Equipment, Data General, and others have been refusing to sign contracts or renewals on most of their products.

The act gives the buyer "all the cookies," and opens up the supplier to consequential damage suits that could "equal the medical malpractice situation in the U.S.," says one disgruntled source. Two major provisions say in effect that the vendor can't limit his liability for damage to the buyer's business by his products and that he's responsible for making sure the system does the application the user ordered. Although the act applies to products priced under $15,000, such as tape or disc media, these could be part of multi-million dollar contracts, and that worries the vendors.
Take IBM's contracts: a new version says that with the exception of patent claims and personal injury, it is not liable for more than $100,000 or a year's rent or lease fees for direct damage caused by its system. Its warranty says the system will work (not uninterrupted) and meet specs, but not that it will meet the customer's requirements. Current interpretations of the Aussie act say those clauses won't stand up in court; in fact, it's illegal to print anything about limitations.

One legal school of thought says that the exposure to suit under the act is uninsurable, so firms would have to raise prices to cover the risk or stop doing business in Australia. Another says the vendors are "overreacting" and trying a "power play," when they should be revising their contractual practices worldwide to take the responsibility for identifiable problems caused by their wares. Anyway, the Australian Parliament can't begin to resolve the issue since they're on vacation until mid-August. No signing on the dotted line until then—except for the ubiquitous Japanese: Fujitsu's Facom subsidiary, scrambling to establish itself there, was doing business as usual.

EFT FOR CREDIT UNIONS
Ten Washington, D.C., area credit unions are easing their way into electronic funds transfer (EFT), at least on a pilot basis, following approval by the National Credit Union Administration of a shared Automated Teller Machine (ATM) system offered by Users Inc., Towson, Md., a data processing company owned by 250 credit unions. The one-year program began last month with the setting up of seven off-premise ATMs in drug stores in Maryland, Virginia, and the District of Columbia. Of the 10 credit unions whose participation has been approved by the NCUA, only one is not a Users Inc. client. Cardholders of clients will be able to access their accounts directly for each transaction. Those of non-clients will have batch resolution of their accounts. Cardholders will be able to access share, share draft, and line of credit accounts, make deposits, make transfers between accounts, and obtain account balances through the ATMs. Users project issuance of 35,000 cards. Participation of additional credit unions will require NCUA approval.

A SWITCH IN TIME FOR PCMS?
A tiny firm in Norwalk, Conn., called Data Switch Corp., may help the plug-compatible peripherals manufacturers cope with IBM's current trick of spreading the software around so PCM's can't figure it out for months. The company, headed by Richard Greene, makes a peripheral switch which is used to help allocation of resources.

IBM also makes such a switch, the 2914, but it's a sluggish, expensive RPQ device (nonstandard and with limited support) of which it has sold about 6,000. Any compatible peripheral can be linked with it. But later this year, we hear, the firm will announce a replacement with microcode that talks only to proprietary microcode in IBM control units. PCM's without the magic words can't horn in where that new switch is used. Data Switch's Greene says his advanced version will head IBM off at the pass. The solid state series, called CPS for computer peripheral switch, will handle eight cpu's and 24 peripherals (vs. four hosts and four peripherals with IBM's 2914, and four hosts and eight peripherals with a switch made by T-Bar Corp., which Greene left recently to form his own company).

Greene says his company also is offering a system for energy saving, called CEECS (computer environment energy control system), which displays centrally those devices that are in use and the use meter of each device, and which allows central shutdown of peripherals. Another possible saving with CEECS: the proposed 20% investment tax credit for energy conservation devices.

OS 6 GETTING GOOD MARKS
IBM's Office System 6, a word processing system introduced last January, is apparently being well received in the marketplace. A big California dp and wp user, which just acquired one of the new IBM systems, is particularly impressed with its administrative records capabilities, which can be used for applications like the storage of telephone lists and mailing records. An enthusiastic New
A significant merger in information management:

System 200™ by A.B. Dick/Scott can link complete, updatable source document files with on-line computer summary data.

Until now, information storage and retrieval has been centered around two separate systems having little direct relationship in terms of coordinated information management.

On the one hand, you've had unwieldy source document files containing 90% of the information but subject to less than 20% referral.

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Now System 200 by A.B. Dick/Scott enables you to tie two paperless record systems — microform and computer — into a compatible, cost-effective entity.

System 200 clears your computer of mass information overloading.

As a complete updatable microform file system for storing and retrieving all types of source documents and business records, System 200 provides an ideal off-line data base for your computer banks.

With the System 200 Record Processor, you can record complete master source documents on File Film in parallel with a computer summary file containing high reference data abstracted from the master file.

Computer indexing speeds access to off-line data.

Used in parallel with your computer, System 200 supplies complete, off-line data in answer to in-depth inquiries plus rapid, on-line access to routine information.

System 200 source file information can also be indexed by file number or file attributes and placed in your computer to speed search and retrieval of original documents recorded on File Film.

In a totally automated information system, it will be feasible to search, retrieve and deliver any System 200 File Film or set of files out of hundreds of thousands.

With or without a computer, System 200 has the answers.

As an integral component in your data processing system or as a stand-alone micrographic record processing system that provides total file control and integrity, System 200 offers a variety of solutions to your information management problems.

Hewlett-Packard brings a bright new look to low-cost graphics.

Auto-Plot

Zoom

Area shading

Rubber-band line

Typical application: scientific plotting.

Typical application: process flow diagram
The new Hewlett-Packard Graphics Terminal uses a microprocessor and raster scan technology to combine high performance with low cost.

The HP 2648A introduces a whole range of bright ideas to graphics. There's so much power built into the terminal itself that you can perform everything from auto-plots to zoom without any CPU help at all.

Auto-Plot. You don't need to know programming or invest in costly software. Once you've entered your facts and figures from the alphanumeric keyboard, press a few keys and your tabular data is plotted instantly.

Raster Scan. No more pulling down the blind to make your plots visible. Our display is clear and easy to read even in bright light. And the raster scan technology permits selective erase, cutting down the time it takes to modify your picture also.

Zoom and Pan. This lets you magnify any area of the display up to 16 times. And you can pan in any direction for closeup investigation of complex designs, without having to reinitialize the data.

Area Shading and Pattern Definition. This makes it easy to distinguish areas with similar shapes, such as bar charts, mechanical parts and architectural drawings.

Rubber-band Line. You can draw trial sketches, such as architectural floor plans, with or without CPU connection. Think of the time and money you'll save by cutting down mistakes.

Independent Display Memories. Both alphanumeric and graphic data can be shown independently or at the same time. And you can carry on a dialogue with the CPU without disturbing the picture.

The HP 2648A also has all the advantages of our popular HP 2645A alphanumeric terminal. Specifically: mass-storage on 110K byte cartridges (you can store graphics as well as data); 'soft keys' to speed up repetitive jobs; one-button self-test; plug-in PC boards for easy maintenance; extensive data communication and off-line capabilities.

This bright new look in graphic terminals is designed for such applications as electrical, mechanical and architectural design. For process and control. For scientific plots. And for business planning.

We'd like to give you a graphic demonstration of everything the HP 2648A can do. Send us the coupon and we'll set it up. Or contact the nearest Hewlett-Packard sales office listed in the White Pages. We're sure you'll get the picture.
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CIRCLE 40 ON READER CARD
The Best of Both Worlds

Ramon C. Barquin catches the visitor to IBM's World Trade offices in North Tarrytown, N.Y., in a judo hold, flips him over his shoulders and slams him to the floor.

Just kidding, folks. Ramon's a nice guy. He wouldn't do something like that. Not that he couldn't. The 34 year old Cuban-born Barquin has a second degree black belt in judo, a sport he's practiced since childhood. He's also fast on his feet mathematically, a talent that's enabled him to design and develop a computerized judo scoring and record keeping system which has been widely accepted now in competitions throughout the world.

Barquin's affinity for numbers and his love for judo converged in the early 1960s in Puerto Rico, where his family moved after Castro took over their homeland. An electrical engineering student at the Univ. of Puerto Rico at Mayaguez, Barquin began competing with a Univ. of P. R. team that would win the 1964 Eastern Intercollegiate Championship and later, competing internationally, he became subchampion in his 154-pound weight class for the Caribbean. But not yet a U.S. citizen, he was unable to represent Puerto Rico in the 1968 Pan American Judo championships held in San Juan.

"It was very frustrating," he recalls, "But I still wanted to be involved in some way."

Involvement took the form of a computer program run on an IBM 360/30 at the firm's San Juan education center where Barquin was then employed as a systems engineer. "One of the reasons why computers started to make a lot of sense was that no statistics of the sport had ever really been kept," Barquin says. "I was starting from scratch and I'm not sure the committee running the championships really thought I could do anything. I was just some crazy guy with a computer."

The committee changed its tune, however, when it got a look at the computer printouts Barquin's system generated. They showed everything from each competitor's won and lost statistics, number of combats, and duration of combat, to the method by which victory was gained. In effect, Barquin had created the automated equivalent of baseball's box score and batting averages for a sport where scoring had previously been done manually with a tremendous variety in format. And the powers that be within the world of judo were impressed. Within the year, the system was adopted officially by the International Judo Federation, and would be utilized in the 1969 World Judo Championship in Mexico City.

Meanwhile, Barquin's career at IBM was taking a new direction. With an M.S. in mathematics from the Univ. of P. R. under his belt, he went to M.I.T., where he received a Ph.D. in computer science management and political science through the IBM Resident Study Program.

But in his spare time, he continued refining the system and applying it in competition around the world. The computer Conference on the system in a special session on computer applications in sports. That year he also was I.J.F.'s director of statistics and became a member of its directing committee—a position he still holds today.

Utilized in both the 1972 and 1976 Olympics, the system has now been put on-line and runs real-time via TSO, IBM's time-sharing option. But Barquin, now program manager, external programs, for IBM World Trade, Americas/Far East Corp., has less and less time to devote to judo, though he still works out a couple of times a month and attends international competitions as an official whenever possible. Instead, as a specialist in technology transfer in emerging nations, particularly in Latin America, he monitors and studies activities in the transfer area at a number of organizations such as the U.N. and the Organization of American States (OAS). He also is the area chairman for the Eastern Hemisphere and Latin America for the IEEE Computer Society. Further, Barquin's still affiliated with M.I.T. as a Fellow of the Center for Information Systems Research at the Sloan School of Management.

Still, there's talk of a new project being started up at the Univ. of Hawaii's East-West Center. "It deals with some anthropological studies involving the martial arts and primitive fighting techniques, and they've asked me to advise them in developing an automated system for classifying, characterizing, and studying the profiles of the weapons," Barquin says.

"This would allow determining discrete features and morphological similarities between the specimens which permit comparison."

Barquin now lives in Mt. Kisco, N.Y., and has become an American citizen, though he still identifies strongly with Cuban culture. In fact, he's currently teaching his girlfriend, a native American, how to prepare Cuban food. Barquin, as his work with computers and judo indicates, knows how to combine the best of both worlds.

His Honor The Mayor

The mayor of Moorestown, N.J., was a day late arriving at the 1977 National Computer Conference at which his company was exhibiting for the first time in several years.

The Moorestown City Council meets on Mondays and the mayor always presides. The NCC opened on Monday without the 45 year old president of Spectron Corp., James Palmer. But Spectron, which he has taken from a three-man firm when he founded it in 1968, to a 275 employee company today, has "tried to share our success with the employees. They participate in a monthly bonus plan based on previous month's shipments, and we have an Employee Stock Ownership Plan."
plan in which stock is contributed to employees by the company once each year and which is approved under ERISA (Employee Retirement Income Security Act). Eventually it will all be theirs."

As mayor of Moorestown, Palmer has instituted "Mayor's Night" held every third Thursday at different community centers and to which any interested citizen can come and share his feelings with his mayor. He also put in a separate telephone in his home, a "hot line" which citizens can call day or night, seven days a week.

Palmer has been active in community affairs in Moorestown, a town he calls "an oasis in a plastic desert," since he moved there in 1964. In 1970, he recalls, he was asked to serve on the town's Planning Board. "This is an official agency of municipal government," he explained. "It determines the town's growth pattern." He served on the board for two years and became its chairman.

In 1972, he said, "I was urged to run as a Republican candidate for a seat on the Township Council." He was elected then and reelected last fall. "In January (1977) the council itself elected me mayor." He explained that the mayor, in Moorestown, is part of the legislative branch and not the executive branch of government. What are his duties? "I preside over all council meetings, represent the township in county and state dealings, cut ribbons, kiss babies, provide the leadership required in the legislative branch, and act as the symbolic head of the community," he says he spends from 12 to 16 hours a week on mayoral duties.

And, he says, it doesn't detract from his work with his company which is headquartered in Moorestown. "It was the success I've had here and a desire to give back," he said, that made him want to get into community activities in the first place.

A native of Philadelphia, Palmer received a B.S.E.E degree from the Moore School of Electrical Engineering, Univ. of Pennsylvania, in 1953. He also holds a Certificate in Municipal Planning received from Rutgers Univ. in 1971.

"I'd worked one summer with RCA while I was in college," he said, "so after graduation, I joined RCA in Camden." What he joined was RCA's then-embryonic and now nonexistent Electronic Data Processing Div. As a design engineer, he pioneered the use of transistors in computer peripheral equipment. "I designed," he said, "the first piece of all transistorized computer equipment ever delivered to a commercial customer." It was a card punch.

In 1955 and '56, Palmer served with the Army Signal Corps at Ft. Huachuca, Ariz. In '56, he rejoined RCA as a project engineer. It was then that he began to get involved with data communications which, he said, "was not yet recognized as a distinguishable discipline." In 1959 he was promoted to engineering supervisor and assigned responsibility for a product line of data communications terminal equipment. During this period, he said, he participated in the formulation of international standards for multiplexing underwater cables and supervised design programs in time division multiplexing and automatic error correction.

His next job with RCA was as manager, communications equipment engineering, and he was placed in charge of such programs as two large-scale message switching systems, a data collection system, and various data communication and computer peripheral equipment innovations.

In 1962, Palmer left RCA to participate in the founding of Data Communications Inc., in Moorestown. "We had a mixture of products related to data communications," he recalls, "including a mag tape buffer which, when connected to a communications line, would capture data and retransmit it at a different speed. Dci was ahead of its time; the market wasn't ready." Among its products was a commercial cryptographic device for data security, something "few people worried about then.

Dci was sold, split up, and virtually disappeared in 1967. "I took the time division multiplexor product line," Palmer said, "and joined Computer Test Corp., a subsidiary of Computest which later was merged into its parent, Computest. He formed a data communications division for Computer Test.

"I soon found out I wasn't cut out for working for somebody else. I wanted to work for myself." In 1968 he left Computer Test to help found Spectron. In its early years, Spectron engaged primarily in development of specialized custom equipment for use in international communications. That equipment, Palmer said, purchased by foreign governments as well as domestic international carriers, "is still in service in all parts of the world.

Spectron's first end user product, the Universal Communications Monitor, was introduced in early 1970. An outgrowth of the earlier work in international communications monitoring equipment, the UCM became widely accepted as the standard for analysis of complex computer-communications system problems. Other end user products for switching and patching communications lines and equipment were introduced in subsequent years and the company today offers a broad line of devices and systems for monitoring, control, test, and management of data communications systems. Among its products is the Datascope, a second generation, improved version of the UCM, which, Palmer said, has "been very well received." He said Spectron currently is offering a wide variety of versions of the Datascope to fully programmable, interactive models.

Palmer is as proud of his company as he is of his town. Of Spectron he says, "It is known as a leader in providing data communications technical control components and custom systems. The company offers customized turnkey systems, complete with training programs in the use of data communications test and control equipment."

Of Moorestown, Palmer says, "It is my hometown just as surely as if I had been born here . . . it has the image of being an affluent community, but it isn't really that or just that. Its homes range from those someone unemployed could afford to $300,000. It's just that the lower income group is less mobile and transactions on their homes aren't recorded." He feels strongly about the "oasis" aspect of Moorestown, and one of the issues he's pursuing most strongly as mayor is "preservation of our farmland." Moorestown has a population of 16,000 and is characterized by Palmer as a "stable community . . . one with a tax rate lower than those of surrounding townships." He's committed to keeping it that way.

Besides his professional and civic duties, Palmer serves as an elder in the First Presbyterian Church of Moorestown. And, he sings in the church choir.

22
New from Diablo:
1200 Baud/200 cps
Matrix Terminal.

4 to 5 times more productivity!

We're offering the most versatile 1200 Baud hardcopy terminal available. Our new Matrix Terminal prints 200 cps, has a 100% duty cycle 7 x 9 dot matrix head, that prints upper and lower case. We are microprocessor-controlled to provide incremental and “automatic” bidirectional printing, unique horizontal and vertical tabbing and extensive margin controls. We also offer program control multiple fonts, control code functions and versatile forms handling. We communicate in ASCII code, and are compatible with Bell 103A, 113A, 202 and 212 modems and other 110 to 1800 Baud asynchronous modems using the RS 232C interface, and we print an original and five or more legible copies of all 94 ASCII characters. A nice plus: our table-top terminal has the features and friendliness of an office typewriter. The rest comes from a demonstration! Call your Diablo representative or write Diablo Systems, Inc., 545 Oakmead Parkway, Sunnyvale, Ca. 94086, or Diablo Systems, S.A., Avenue de Fre, 263, 1180 Brussels, Belgium or Mitsui & Co., Ltd., 2-1 Otemachi 1-Chome, Chiyoda-ku, Tokyo.
and a special exhibit have been planned for university-level computers, home computers, and transition to distributed computing. Sessions will cover such topics as: energy alternatives, management in the microprocessor peripheral circuits, designing with microprocessors, programmable pocket calculators, large scale program development for microprocessors, new advances in processing. There also will be a presentation of the IEEE Convention since 1969. Thirty-two professional exhibitors will make this the largest Western Electronic Show.

Contact: Richard Zapolin, The MITRE Corp., P.O. Box 208, Bedford, Mass. 01730. (617) 271-2534.

MUMPS Users' Group Meeting, Sept. 7-9, Boston. This sixth annual gathering of MUMPS users will include a first day primer tutorial on getting started in Standard MUMPS; five technical sessions, including information panels on user experiences with Standard MUMPS; vendor forums on new hardware and software; and visits to major MUMPS facilities. Fee: $50, members; $75, nonmembers. Contact: Richard Zapolin, The MITRE Corp., P.O. Box 208, Bedford, Mass. 01730. (617) 271-2534.

On-Line Conference on Data Bases, Sept. 13-15, London. Managers, designers, implementors, and users of data bases will meet and exchange views, ideas, and experiences, and extend their contact in this evolving field at this conference on experience and technology of data bases. The conference will cover three parallel themes. "User Experience with Data Bases" will provide an overview of data base techniques and an assessment of current experience with them. The other two themes, "Data Base Technology," and "Implementation and Operation," will provide insight into recent thinking and exposure to some of the key areas. Contact: On-Line Conferences Ltd., Cleveland Rd., Uxbridge, Middlesex, U. K.

WESCON/77, Sept. 19-21, San Francisco. Over 400 exhibitors will make this the largest Western Electronic Show and Convention since 1969. Thirty-two professional program sessions will cover such topics as: energy alternatives, program development for microprocessors, new advances in microprocessor peripheral circuits, designing with microprocessors, programmable pocket calculators, large scale computers, home computers, and transition to distributed processing. There also will be a presentation of the IEEE Region 6 Student Papers Competition, and a special exhibit of projects created by IEEE Region 6 students. Two sessions and a special exhibit have been planned for university-level engineering students. A panel session will discuss "Engineering Careers and the Problems After 40," and another session will discuss "Your Job Interview: The Million Dollar Decision." Fee: $9. Contact: WESCON, 999 N. Sepulveda Blvd., El Segundo, Calif. 90245 (213) 772-2965.

ASIS 40th Meeting, Sept. 26-Oct. 1, Chicago. "Information Management in the 1980s" will be the theme of this meeting which will look ahead to the next decade in the area of managing information. Topics addressed will include: technological implications, social impact, the role of the government and private sector, economic impact, privacy considerations, and freedom of information. The technical program of contributed paper sessions, special interest group programs, and technical sessions on the federal government's role will be supplemented by exhibits, special workshops, and counter program sessions. Fee in advance: $65, members; $95, nonmembers; at the conference: $85, members; $115, nonmembers. Contact: Skip McAfee, ASIS, 1155 16th St. N.W., Washington, D.C. 20036 (202) 659-3644.

NMA/IMC Midyear Meeting, Sept. 27-29, Washington, D.C. "Micrographs: A Partner in Emerging Technologies" is the theme for this combined meeting of the National Micrographs Assn. and the International Micrographs Congress. Twenty-one educational sessions will cover the state of the art of micrographs, new technological developments, new applications, and present and future partnerships of micrographs with other technologies and user groups. There also will be an equipment exposition.

One day before the official start of the meeting, four all-day concurrent seminars will be offered to those interested in learning the basics of micrographics or in expanding their knowledge in the field. Full registration for the meeting is $150. Contact: National Micrographs Assn., 8728 Colesville Rd., Silver Springs, Md. 20910 (301) 587-8444.

Datacon '77, Sept. 28-30, St. Louis. Cosponsored by the St. Louis chapters of the ASM and the DPMA, the conference will feature 32 seminars and over 50 exhibits. Those attending six of a series of eight courses designed for systems trainees, junior analysts, and newly assigned information systems personnel will receive a certificate of completion—Datacon '77 Basic Systems Course. Courses applicable to various levels of management will include: word processing, project management, minicomputer management, how to build an effective team, managerial procedures and contingency planning, and an update on privacy legislation. Courses for operations specialists and auditors, and systems and programming technicians also will be available. Fee: members, $70 for two days, $40 for one day; nonmembers, $80 for two days, $45 for one day. Contact: John Vaughan, ASM/DPMA, P.O. Box 1401, St. Louis, Mo. 63188.
Cross our Level 6 fox with our Level 66 lion and what do you get?

A new breed of distributed systems that command a lot of respect.

Honeywell's Distributed Systems Environment integrates satellite minicomputers and general purpose systems, within an environment of cooperating software. It lets a modern organization distribute appropriate data bases and application programs among remote locations. In short, it's a system that works the way a modern company works.
First the lion.

Start with the upper end of Honeywell's Series 60 family, the large-scale Level 66 system. Here you have a powerful, large-scale multi-dimensional central processor. You have hardware and software features that simplify the management and utilization of your data. You have reliability with a minimum of human intervention.

The modular design of Level 66 systems lets you do what you want to do now and grow as your requirements grow. You can add resources where and when you need them most—input/output devices, processors, or memory—without having to swap out your system. And without reprogramming and retraining.

A well-managed computer...

GCOS (General Comprehensive Operating Supervisor) is the executive software for all Level 66 systems. GCOS controls, schedules, and monitors all activities, and adjusts processing activity to changing demands. Processing modes include transaction processing, data base inquiry, time sharing, interactive job entry and execution, and batch processing. These modes are available at the central site, or remotely via Level 66 communication facilities—and they're available concurrently, using a common data base.

leads to well-managed data.

Data Management-IV (DM-IV) is the Level 66 data base management system designed for high volume on-line transaction processing, and efficient, interactive remote query and reporting. It uses a common language for defining, managing, and directing data, and provides a standard user interface that is simple and logical. It allows a common file description to govern the structure of all data, but is independent of that structure.

DM-IV gives your key people timely access to vital information, and provides data integrity protection, security, and automatic recovery and restart.

A system that works better, longer.

Level 66 systems have many features to ensure maximum uptime. While your work is being done, on-line testing programs can check the operation of the system. Automatic error analysis and logging programs provide fast, diagnostic reports that help identify potential trouble spots and avoid interruptions.
Configurations with more than one of any module (two processors, for example) not only increase throughput, but provide built-in backup. Should one module go down, GCOS allows you to dynamically reconfigure the system to work around the inactive module and provide significant fail-soft protection.

And now for the fox.

The fox, of course, is Honeywell’s quick, versatile, and smarter-than-ever line of Level 6 minicomputers. Level 6 features an extremely flexible architecture and advanced modularity. It’s a combination of large-scale integrated logic circuitry, firmware-driven micro-processors, MOS memory, and etched-wire connections that achieve plug-in modularity with optimum configurability.

Coupled with its powerful and compact processing capability is a superior communications processor. Level 6 technology and packaging are used in the Honeywell DATANET 6670 Front-end Processor. Honeywell minicomputers are also being used as network processors and as intelligent terminals, doing everything from remote job entry to multiple workstation data entry.

The software wherewithal.

Level 66 communications software includes the Network Processing Supervisor (NPS) and Remote Terminal Supervisor (GRTS) which simplify implementation of an information network and help optimize both response times and line costs. Messages from several terminal stations can be concentrated and forwarded to the host computer via a common communications line. And with NPS, transactions can be passed directly between stations.

Since NPS has its own access to stored information, the host system is free for other tasks and remote sites are insulated from host system operating conditions.

Level 6 offers a choice of rack-mountable, cabinet and tabletop models, and includes a full line of low-cost peripherals in both tabletop and rack-mounted versions. The cabinet version is shown at the left, the tabletop version with diskette and CRT below.
**GCOS 6/MDT (Multi-Dimensional Tasking) Software**

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**Can we help you?**

Honeywell's approach to distributed systems is realistic. It lets you build your system based on current needs. And it lets you evolve into more sophisticated applications as priorities and plans dictate. And you benefit from working with a company that can help meet your total requirements and provide the full support you need, wherever you need it. We'd like to work with you on both current and long term solutions to your data assembly, data processing, and distributed system requirements.

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CIRCLE 44 ON READER CARD
Logical Construction of Programs
by Jean D. Warnier
Van Nostrand Reinhold Company, 450 W. 33 St., New York, N.Y. 10001 (1977)
230 pp. $14.95

When was the last time you had to design software? If you had a problem, you may remember needing an effective, relatively straightforward design method but not having it. Several authors have attempted to rescue software designers from this dilemma. The methods they promulgate are directed at neutralizing the acid content of a software design problem and bringing quick relief to a designer's upset stomach. This book presents one such remedy. But, like other miracle cures, you only get what you pay for, and sometimes not even that.

This book is an "English" (not to be confused with American English) translation of a French manuscript. The management requests that linguists and information theorists not smirk! During the translation process some information was lost and the meaning of many phrases diluted or distorted. The translation is not necessarily an exact reflection of Mr. Warnier's intent or perception of his method. In fact, he has privately expressed some dissatisfaction with it. Hence, this review refers to the concepts as stated in the book. It is also interesting to note that there is a soft cover translation with the same title and author, but it is not identical to this book. The book being reviewed has a total of 11 chapters while the "English" translation has 10. This "new" chapter appears at the end of the book and is written in American English (e.g., organization vs. organisation elsewhere). More about organizational factors later.

The book describes a technique and rationale for designing software based on the premise that the structure of a program should reflect the structure of the program's data files. Intuitively, it sounds like a good idea, but can it be done? Mr. Warnier's book tells how.

The scenario is quite simple. Begin by graphically identifying the structure of the data. Next, this graphic depiction is used to define a modified form of flowchart. Detail is added to arrive at pseudo code which can later be converted to executable code. Sounds simple enough, but ... there are a few minor problems. One is that not all data organizations are hierarchical. When this happens, the result is a poor quality program. Unfortunately, the book does not tell how to reorganize an imprudent data organization or how to compose a prudent one. Instead it introduces the concept of phase and uses it to subordinate a program, noting that a complex program may contain more than one phase. However, a method for identifying a phase is not provided.

Another problem is the implicit assumption that there is one input and one output file. When multiple files are used, a "guide" file (hierarchically superior to all others) is employed containing the element identifiers for all files. In the event a guide file is not present, the situation becomes complicated. These data file situations could be the final blow.

Warnier does not tell the reader the circumstances for using the method. In this regard, his presentation is similar to other formalized methods. However, the method is effective on small (single or few modules) design problems, and it may also be useful in detailing identified modules within a large system, but it is not a software system design method in the sense of Constantinete, et al.

The book is presented bottom-up, and gives the feeling that something is missing or left out. It consists of Part I, which has six chapters, and Part II, which has five. But it is not until chapter four of Part II that the reader discovers the missing element—an overview of how the concepts fit together. Unfortunately, by this point many readers will have lost interest and given up.

Presentation is not the sole cause of the lost feeling. Two others are the book's title and the audience definition. The title, "Logical Construction of Programs," does not reflect the content of the book, which describes a set of rules which use the structural relationships of the data. Strictly speaking, it does not address program construction (i.e. packaging, run environment, data element binding, and other issues), only program design. The issue of audience characterization, an important one for a technical work, is not addressed, although the book's introduction mentions the expertise the reader is expected to possess. A technical book should say up front who is going to get the most benefit from it.

If you subscribe to the view (as this reviewer does) that an effective software designer should be able to use several different design approaches, then this book would be a worthwhile addition to your library. Its contents represent a useful tool under the right circumstances. However, if you use the method described you will have to rely on your own ingenuity, since the book is not useful as a reference.

-Lawrence J. Peters

Mr. Peters is a software engineering consultant with Boeing Computer Services in Seattle. He holds degrees in physics and engineering, and has published several articles about software design.
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The easy way is UCC-2 (DOS under OS). This software package allows you to run your DOS programs on your 360/370 OS or OS/VS system without reprogramming.

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- A Disk Management System that you should look into before you buy another disk drive (UCC-3). Circle 95
- A PDS Space Management System that eliminates the need for PDS compression (UCC-6). Circle 96
- A Data Dictionary/Manager that really gets IMS under control (UCC-10). Circle 97
- A Restart/Recovery Management System that makes restarting in a matter of seconds...a matter of fact (UCC-15). Circle 98
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TI's 745 offers you fast remote access to your central computer. With lightweight 13-lb. briefcase mobility.

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The 745 translates into a better solution for your APL needs.

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TExAS INSTRUMENTS.
source data

(Continued from page 29)

Personal Computer
A new desktop computing system described as having the retrieval power of a mainframe is the subject of this descriptive brochure. The pcs-II features random access storage on exclusive minidiskettes said to offer the fastest data access of any portable computer, be compact, easy to operate, and provide instant access to computer power for businesspeople, managers, scientists, and engineers. Suggested applications include: reference and customer information storage; material location and performance; consolidation of information from different points; and forecasting of cash flow, or total sales. WANG LABORATORIES, INC., Lowell, Mass. FOR COPY CIRCLE 265 ON READER CARD

Test Editing Terminal
The vt/711t is a microcomputer-controlled text editing terminal featured in a new pamphlet. The terminal contains an integral lsi-11 programmable microcomputer, and features large characters to ease reading. The unit can store up to 31,000 characters internally. The pamphlet also describes the video display terminal's advanced editing functions and special capabilities such as smooth scrolling, restoration of deleted paragraphs, and up to 32 user-definable functions. DIGITAL EQUIPMENT CORP., Northboro, Mass. FOR DATA CIRCLE 252 ON READER CARD

Mass Storage System
A mass storage system with a capacity said to equal that of 150,000 average computer tapes is described in a brochure from this vendor. The sdc tBM II uses standard videotape on which data are recorded in a block format. Random access to any record is achieved by performing block address searches at tape speeds of 1000 ips. Features described in the brochure include capacity, cost, throughput, and architecture. There also is a comparison of the performance of the sdc tBM II with conventional tape storage for data base consolidation, file processing, and batch applications. SYSTEM DEVELOPMENT CORP., Santa Monica, Calif. FOR DATA CIRCLE 253 ON READER CARD

Microcomputer Products
Seven separate microcomputer families, peripheral support circuitry, single board computers, packaged microcomputer systems, and product development aids are listed in this eight-page, four color product line brochure. Also detailed is the support assistance available from the vendor, including documentation, training programs, a user's library, and software assistance. INTEL CORP., Santa Clara, Calif. FOR DATA CIRCLE 254 ON READER CARD

Time-sharing Systems
A new 20-page brochure describes this vendor's line of computational time-sharing systems, and explains how a single system can meet most time-sharing needs by combining mainframe performance and minicomputer adaptability. The most powerful system, the Prime 500, is said to support up to 63 users simultaneously. The systems can support programs up to 32MB long and can provide up to 8MB of main memory. They offer virtual address spaces of up to 512MB per user, and up to 2.4 billion bytes of on-line disc storage. The systems are built around totally upward/downward compatible central processors, and use the vendor's full line of time-sharing software. PRIME COMPUTER, INC., Framingham, Mass. FOR DATA CIRCLE 255 ON READER CARD

Forms for Minis
Forms designed for minicomputer use, including source documents, continuous forms, Moore Clean Print cop forms, report forms, labeling systems, and government reporting forms, are described in this six-page brochure. The Total Concept Package is designed for use with System/32 and other small business computers. MOORE BUSINESS FORMS, INC., Niagara Falls, N.Y. FOR DATA CIRCLE 259 ON READER CARD

Project Planning
A new four-page bulletin explains the "Expert" alternative to the manual process of drafting a project network diagram to show planned work sequence among activities. "Developing Project Plans" begins with an example task list and proceeds in a step-by-step process to the completed logic network. There is also a graphic description of the seven steps involved in using the Prenet mode of the Expert project graphics system. SYSTONETICS, Inc., Anaheim, Calif. FOR DATA CIRCLE 258 ON READER CARD

Image Processing
Vision One is a stand-alone image processing system said to be the most powerful system of its type available. A new six-page brochure describes the system, which includes a self-contained, general purpose programmable processor providing system control functions, computational ability, and access to the data base. Vision One is designed to interface with a wide variety of general purpose computers, including the most powerful minis, the IBM 370, and the CDC Cyber series. The brochure also describes the alphanumeric keyboard console, which contains a full typewriter keyboard plus up to 20 special function keys. A color CRT monitor, and the software which provides the ability to read or write and display selected images and graphic overlays from the source data base. Other software features include computing of histograms, image size changes by extrapolation or interpolation, multiple image logical and arithmetic operations, and interactive video rate control of pseudo color and function processors. COMTAL CORP., Panama, Calif. FOR DATA CIRCLE 257 ON READER CARD

Digital Switch Patches
A new product sheet describes this vendor's digital switch patches used in data communications network control to permit manual or automatic selection of on-line or standby equipment. The two-color sheet details features and operating information of the patches, and includes photos of the unit in a range of in-use modes, and schematic and block diagrams. Features referenced include: a digital switch patch which assists in the rearrangement of interconnections between modems, multiplexors, terminals, and computers, plus a fall-back switch for switching modems or termi—

August, 1977
nals between on-line and standby equipment; fast patch with single plug insertion; and transfer or monitor of all 24 leads of an Rs232 interface.
SPECTRON CORP., Mt. Laurel, N.J. FOR DATA CIRCLE 256 ON READER CARD

Air Conditioning Brochures
Two new brochures are now available from this vendor. The Underspace-maker is an air conditioning system for computer rooms which uses the space created under the raised floor as an air supply plenum to pass the conditioned air into the room at conditions specified by the computer manufacturer. The system is in modular form, and can be expanded to meet increased demands on its potential. It also allows units to be installed in existing computer rooms where the computer is either being upgraded or replaced by a more powerful model, and where the existing air conditioning plant will not adjust to an increase in heat load and change in configuration.
FOR COPY CIRCLE 252 ON READER CARD

The Over 32 system is designed for small computer rooms, and can be equipped to perform the functions of dehumidification, humidification, and heating. The unit can be installed underneath a window or in any other desired position, and it is claimed to have an average energy saving of 30% over any standard window-type unit of comparable capacity. This system also may be expanded to meet the needs of a growing computer system. For Copy Circle 263 on Reader Card. HIROSS Denco, Lockport, N.Y.

Data Communications Products
A new catalog offers 16 pages of descriptions and illustrations of ICC/Milgo products, including modems, network diagnostic control systems, and terminals. Nine different modems, including a new microprocessor series of modems are described, as well as network diagnostic control systems which provide the user with centralized data communications network control. System accessories include transmission test sets, display panels, and patch panels. Terminal products described include the 40+K1 Data Display Systems, the 40+ MPL Data Display System, and the System 400 Video Display terminal which offers full protocol and functional compatibility with the Honeywell VIP 7700 under "poll and select" protocol, the Univac Uniscope 100/200, and the IBM 3275 and 2265 terminals. INTERNATIONAL COMMUNICATIONS CORP., Miami, Fla.
FOR DATA CIRCLE 261 ON READER CARD

HP 21 MX-based Systems
Nearly all the published data sheets about HP 21 MX-based computer systems are consolidated into this new 124-page booklet. The systems described are high performance small computers said to be ideal as building blocks for scientific measurement and control systems, disc-based systems, and as distributed network stations. Systems discussed include the E-, and M-Series computers, disccomputers, and K-Series processor components. Also covered are memory systems, extenders, hardware and microprocessing accessories, and data communication, terminal, and instrumentation interfaces. HEWLETT-PACKARD CO., Palo Alto, Calif.
FOR DATA CIRCLE 260 ON READER CARD

Managers' Brochure
This eight-page brochure, "A Manager's Introduction to Incoterm Intelligent Terminal Systems," is an introductory guide which presents the vendor's terminal product line in summary form. The brochure includes two charts, the first of which shows the relationship of the vendor's standard intelligent terminals in the stored program display product line. The second chart lists the basic hardware and software characteristics for each standard model, as well as available enhancements and upgrade potential.
INCO-TERM CORP., Wellesley Hills, Mass. FOR DATA CIRCLE 264 ON READER CARD

Keyboard Described
This 12-page brochure reviews this vendor's line of sealed solid state keyboards designed for applications in industrial, aerospace, marine, military, and other severe environments where contaminants, shock, and vibration are major factors. The Hall-effect keyboards are available in 16, 26, 63, and 75 key alphanumeric configurations, and are designed to operate at temperatures from —40 degrees to +75 degrees Centigrade. The brochure also describes individual sealed key plungers for those wishing to make their own keyboards. Mounting dimensions, product photographs, electrical data, and code and character assignments also are included.
MICRO SWITCH, Division of Honeywell, Freeport, Ill.
FOR COPY CIRCLE 266 ON READER CARD

Computer Review
Computer Review is a 600-page book generated from a computerized data base. The main section of the book includes descriptions of central processor units, described one per page for easy look-up, with a 100 word description of the unit, and listings of system applications and features, characteristics of the central processor, and compatible peripherals. Systems software and software language availability, prices, and marketing data are also included.
Appendices describe each peripheral model referenced in the main section; describe operating systems; and give the name, address, and telephone number for each manufacturer. Price: $75 per year; includes updates every four months. GML CORP., 594 Marrett Rd., Lexington, Mass. 02173.

Remote Batch Devices
Remote batch terminals have changed since the advent of the minicomputer and microprocessor. The Guide to Remote Batch Terminals highlights a number of minicomputer-based systems that have local processing capabilities, in addition to concentrating on equipment designed to perform the traditional remote batch processing functions. A Search Chart lists almost every hardwired and programmable device that can be considered a remote
Scores of customers are taking advantage of our lead in 32-bit design right now, because we were there first ... with the first mini with true 32-bit architecture. Hundreds of Interdata Megaminis® computers have been working throughout the world since 1973.

Interdata's 8/32 computer processes data at one-half the speed of the IBM 370/158, for about one-tenth the cost. And the Model 7/32 offers even greater economies. With our Multiport Memory System, up to 14 processors can share a single memory bank, increasing throughput and processor-to-processor operation even further.

And, although they cost as little as the 16-bit DEC 11/70 or DG Eclipse, Interdata's Megamins are the only low-priced computers with no constraint on program size. That's just one benefit of 32-bit architecture.

You also get 219 IBM-like standard instructions, and can create even more of your own with up to 512 words of Interdata Writable Control Store, raising throughput by a factor of five. And for still greater throughput, Interdata's exclusive Hardware Floating Point option improves the speed of scientific calculations ten times faster than software-bound minis.

Send me 1977 specs on your 7/32 and 8/32 Processors and field proven software.

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August, 1977  CIRCLE 8 ON READER CARD
batch device, and there are 31 individual product reports analyzing specific devices or product lines. A tutorial article explains techniques used for remote batch processing and the various typical alternatives now available. The 189-page report is $24.95.

**Datamation Mini/Micro Survey** Five-thousand oems, systems houses, and end users responded to a survey by Datamation, and the results of that survey now are available in the 200-page report, 1977 DATAMATION Mini/Microcomputer Survey. The survey was directed only to those with a known interest in mini and microcomputers; both foreign and domestic markets were examined.

The survey, which will be updated annually, looks at the current and future hardware and software needs of the users surveyed, and analyzes their spending plans for minis, micros, and miniperipherals for 1977 and beyond. There is an assessment of the IBM Series/1, and 32-bit machines by their users, and an analysis of prospective demand for the 32-bit systems.

End users will find the report allows them to compare their own experience with specific vendors to a national cross-section of other users.

There is a section on the respondents' microcomputer spending outlook for 1978 and longer term which will be of interest to industry and investment analysts, along with a report on the status of oem inventories, and one on the impact of minis on mainframes.

For market planners and sales executives, there is information on customer loyalty: what factors they consider important in choosing a vendor, and why they become unhappy with a vendor. Also included is a look by vendor and units at what software and peripherals are needed and planned by users.


**Word Processing News** A monthly newsletter providing news commentary about important events and trends in word processing, the Datapro Word Processing News is designed to provide wp managers and office systems planners, specifiers, and designers with in-depth information on currently available systems. There is coverage on changing technology, new products, new concepts, and related industry developments. Subscription: $42/year.

Also new from Datapro is the information service, Datapro Reports on Word Processing. A free brochure includes summary information about the new reports and their comprehensive analyses and evaluations of word processing systems, products, and services. The brochure lists ten major categories of reports and gives a brief description of each one. The service itself includes looseleaf reports, monthly supplements, monthly newsletters, and a telephone inquiry service. Subscription: $290. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075.

**Courses**

**Microprocessor Education** A series of three courses over a period of four days cover everything from microprocessor project management to hands-on microcomputer programming. The first course, on project management, emphasizes high-risk, high-cost, and time-critical problems unique to microprocessors. Case studies illustrate the step-by-step methods presented. Key topics include: fundamental concepts; planning and specifying the project; how to select personnel; software development and how to verify the software works; testing and QA; servicing microprocessor-based products; and how to prepare for the future.

The second course, an introduction and survey, emphasizes factors affecting key design and development decisions including: processor selection, I/O and software design, software implementation steps, development and test equipment, and pitfalls to avoid when getting started.

The final course is a hands-on microcomputer programming workshop in which each participant receives a complete 8080 microcomputer for use throughout the course.

The courses will be offered in Atlanta, Aug. 16-19; and Anaheim, Calif., Sept. 13-16. The first two courses comprise the Management Series, for which the fee is $295. The second and third courses are the Engineering Design series, for which the fee is $495. The fee for all three courses is $595. INTEGRATED COMPUTER SYSTEMS, INC., 1445 Overland Ave., Culver City, Calif. 90230.

**Writing Skills for Dpers** Improving the writing skills of dp specialists is the aim of this two-day course, "Writing Skills for the EDP Professional." Workshop participants learn writing skills in two phases. The first is the workshop itself, which begins with learning to focus on the reader, the media, and the structure of the report. The second day of the workshop focuses on the message and writing it efficiently. The second phase of the program, the individualized coaching program, is in effect for six months after the seminar, and is designed to encourage participants to submit copies of their written communications to the course director for editing or critique. The material is returned to the writer with suggestions for improvement. The course will be offered in Boston, Aug. 15-16; Washington, Aug. 17-18; Houston, Aug. 29-30; and Saddle Brook, N.J., Sept. 1-2. Fee: $395. Team discounts are available. AMERICAN INSTITUTE FOR PROFESSIONAL EDUCATION, Carnegie Bldg., Hillcrest Rd., Madison, N.J. 07940.

**Office Automation** The impact of office automation on personnel, systems, and organizations will be the subject of this three-day conference. "The Automated Office: Integrating Word Processing, Data Processing, and Administrative Systems" has been organized for executives and professionals concerned with current and future information systems in the clerical, administrative, and managerial office environments, and will provide an overview for the user or systems professional considering a first or subsequent office automation project.

Scheduled for San Francisco, Sept. 28-30, and Washington, D.C., Dec. 7-9, plenary sessions on the first day will survey the functions and systems of the automated office, including data processing, word processing, information communications, and file/record management. On the second day, there will be concurrent workshops examining such topics as: word processing technologies, electronic correspondence, and data processing systems for information and data storage and retrieval. Presentations on the third day will examine the integration of required diverse technologies and procedures into operational electronic office procedures. Fee: $295; teams, $195. AIE SEMINARS, P.O. BOX 3727, Santa Monica, Calif. 90403.
PDP-11 users, let the computer experts help you play your hand

DEC* computers are among the best ever. Everybody knows that. But even with DEC there is room for improvement. We took advantage of that fact and made the best even better. In the process, we've given you a chance to supercharge your present PDP-11* instead of upgrading to the next computer. We've given you more time and improved your cash flow with the most complete line of sophisticated computer enhancements on the market today. They are available off the shelf. They are priced competitively. They install in minutes. They provide immediate results. And, in every instance, they outperform the competition. They should. We are the only computer people in the business. We are the only people really qualified to help you play out your hand and win.

Here are all the cards in our present deck: CACHE/34", CACHE/40" and CACHE/45", a series of 2048-byte single-board buffer memories which increase processing speeds as much as 100% in the PDP-11/34, PDP-11/40 and PDP-11/45. SCAT/45", an add-in memory which installs 128K of high-speed memory on the Fastbus* of the PDP-11/45, PDP-11/50 and PDP-11/55. QUADRASYNC", a quad interface board between the PDP-II Unibus* and 4 asynchronous serial communication channels which presents only one load to the Unibus. Current loop or EIA/RS-232 versions available. REBUS", a dual-width board which supplies a repeating function for the Unibus without requiring space for an entire system unit. And UNIVERTER", an adapter which converts the LSI* bus to a Unibus structure and gives the LSI-11 access to a megabyte of memory.

There are more cards coming. In fact, we would like to build something especially for you. We'll tell you all about it when you write for details on our present line.

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The system is the solution.
Designing for Auditability

by William E. Perry and Jerry FitzGerald

Audit controls must be built in, not added on. And that means the auditors must learn enough to participate in system design.

Changes in data processing technology have occurred concurrently with the expansion of both management's information needs and government requirements. Not only has the number of computer systems installed multiplied, but new capabilities and user applications have continually been developed and refined. These advances have had a number of implications for auditing and control procedures.

The growth in the use of data communications to connect processing facilities at many locations is one example of how new technology has complicated auditing and control. The number of data communications terminals installed was less than 250,000 in 1970, but by the end of 1975, the figure was almost a million. A further jump to three million terminals is expected by 1980, thus multiplying the number of locations subject to control and audit.

The potential for loss associated with the use of data processing is increasing not only with the increasing complexity and exposure, but also as procedures once performed manually are automated. Today, computer programs rather than human beings perform many of the checks and verifications necessary to ensure accuracy and completeness of data and records. This development has exposed information systems to the possibility of loss from several sources, including: errors or omissions in input, improper controls within the system, inadequate system design, fraud or theft, and failure to comply with legislated or other standards and procedures.

Another way in which the potential for loss is expanded is found in modernizing old systems. Although the number of errors made generally does not increase as a result of moving from a manual to a computer-based information system, the effects of any one error are potentially much greater. Moreover, tracing an error has been found to be considerably more difficult.

Off to a bad start

Data processing managers and internal audit managers report that they expect intensifying top management concern about potential loss to result in greater emphasis on, and consequently more spending for, the development of audit and control tools and techniques. While increased expenditures for data processing controls will probably have only a limited impact, internal audit costs can be expected to increase sharply in the near future if internal auditors are to fulfill a significant role in the data processing environment.

Cost is not, however, the primary constraint on the development of an adequate dp audit capability. Rather, the development is constrained by the time required to recruit and train internal auditors so they can be effective in the data processing environment and participate constructively in the systems development process.

Top management, as well as the regulatory agencies and the general public, have tended to rely increasingly on the audit community (both internal and external auditors) to protect organizations against the hazards of inadequate control in dp systems. However, preliminary investigations reveal a dangerous gap: auditing and control procedures for dp systems have failed to keep pace with the introduction of new technology and new concepts in dp system design. Also, though techniques for dp auditing and control have been developed in some organizations, these have not been widely communicated or generally applied.

Although data processing systems and internal audit techniques both have been evolving, there has been little coordination between the two disciplines. From a standpoint of those managing the dp facility, the internal auditors' mandate and their scope of activities are not clear. On the other hand, internal auditors presently are faced with the task of investigating an environment in which most of them have only limited experience, knowledge, and tools. Compounding these conditions is the fact that top management in many organizations has not given adequate attention to the potential repercussions of inadequate dp audit and control practices.

Thus there is a need to increase management's awareness of changes in the data processing environment as they affect internal audit and controls governing data processing. This increased awareness, in turn, is required to place auditability and control of computer-based information systems in a proper perspective.

Building in the controls

Some of the first things which must be developed are control guidelines based on cooperation among data processing, users, internal auditors, and external auditors. Firms which seem to have done the best work in this field have identified the following as some of the considerations that characterize effective internal control programs:
Control objectives are defined during the system development process and are recognized as separate development requirements. Computer-based information systems, computer service center operations, and system development are considered within the context of the total management environment. Before new data processing technology or system design concepts are introduced, they are evaluated in terms of associated control requirements, capabilities, and procedures. Design review programs that cover planned controls are part of the information system development process. Control features are built into information systems, not added on. The operational responsibility for internal control resides with data processing users. Clear statements of responsibility define the relationships between users, the dp department, and the internal auditors. Users, internal auditors, and dp personnel work together to develop guidelines and standards for controls. Systems designers consider human factors affecting the reliability of computer-based information systems and data processing operations.

Pre-installation testing is not compromised to achieve system development and installation schedules. Effective pre-installation evaluations are performed by internal auditors who also perform periodic post-installation verification of controls and of processing results such as records and reports.

Looking at the life cycle

One of the real strengths of the recent study results from the research team collecting and organizing hundreds of controls that were found to be in actual use in various firms. One of the best sets found appears as the System Development Life Cycle. The System Development Life Cycle technique is used to divide the system development process into a small number of distinct phases with formal management control points placed between and during each phase. The objectives in using the technique are two-fold: to provide a more structured management scheme for controlling costs and schedules, and to ensure proper and responsive communications channels among users, dp auditors, hardware planning personnel, top management, and the data processing personnel responsible for developing the application systems. The majority of companies interviewed which were using such a technique did so to ensure that major application systems were developed on schedule, within cost, and to the user's satisfaction.

The following representative example of how one large government organization has defined and uses the method serves as a basis for describing the general controls and techniques identified in use during the study. (However, other organizations define and use slightly different life cycle techniques, and such differences are discussed after the example.) The government organization defines the technique as follows:

- Project definition—That phase whose primary purpose is to define the user requirements and uses for the system.
- System analysis and design—That phase in which an overall description of the system is prepared.
- Detailed design and programming—That phase that focuses on the internal components of the system and the development of computer programs needed to form the system.
- System test—That phase in which the system is exercised to determine the correctness and completeness of implementation to the user requirements as manifest in the design documents.
- Conversion—That phase in which the tested system and operational procedures are initiated to move the system into full operational mode.
- Other organizations include one or two additional phases broadly defined as:
  - Operational—That phase concerned with ongoing operation, program changes, and maintenance.
  - Post-implementation—That phase concerned with whether the system performs as intended by the user, with focus on methods to improve the development process.

The conclusions reached in this article are based on a two-year research project which documented the state of the art—or at least the state of current practice—in dp auditing around the world. The project was conducted for The Institute of Internal Auditors by Stanford Research Institute, and was sponsored by IBM. Called the Systems Audiability and Control project, the study was founded on the belief that practical audit and control techniques have been developed by many larger organizations. It was felt that there would be considerable value in providing a compendium of these proven methods to the auditing and dp communities. The scope of sri's research included visits to 45 organizations in Canada, the United States, Europe, and Japan, plus a questionnaire mailing to 1,500 more organizations in those areas. The organizations contacted were in industry and government, and most were large; the findings, however, are not based exclusively on larger organizations.

As a result of the research, three reports have been written: an Executive Report for top management, an Audit Practices Report for the dp auditor, and a Control Practices Report for the dp professional. Each is available for $12 prepaid ($30 for all three) through The Institute of Internal Auditors, 249 Maitland Ave., Altamonte Springs, FL 32701.
AUDITABILITY

lysts review the file requirement specifications and the input requirements associated with them. The user attempts to ensure that the file requirements do not implicitly or explicitly change the original system specifications.

- Control Point 7—The user, project leader, dp auditor, and other data processing personnel responsible for hardware planning review the equipment requirements.
- Control Point 8—The dp auditor, user, and project leader review the design from cost, data processing standards, and general management points of view. The project leader is interested in ensuring that all loose ends from the past two phases are in place before moving into the detailed design phase.
- Control Point 9—The dp auditor, project leader, user, and data processing personnel make a final review of plans, equipment, costs, project organization, and communications channels to ensure that all participants have agreed upon the status and direction of the project. The project leader is primarily concerned with ensuring that sufficient systems analysis and design have taken place before the detailed design phase.
- Control Point 10—The dp auditor, user, and project leader review the documentation scheme and documents available describing the file systems, interface data handler programs, and program run documents for compliance to standards, completeness, accuracy, and clarity. The project leader is primarily concerned with ensuring that the project team is providing adequate documentation to meet data processing and user documentation standards.
- Control Point 11—The dp auditor, the project team members, testers, and user review the detailed system design to ensure that it follows from the general system design and still meets the user’s requirements. In addition, the test plan is reviewed for completeness, timing, and cost. The conversion plan and associated paperwork are reviewed for reasonableness, completeness, and clarity. As this is the last checkpoint before the test phase, the project leader takes special care to ensure that the original design requirements are still intact or that a traceable trail exists that explains to top management and users why the system has changed.
- Control Point 12—The dp auditor, testers, user, and project leader review the test team organization to ensure that the proper people are present and that the project test plan is complete and consistent. The project leader is primarily concerned with assuring himself that the test plan will completely test the system and in particular will test the internal controls designed in the system.
- Control Point 13—The dp auditor, user, and testers develop test data, build master files, review test results, and monitor the test plan progress.

General management and other organizational interface controls occur primarily at Control Points 1, 2, 3, 4, 14, and 15, and Control Points 1 and 4 have already been described. The others are:
- Control Point 2—The user, dp auditor, and project leader review the analysis and planned cost for completeness and accuracy. In addition, the project control and communications plan is discussed and changed if necessary. The user plays a major role at this control point in assuring that proper analysis has been taken place.
- Control Point 3—The user, dp auditor, and project leader review the conceptual design documentation for accuracy, completeness, and any changes that may have occurred. A revised cost-benefit plan is developed, and the dp auditor presents the findings to top management.
- Control Point 14—The user, dp auditor, computer operation personnel, and the project leader review the conversion plan for completeness of detail and personnel involved. Plans for communicating the production schedule to top management are discussed as well as other miscellaneous considerations germane to the specific project.
- Control Point 15—The user, dp auditor, and project leader review all problems not yet resolved, adequacy of documentation, and any incomplete activities identified. Final reports on the project status can then be written by the dp auditor.

Management at the government organization using the above approach said that they would like to include a post-implementation phase in their current cycle. They feel that after the application system has been used for a few months, problems can be identified by the users that will point out methods to improve the application system in question, as well as improve the entire life cycle review technique used.

Controls and techniques used in connection with the system development life cycle review by other companies interviewed include:
- daily reports to the managers of the functional areas during the critical stages of application system development.
- required sign-off by the internal audit department on all new applica-
Two years later

Based on the successful experience of leading organizations like the installation described above, we conclude that greater involvement of the internal audit functions in all phases of data processing is absolutely necessary and proper in today's increasingly complex data processing environment.

As management has become more dependent on data processing, data processing responsibilities have become more diffused throughout each organization. Previously, a department such as payroll or purchasing was responsible for its files and processing. That responsibility is now shared with a separate service facility, data processing, and frequently with other departments that use integrated systems as sources of information or as users. This brings about an upward shift in the lowest level of common responsibility or line management control. As a result, management increasingly looks to the internal audit staff as the logical group to evaluate and verify the effectiveness of internal controls across the entire organization.

But four things must occur before the internal staff can be effective:
1. Top management must ensure that the proper auditability mandate is established for the organization.
2. Data processing personnel must pay closer attention to building in adequate controls for computerized applications.
3. Internal auditors must be involved in application system development.

In summary, using some type of life cycle review does provide more management structure and an opportunity for users and dp auditors to participate in all stages of application system development. It does not ensure that users and dp auditors will do their respective jobs well or that project leaders will communicate as well as everyone would like.

The approach is a good application system development technique because it provides a means to develop more reliable and higher quality systems that can provide a high degree of data integrity. We see a definite trend to the use of some types of life cycle review in organizations that are heavily involved in application system development.

Table 1. Stanford Research Institute's best estimates for the present use of tools and techniques in auditing are based on 221 questionnaire responses.

![Diagram](Image)

Fig. 2. In one large government organization's dp system development cycle—here illustrated serially—there are 15 control points where the dp auditor can apply some leverage to the design and operation of the resulting product. Quality control points are primarily point 1 and points 4 through 13. Points 1, 2, 3, 4, 14, and 15 are user or management interfaces.

Other organizations often include two other phases in the life cycle: an "operational" phase concerned with ongoing use of the system, program changes, and maintenance; and a "post-implementation" phase concerned with user evaluation and focusing on ways to improve the development process.

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An Application Audit
by Bryan Wilkinson

What to expect when someone says, "The auditor is waiting in your office."

In an ideal world, every company would have a sufficient number of dp auditors so that these people could participate in the designing and continual monitoring of all dp applications at all computer sites. Unfortunately, few of us spend much time in such a world. Many data processing managers work in companies which do not have permanently assigned internal dp auditors, and so they have infrequent contact with the consultants, CPA firms, or other outside persons who come to scrutinize their shops. As a result, the managers don't know what to expect when they are told there will be an audit, or, worse, if the auditor shows up one morning.

A review of the life cycle of a dp audit may remove some of the mystery. And, as dp managers should have learned by now, mystery is not conducive to cooperation and acceptance. Here's a quick review of what an auditor will do.

The life cycle of an audit can be divided into phases, each with several work steps. Time or money constraints may eliminate some of the steps listed below:

A. Pre-audit phase
1. Select the installation to be audited.
2. Choose the application(s) to be reviewed in detail.
3. Set the date and duration of the audit.
4. Advise the installation of the audit.
5. Have installation personnel collect the requested work papers.

B. Audit phase: around-the-computer audit
1. Briefly review work papers.
2. Hold orientation session with key management personnel.
3. Cross-reference, index, and assemble work papers.
4. Complete the checklists (of questions to be asked).
   a. dp manager
   b. dp personnel
   c. user personnel
   d. others
5. Complete the work programs

C. Audit phase: through-the-computer audit
1. Determine questions to be answered.
2. Find out how to run the audit software on the installation computer.
3. Prepare and test the audit program.
4. Run the installation files against the audit program.
5. Analyze the results and explore discrepancies.

D. Audit wrap-up
1. Evaluate the findings.
2. Prepare a preliminary report.
3. Hold exit interviews.

E. Post-audit phase
1. Prepare and mail the final report.
2. Division (or company) management submits a reply.
3. Reply reviewed by dp auditor.

4. Prepare a request for further clarification if needed.
5. Division (or company) submits further clarification.
6. Follow-up review (or repeat audit, if necessary).

Pre-audit phase
If a company has 50 computer installations, they can't be covered in a year with any degree of thoroughness unless the company also has a large dp audit staff. But large audit staffs are rare. So, a decision must be made.

Which installations will be audited? If one or more of the following conditions is true of your shop, you should expect a dp audit or reaudit:
1. Yours is a large computer installation. This represents considerable investment in dollars and manpower.
2. Your installation has had significant changes in manpower, equipment, or systems since last audited.
3. Your division has automated applications which are used to control and manage a large dollar volume of assets, or applications which are used to make significant management decisions.
4. Your division has had significant deviations from plans or budgets or has had unusual changes in financial data.
5. You manage a company data center, or your installation services other divisions or outside companies. This creates special control problems.
6. Your method of operation may expose you to fraud or loss of control (such as using on-line terminals to record sales or to change asset values).

The "application to be audited" is a decision that is made more or less concurrently with the decision of whom to audit. Formal selection of the application using weighted factors would require information about all the applications in all the installations. There might be several thousand applications, and a formal analysis would waste manpower. An informal approach serves the purpose.

Payroll is often the choice for a first audit. It controls assets. It is vulnerable to fraud. More importantly, it usually was the first system to be automated in any division. As a result, internal con-

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controls may be nonexistent, the documentation may be incomplete and/or out of date, and the people who designed the system may no longer be with the division. As a result, payroll may be the least understood and least controlled application on the computer.

Financial systems are the normal candidates for audits. ("Financial" is defined to include inventory systems.) Systems which are given high priorities for audits are those which control significant assets, produce reports used by management, update important master files, have a large number of programs, and use considerable computer time during a month.

An audit by an internal dp audit team may take two or three weeks. Due only to the costs involved, it will probably be shorter if done by a CPA firm; that's not an ideal situation, but it's true. It may take longer if several applications are being audited or if unusual problems are encountered. This means that an internal dp audit team can handle 12 to 15 audits in a year.

Unless the auditor has reason to suspect embezzlement, you should expect to be notified about the audit one or two months before it is scheduled. The auditor should discuss the scope of the audit with you and request work papers which will be used in it. If this doesn't happen, both you and the auditor are going to have problems at audit time.

One of the important purposes of the pre-audit visit, if you haven't been audited before, is to let you know that the auditor doesn't have horns and a tail. It is essential to understand that the normal dp audit is not a "hatchet job." The auditor is concerned with controls, efficiency, safety, etc.; these are your concerns as well.

The preliminary visit also serves other purposes. If the auditor has not visited your facility, it gives him a chance to judge whether the time allotted for the audit will be adequate. Preliminary discussions about the application may result in the selection of a more appropriate one than he had chosen. The visit also serves to "break the ice" so that a minimum amount of orientation is required on the first day of the audit. Various mundane housekeeping requirements can be arranged, such as office space and the need for a telephone.

While the pre-audit meeting serves many purposes, the primary one is to discuss with you the work papers required and to set in motion the process of assembling them. Work papers are extremely important to the dp auditor. They orient him to your installation and the application to be audited. Work papers are also used to verify statements made by division personnel and observations made by the auditor. While they could be developed or assembled by the auditor, the initial collecting can be done more efficiently by your staff. The auditors will cross-check it against other documents and findings.

There are two types of work papers:

1. Equipment: types, location, costs, and contracts.
2. Applications: number of programs per system, languages, cost if leased or purchased, primary users.
3. Systems software: description, costs, and contracts if purchased or leased.
4. Organization charts: data processing and the company.
5. Personnel practices: vacations, overtime, background checks, etc.
7. Logs and controls: maintained by dp and by the users.

One of the most important side benefits may be that the user's misunderstandings are cleared up.

8. Plans: new systems, major modifications, equipment, facility, personnel.
10. Project control: project authorization, project budgets, progress reports, post-installation reviews.

The application work papers include:

1. System documentation: narrative description, overall system flowchart, report examples, input form examples.
2. Program documentation: descriptions of each program, file layouts, edit rules, logic flowcharts if available, otherwise, access to program listings.
3. Operations documentation: computer run sheets, data entry instructions, data transmission procedures and controls, report distribution instructions.
4. User controls and procedures: user manuals, logs, batching, error correction procedures.
5. Data processing controls and procedures: control section logging and balancing procedures, tape library procedures and logs.

You will be asked to assemble some or all of the types of work papers listed above and have them available on the first day of the audit. Failure to do this will, more often than not, prolong the audit.

Audit phase (around-the-computer audit)

During the morning of the first day of the dp audit, the division general manager and the division's chief financial officer are given a preliminary schedule for the audit, are told again how it will be conducted, and are advised about the post-audit activities. (They would normally have been told about it for the first time during the preliminary visit.) This is important because they will be asked to sit in on the exit interview and to respond to the audit report. At this time, schedule adjustments are made so that the review of the findings (the exit interview) can be tied to the availability of these management people.

The working papers are briefly reviewed during the first day to see how complete they are. Missing or incomplete papers are normally a portent of troubles to come. At this point it is too early to tell if the papers are accurate and up-to-date or not. To determine this, the junior member of the audit team is set the task of indexing and cross-referencing the papers. Cross-referencing the application is most time-consuming—usually requiring one man-week, more if many problems are found.

The overall system flowchart is the heart of the cross-referencing effort. It is supposed to show all input, all output, all programs, and all files in the order of use. In turn, the working papers are supposed to include examples of all input and all output, file layouts, and program descriptions. Cross-referencing these documents points up miss-
ing and poorly maintained documentation. It is unusual not to find problems here. The operator run sheets normally show files and output for each program. These are also compared to the flowcharts and discrepancies are explored. Finally, the keypunch instructions are compared to the input documents. At the conclusion of this effort, the division will have one up-to-date, well-documented system, if only one.

To return to the first day's effort, the balance of the day is spent asking the dp manager questions from a checklist. During the first half of the audit as many as 20 or 30 people may be asked questions from the checklist. These people will include dp supervisors and workers, a cross-section of users, the controller, someone from the personnel department, and vendors.

Many of the questions can be answered "yes" or "no." A few will ask for descriptions of practices or policies. Checklists are available from CPA firms and the literature on dp auditing. (We initially assembled and used a list of 250 questions, but have reduced that to 165.) The checklist format provides a place to record the answers received. (The auditor also records his answer to each checklist question after completing the associated work program.)

A work program is a series of pre-defined steps which the auditor must go through to validate the answers received and to arrive at his own judgment about the checklist questions. These validation steps include such things as:
1. Asking different people the same question and comparing their answers.
2. Asking the same question in different ways and at different times.
3. Comparing checklist answers to work papers or the lack thereof. For example, the manager states that he has a written plan for developing new applications, but he is unable to furnish one upon request.
4. Comparing observations to the checklist. For example, the operations supervisor says that access to the computer is limited to authorized people, but the room is unattended and the door is unlocked.
5. Mini-studies. The auditor may develop rudimentary disaster plans or examine the invoices and the purchasing practices for dp supplies. (On several occasions, for example, I have analyzed run time to see if the computer is being used efficiently or to determine if a third shift is actually required.)

Because the checklist and the associated work program represent an organized, written, pre-planned approach to studying a data processing department, the auditor is able to get fairly deep insight into the operation of your data processing facility and your user relations in a relatively short time. In fact, one of the important side benefits of an audit is that misunderstandings on the user's part about the handling of his requests or questions can be aired and cleared up. For example, a department manager may blame data processing for delayed reports. The auditor may find that the delay was caused by clerks in the user's department not submitting input on schedule. When user management is advised of the true cause of the problem by a disinterested party, it is usually cleared up and both the user and the data processing department benefit.

Audit phase (through-the-computer audit)

Some audit teams make use of audit software that lets them use the computer to scan, verify files, and the performance of programs. There are 20 or more such packages available, most of which are meant for use by nonprogrammers, and they are worth using for auditors with one or two installations. Practically speaking, if an auditor has 50 sites to check in a single year, perhaps with several brands of cpu's, chances are he won't have the luxury of using such packages. In the first place, no one package will work at all locations. Second, operational practices and approaches to jcl will vary from place to place so these must be learned at each new location. Third, if a "through-the-computer" audit is added to an "around-the-computer" audit, the time required to perform an audit may double. This, of course, increases the cost and reduces the number of installations that can be audited during any given period.

The steps in the audit phase of a through-the-computer audit are as follows:
1. Determine the questions to be answered. This is the hard part.
2. Fill out the audit forms (which are provided by the audit software firm when such a package is being used). Have the forms keypunched.
3. Find out how to submit jobs to the facility and prepare the necessary jcl and job request forms.
4. Test the "program" produced by the forms and correct the errors. There always seem to be errors.
5. Run the files against the audit program.
6. Analyze the results.
7. Repeat the process to find answers to all the questions raised by the analysis.

Following are some examples of errors found by through-the-computer audits:
1. Two files of customer contracts were compared to determine if the names of the customers and the effective dates of the contracts were the same on both files. They should have been, but numerous differences were found.
2. An accounts receivable file was aged to find overdue accounts and to determine the amount of overdue dollars. It was found that the controller was using the system improperly and payments had never offset balances due.
3. A file of accounts payable was searched to see if the company had paid for the same item twice. It hadn't.
4. A file of vendor names and addresses was printed out and compared to a manually maintained file. Several differences were found.
5. The pay rates on the payroll file were printed and compared to manual payroll records. Differences were found.
6. The deduction calculations performed by a payroll system were re-done using the audit software package. The results were compared automatically to the results of the payroll system. No differences were found.
7. Two files with a million records each were maintained by different systems. The records in each file had one important money field coming from different sources. The values for these money fields should have been the same in both files. Only three differences were found—which was almost unbelievable!
8. Sales forecasts in one file were compared to actual sales on another file on an item by item basis. Significant differences were found.

The above only suggests what can be obtained from audit software. Time and one's imagination are the limiting factors. In the examples chosen, you can see that audit software not only points out problems, it also can tell when things are under control and are functioning "as advertised."

Audit wrap-up

When the auditor has finished his checklist, work program, work paper cross-referencing and review, and the use of his audit software, he then asks himself, "What does all this mean?" Actually, he's been sparring with that question all along, but now he can no longer delay his answer. He must begin to sift and weigh his findings so that he can prepare a preliminary report which sets forth his findings and recommended actions. This evaluation process and the preparation of the pre-

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The recommendations are more easily understood and corrective action is facilitated by grouping related points. We use the following groupings:

1. Project and change control procedures: how systems are initiated, how changes are controlled, the extent of testing, how documentation is maintained.

2. Operational and administrative controls: personnel practices followed with regard to hiring, training, and vacations; how budgets and costs are handled; how duties are separated; practices with regard to standards and documentation controls; what is logged and by whom.

3. Manual controls of applications: how input and output are handled, what the process for correcting input errors is, how changes to master files are controlled, what controls the users have to insure that the data are properly processed.

4. Programmed controls of applications: whether the input is edited as it is received or whether the system is designed to provide audit trails.

5. Control and protection of on-line systems: whether terminal access and use is controlled, whether the software prevents improper access to files and programs, and if hardware and software controls are adequate to ensure that the data are transmitted and received accurately.

6. Control when a service bureau or other outside facility is used: whether there is proper contractual protection, and if source documents are protected if sent outside, and the charges proper.

7. Safety, security, and back-up: whether reasonable precautions are taken to protect the facility and the personnel against fire, flood, or other natural disasters; whether the facility is secure against unauthorized trespass; the equipment, files, programs, documentation, and necessary preprinted forms backed-up off-site; whether emergency, back-up processing has been arranged; and if there are emergency procedures.

8. Asset protection: is negotiable paper secure; are supplies purchased and handled in a proper manner; are proprietary programs and confidential company data secure; is computer time used for personal projects; is adequate insurance carried.

9. Efficiency and effectiveness: is the computer operated efficiently; are cost savings techniques used; are relations with users satisfactory and is data processing perceived to be responsive to user needs; do the systems actually provide usable and useful data.

Most of these are points which should also concern the data processing manager. Very few are strictly auditor-oriented. When weaknesses are found, you can expect the auditor to assign priorities to his corrective recommendations based on an evaluation of the cost to correct problems versus the expected benefits. He will probably not include low priority items in the report, maybe not even all the high priority ones. The reason for this is that if you are given a mass of problems to work on, your tendency may well be to throw up your hands and forget the whole thing.

The next wrap-up step should be a series of exit interviews—a "series" because if the auditor is doing his job no one should be surprised in front of his boss. The purpose of the audit should be to improve data processing operations and controls, not to crucify someone. The first exit interview should be with the dp manager, the next with the manager and his boss, and finally the division manager should be added to the group.

A primary purpose of the exit interview is to ensure that the findings are correct and that the recommendations are reasonable. If, during this interview, it develops that there was a misunderstanding, you should expect the auditor to change his report before proceeding further. However, be prepared to convince him of the error. Each exit interview takes from an hour to four or five, depending upon the questions raised by the division personnel.

**Post-audit**

Sometime after the auditor leaves, you should expect a final audit report from headquarters. You will be asked to indicate what is being done about each deficiency and to supply a plan and schedule for the corrective action.

When your reply is received, it will be reviewed by the auditor responsible for the audit. If your plan of corrective action appears to be appropriate, no further correspondence takes place. In some cases, your plan may appear to be inappropriate. Deficiencies may not be covered in the plan or your proposed action may not supply a solution. In such cases, you should receive another letter explaining the deficiency further and outlining why the proposed actions do not appear to be adequate. You may be asked for further plans.

Six months to a year later, depending in part on the corrective plan, you may expect a follow-up to see if the corrective actions were taken. This may be a mini-review and a mini-audit, or, if it appears that little progress has been made, a full-scale reaudit. In the worst cases personnel changes may be made, perhaps even at your immediate level. At least forewarned is forearmed.

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If the auditor is doing his job, no one should be surprised in front of his boss.
Who Is the DP Auditor?
by Edward K. Yasaki, Sr., Associate Editor

The dp auditor is a rare individual whose special mix of skills can win him a good position. Someday he may be a manager, but for now he's a technician in search of tools.

Meet Paul N. Norris, manager of internal audit at Burlington Northern Inc., St. Paul, Minn. He's been a traveling auditor, has worked in dp operations, been a computer systems designer, programmer/analyst, and an internal auditor. Back in 1968 he became the first dp auditor of the Great Northern, that being the corporate name before the merger that produced the Burlington Northern. Today the company has close to 50 internal auditors, of whom six are in computer auditing. The latter function began when the president of Great Northern showed uncanny foresight and expressed the need for someone with both an auditing background and dp systems experience because of the growing impact of computers on the company.

There are not too many of this "new breed of cat," as Norris calls them. William E. Perry, director of research at the Institute of Internal Auditors, estimates the number of dp auditors in private industry at between 5,000 and 10,000, while Gerald E. Meyers of the EDP Auditors Assn. makes a conservative guess of about 3,000. But companies are falling over themselves in the scramble to find more. As Norris says, there's a large demand for, and a short supply of effective dp auditors.

A different role
The green-eyeshade connotation of the "auditor" title sometimes turns people off on dp auditing too, but while the traditional auditor reports on past corporate events, saying "this is what happened," the dp auditor's job is to say that this or that might happen. They're two different roles.

With the complexity of some of today's systems—incorporating teleprocessing and data bases, involving and impacting a number of people—"It doesn't take much for some flaws to creep in and for the process to go haywire," says Paul Norris. "Sometimes people can't quite spot this. But a good dp audit review can shake a system down and find its flaws, its potential weaknesses, and come up with recommendations for the different people involved to put a fix in, to correct it before you suffer. So it's more future-oriented than other types of auditing."

Greg Grosh, who has been in auditing since 1970, also has 12 years of data processing behind him, including stints as a systems programmer and data base administrator. "As the eyes and ears of management," he says, "we are in many respects an internal consulting group, independent from dp." As the head of dp auditing at Wells Fargo Bank in San Francisco, he explains that when management is confronted with a major proposal, say for a mainframe change, management can turn to his group for a review of the proposal, and his group would look for alternatives or trade-offs overlooked by the original study group. Still, the main emphasis of dp auditing is on control or control systems.

Eleanor O. "Carol" Schaffer, v.p. and assistant auditor at Wells Fargo, was that firm's original dp auditor. She explains that the auditing staff's job is "to see that the company is protected against loss of all types. I emphasize all. It isn't strictly a fraud loss. It could be waste, inefficiency, ineffective systems that are the causes of loss of resources." So the group has a broad charter. Says Grosh: "We review systems in development, review all production systems, and do functional audits of operational areas—which are traditional-type auditing areas."

Thus the auditor's job is to provide an independent review of computer-related activities as a direct service to management. What with the formation of audit committees by the boards of directors of some publicly held companies, some internal audit groups report directly to that committee, achieving an independence and a prominence never before attained.

An un-rosy past
There was a time not too long ago when the internal auditing job was given to someone new at the company. It often became a dead end job. But at larger firms, the position has been elevated and given more prestige. The top internal auditor at B. F. Goodrich was recently made a v.p. and member of the board. At J. C. Penney, the general auditor is a v.p. But it varies among companies. There are firms where the audit function is esteemed, where it interacts smoothly with dp management. At such companies, says Donn Parker of sri International in Menlo Park, Calif., "you find that dp management is very self-confident and in a strong position."

But at the other extreme are companies where internal audit is staffed with rejects from the accounting department and where the dp organization is shaky. "And if they have dp au-
getting going to help the rest of the groups wants, including management services oftentimes some very severe communi­or systems and programming, and many departments with needs and

dent review is not independent, it's not often, during the course of develop­ment of major systems, you'll have many departments with needs and wants, including management services or systems and programming, and oftentimes some very severe communic­ations blockages can occur during this rain dance we call systems design. And if the party that comes for an independent review is not independent, it's not going to help the rest of the groups get united."

The auditing function began at PG&E along about 1967 when the firm sent four people to dp training school. Cul­bertson was the lone auditor among them, never having had any dp back­ground until that time. He now has six dp auditors, all of them coming from the dp side. He feels MM’s System/360 was the primary motivating force behind the start of dp auditing at the utility company.

"Most companies weren't interested in dp auditing until then, at least with first and second generation equipment. With the 360 and all those wonderful things we were supposed to be able to do, management became concerned about how we were going to audit those particular applications when they became completely automated . . . It was a realization that dp was here to stay and eventually all systems were going to become computerized, so we'd (the auditors) better become involved."

Proving its usefulness

But Culbertson also acknowledges that the Equity Funding incident (where data processing was used to perpetrate a multi-smillion fraud) "probably triggered more interest in dp auditing than anything else that has come along in the past 10 years." He says that 60% of all major corpora-

lot of politics involved, that one can't just go to dp management and begin some form of auditing. One must earn the right to do so, starting with tasks he knows he can accomplish and doing a good job. Of the people on his staff, he says, "Each one has to earn his own way. If he doesn't, he really can't function for you effectively."

Five years ago, he continues, he would not have expected a request from dp management to perform an audit. "But we've been requested several times in the last two years to perform... approaching auditing from a viewpoint management hasn't seen before."

"... auditing as

People in the dp auditing field, including any with a bit-fiddling capa­bility, speak of the job as being an alternative career path for those in dp. They say that anyone who has risen through the ranks but no longer has much hope of becoming the top dp honcho at his organization might con­sider the management slots in other departments that are open to him or her by way of the dp auditing post. "It’s a management training center, and it’s used in that way in many corporations," says Eleanor O. Schaffer of Wells Fargo Bank. You learn much more about your company than you would sitting in the operations center. "Dp auditing is so new that it doesn’t have a track record as to where your auditors will go, as far as a career path is concerned," says Roy Culbertson of Pacific Gas and Electric Co. He says he’s had only one auditor transfer out, and she returned to the dp department, not into pro­gramming or analysis but into a cor­porate systems planning group. Why do they come to auditing from dp? "I think it’s a desire to do something beyond just data processing."

According to Gerald E. Meyers of the EDP Auditors Assn., the salary scale ranges between $25K and $35K for a dp audit manager (others place the upper limit at $40K), from $19K to $29K for a senior dp auditor, and from $17K to $24K for a junior dp auditor. These figures, however, can be expected to rise not only because of inflation but also as people with technical expertise in systems software and in teleprocessing and net­working are lured into the world of auditing. Rare is the dp auditor today
diting," Parker says, "the dp auditor is frustrated and winds up being, essentially, go-fer for the traditional auditors." They receive copies of this file or that, and they're sent to extract data from certain files within the computer. At such firms, too, says Douglas A. Webb of newly formed EDP Audit Controls in Oakland, Calif., computer auditors “need to sell themselves to upper management as being an important function... they're unloved.”

At Pacific Gas and Electric Co. in San Francisco, the manager of internal audit reports to the president and chief executive officer. "So we have pretty high visibility, as far as the company is concerned," says Roy C. Culbertson, supervising auditor. When he started auditing there, auditors reported to the controller, then to the v.p. of finance, then the senior v.p. of finance, then the vice-chairman of the board. "I think the higher your reporting relationship, the more effective you can be as an auditor," he says.

The Burlington Northern's Paul Norris agrees. "Independence is a key requirement if you want truly effective internal auditing," he says. "Because... auditing from a viewpoint management hasn't seen before."

"... auditing as

People in the dp auditing field, including any with a bit-fiddling capa­bility, speak of the job as being an alternative career path for those in dp. They say that anyone who has risen through the ranks but no longer has much hope of becoming the top dp honcho at his organization might con­sider the management slots in other departments that are open to him or her by way of the dp auditing post. "It’s a management training center, and it’s used in that way in many corporations," says Eleanor O. Schaffer of Wells Fargo Bank. You learn much more about your company than you would sitting in the operations center. "Dp auditing is so new that it doesn’t have a track record as to where your auditors will go, as far as a career path is concerned," says Roy Culbertson of Pacific Gas and Electric Co. He says he’s had only one auditor transfer out, and she returned to the dp department, not into pro­gramming or analysis but into a cor­porate systems planning group. Why do they come to auditing from dp? "I think it’s a desire to do something beyond just data processing."

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A DP CAREER

who has that type of knowledge, but his technical skills in computing provide him with a premium position within an internal auditing staff. They are paid more than auditors in general, says William E. Perry of the Institute of Internal Auditors.

But Schaffer says it's more than the salary. The dp auditor also receives management attention and training, as well as a certain independence; you get an assignment and are pretty much free to do it your way. And you get to keep up with the state of the dp art.

"I think dp auditing is a very good place for me to keep current in dp," says Greg Grosh, who heads up this function at the Wells Fargo Bank. "From the position of dp auditing, I can stay current on virtually everything that's happening in data processing. I mean, I can look this year at telecommunications and at distributed processing, learning new pro-

docs and picking up some new languages for this machine. I was very keen for many years on data bases and data base administration, so I got involved in that.

"So I have the opportunity to see, from above, all of these different things that are happening in dp, and sort of pick and choose what I want to look into—what I think is personally interesting to me but more importantly what I think is more interesting to the bank."

More information on the job, the people in it, and the things they do, is available from the Institute of Internal Auditors, 249 Maitland Ave., Altamonte Springs, Fl. 32701, as well as from the EDP Auditors Assn., 7024 Edgebrook Lane, Hanover Park, Ill. 60103. 57

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too, is part of this trade-off. Does a program do what it is supposed to do and nothing more? Is it worth the effort it would take to determine that? "Some dp auditors will get down to the nuts and bolts," observes Doug Webb of EDP Audit Controls. But, he adds, "there are not too many who can do that." Nor is there always an adequate payoff to justify such an examination.

Back in January of 1976, at a software auditing workshop, Bill Perry of the Institute of Internal Auditors observed that the auditing of software was being performed at a mere 100 computer installations. To date, he muses, he has seen nothing to indicate that that number has increased. Perry feels that the products of software vendors have been relatively free of security gaps. He thinks the fixes required are more in terms of controls. "Take, for example, the password feature in TSO," he says. "Many companies just ignore the use of that, and I'm sure if auditors were more involved they would insist on those features being used."

But a lack of tools

Grosh believes you can look at source code for its information value, but you still must also test to see that the code does what it's supposed to be doing. "Having been a systems programmer, I can effectively hide anything in a piece of code that I want to," he says he knows people who do source code compares to see that one matches another. "I would never do that, even if I could look at all the source code, because I know that what's executing in that machine does not have to bear any relationship to what's happening in that source code."

The comment prompts Schaffer to remark that she has always wanted a facility that would translate object code to source code—sort of a reverse compiler.

She is not alone in lamenting the lack of adequate tools for her trade. The dp auditors interviewed for this article believe they understand batch systems adequately to do their jobs effectively. But they all agree that online systems incorporating teleprocessing and data bases pose a serious challenge to them. Now with distributed processing and all that implies, they're in need of help. "That's probably the thing that's going to change the face of dp auditing—going from centralized to distributed processing," she says.

Adds Paul Norris: "The technology that's available and starting to be utilized by larger organizations—and it will spread down to smaller ones in the future—is moving so fast that the previous control theories relating to systems and data processing are being fast obsoleted, and nothing is coming in their place. If I had a key concern in terms of dp auditing of systems, and of dp in general, it's that somehow or other we have to bring the control theory—cost-effective controls—up to date and keep it in stride with technology."

He says there are a number of new concepts coming, but not nearly fast enough. "Obsolete control theories, when you try to apply them, sometimes are worse than no control at all because they give a false sense of security and really don't fulfill the original control objectives."

Norris sees bits and pieces of activity, such as those relating to data base security and teleprocessing and networking, but no overall integration of them that could result in good control theory.

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A NEW ERA
Making Documentation Painless
by Richard C. Fitzpatrick

The way to get programmers and analysts to do it in spite of themselves is to provide them a cookbook example, have them use checklists where possible, and back them up with people who are better suited to the task.

Documentation can no longer be considered the poor relation of the computer system implementation effort. The arrival of dp auditors has axed documentation inefficiency, and those who would ignore this reality are Pollyannas. Complete and timely documentation of each production system within a data processing facility must now be considered a necessity if management is to protect the company's computerized assets, prevent disruption of orderly operations when the unexpected occurs, and satisfy the ever-increasing demands of auditors.

However, the success of a documentation program cannot be predicated simply on the amassing of voluminous materials. A successful documentation program requires establishing standards and enforcing procedures to provide initial high quality, and then providing for continuous maintenance and updating.

In 1972 the Information Systems and Services Department of American Mutual Liability Insurance Co. embarked on a documentation program, fully cognizant of the following, sometimes unfortunate, realities:

1. Systems analysts and programmers find no challenge in documenting systems once they are "on the air."
2. Without formal documentation standards, it is a good bet that no two people will use compatible documentation formats.
3. Documentation material that affects dp operations personnel should be reviewed by them before they are required to accept it.
4. Responsibility for scheduling, typing, editing, finalizing, publishing, distributing, and maintaining systems documentation would best be entrusted to a specially trained unit for whom the everyday problems of getting materials ready for publication are routine. This would permit technical people to properly devote their efforts to systems and programming work.

At American Mutual, the documentation program has really paid off. We now use a systematic, planned approach which can be adapted easily to almost any data processing organization. It was the result of research into various published works on the subject from which we chose those ideas and concepts we could effectively adopt. We also made inquiries and comparisons of successful documentation methods in other organizations, and fitted some of their proven techniques to our needs. And we decided to use various preprinted forms only where they would legitimately be more effective than straight narrative documentation.

To prevent the short-term demise of the documentation program and to save the product from dilution with the passage of time, we established three goals:

1. To provide a standardized approach to documenting all production systems.
2. To assemble a standards manual whose format and organization would be a model for all documentation packages to be developed by project teams.
3. To provide a simplified, yet comprehensive, method for creating and updating documentation.

First, the specifications
Since new project documentation generally follows a request from either a user department or the system development department itself, a standard form authorizing the initial study and subsequent authorization to proceed should be mandatory. Purely from the standpoint of documentation, work will begin with the preparation of functional specifications. These should be mainly narrative and should cover such items as:

1. Background/brief history: a complete history of this system in-
including how the work currently is being processed.
2. Summary / objectives / scope: a brief but thorough description summarizing the objectives and defining the limits of the system.
3. Alternatives: a narrative of all alternatives including advantages and disadvantages of each and reasons for selecting the chosen approach.
4. Benefits/advantages/cost savings: a list of major benefits, etc., to be gained.
5. Conversion procedures: a procedural description for converting to the new system, if applicable.
6. Implementation plan: a step-by-step plan for installing and implementing the system, including personnel responsibilities.
7. Glossary: definitions of any unusual terminology or acronyms.
8. Detailed project plan: identification of the objectives in the system design and review phase.

Then, during the system design phase, technical specifications should be prepared. These should include the following items:
1. A systems narrative: including a detailed description of all necessary procedures and instructions.
2. A system flowchart: to reflect processing steps and relationships of inputs and outputs to the processing steps.
3. Document identity: including data concerning source, input, and output documents. Identification may be by title, form number, report name or number, etc.
4. Source document samples: including actual samples from originating departments.
5. Report samples: hand-drawn or typed facsimiles of proposed computer-produced documents.
6. Data layouts/item designs: these deal with record-level information and should include name, length, and type (alphanumeric, etc.) of each data element.
7. Input control procedures: these may be narrative and should explain all procedures for control of source documents, including accountability.

At the operations level, the following items should be considered necessary:
1. Report balancing instructions: the quantitative data to be balanced (dollars, hours, etc.), where to obtain the data, where to enter it, and how to handle out-of-balance conditions.
2. Report distribution: this should include a copy of each report plus a report specification sheet that contains report name, run day, type of paper, sheet volume, retention information, etc.
3. JCL lists: listings of the commands necessary to control the job.
4. Halt/console messages: this should reflect the halt code or message, its cause, and the suggested operator action.

The master manual
In the typical dp installation, the documentation standards package should provide information covering: (1) user/management, (2) systems history and design, (3) programming, and (4) operations. Rather than create a separate manual for each, we created a single master manual which incorporated all the data pertinent to all of the sections. In addition, we prepared utility manuals which included only those items useful to user departments and computer operations.

This is the point where the work began for the documentation unit. This group had to collect, develop, and modify all the items of information that were to become the nucleus of the standards package.

The next step was for the documentation manager to evaluate all items collected, combining similar ones, eliminating others, and deciding which ones could best be consolidated on preprinted forms (here knowledge of forms design was desirable). When the list of required items was reduced to a workable size, the next step was to decide the applicability of each item to the basic information areas (user/management, systems history and design, programming and operations) to aid us in distribution.

To be useful to systems personnel when they are assembling their documentation, the list of required items had to be formalized on some kind of preprinted worksheet. Fig. 1 shows one effective documentation control tool, the documentation checklist. It is suggested that a checklist be tailored to the individual needs of your organization, but there are some basic things it should accomplish:
1. It should identify all documentation requirements of a system.
2. It should serve as an index or table of contents for the systems package throughout all stages of development.
3. It should show what items are required before approval for the package can be sought.
4. The checklist should serve as a reminder of what is completed and what isn't, allowing the documenter to do other work and then return to the documenting, knowing where he is.
5. When an item applies to more than one area (systems, operations, etc.), the checklist should

Even the method of storing documentation should be kept simple using alpha ordering—with color-coded tabs for related products if the budget will stand it. Locked cases, sign-out procedures, and back-up microfilm all help ensure the right documentation will be there when required.

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DOCUMENTATION

eliminate the possibility of duplication.

After all items on the checklist have been accounted for by the documenter, they are turned over to the documentation unit in rough draft form. It is advisable to include a cover sheet which can supply such information as: the submitter's name, phone extension, and whether there is a critical completion deadline.

Following review (for accuracy and completeness), finalization (forms typed, flowcharts drawn, and pages numbered and dated), printing (as a manual), and distribution to users and operations, it is suggested that the original manual and one back-up copy be stored alphabetically in the documentation library.

Working with "live" systems

As an aid in documenting "live" systems, at American Mutual all systems and programming personnel receive a documentation standards manual which is organized as a model for future systems packages. Included in the standards manual are: documentation preparation requirements, review and finalization information, chargeout procedures, update submission procedures, country-wide distribution information, scheduling, interface (between two related systems) procedures, and checklist information.

The thing that makes the standards manual so effective is that it provides an actual "live" example of each item on the checklist. A programmer/analyst who follows the manual page-by-page should be able to effectively document or update a system with minimum assistance from his project manager.

Occasionally, when it's advisable to make a change to the standards manual, the new page(s) carrying the latest revision number should be distributed to all holders of the manual. To ensure accountability, standards manuals should be listed by each person's name and manual number on a master list maintained by the documentation unit. As revisions and changes take place in a system, the documentation unit can handle these in a manner similar to preparation of the original manuals, distributing updates to all holders of that manual. It is then the responsibility of the manual holder to insert the update in the proper location in his manual immediately upon receipt of the change. (Unscheduled audits of manuals help to ensure compliance.) The documentation unit sees to it that the library masters (originals) and back-up (working) copies are up to date.

Keep all updates involving narrative information on some word processing medium.

The following are some effective procedures that may be used to enhance maintenance and development of production documentation.

1. Use a simplified storage medium for all systems manuals in the library, such as alphabetical filing. Consider ease of accessibility when deciding where to store the manuals.

2. Store material securely in three-ring binders or some other folder that allows for front and side identification tabs indicating the system name.

3. If the budget will stand it, use color-coded tabs for systems packages that fall in the same

Fig. 1. Checklists simplify things. This one is for the programmer or analyst to use in assembling the documentation for a new system or for an update. Most of the elements called for on the list can be supplied on standard forms too, which keeps documentation consistent and makes its generation that much easier.

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From the company that makes technology affordable.

The Model 770 Intelligent Terminal is a powerful system designed to meet your distributed processing needs. Better than sending your data to your host by mail or tele typewriter, better than entering it by keypunch or key-to-disc, the 770 provides the ideal, cost-effective solution for source data entry, data pre-processing and communications for your distributed processing applications.

Reduces your communications costs.
The Model 770 removes a substantial burden from your host computer and reduces your data communications costs. By pre-processing your data on the spot, errors are reduced, and speed and accuracy are increased. Additional communications savings can result by transmitting batched data at high speed during unattended operation when line rates are lower.

Totally integrated package.
The Model 770 terminal includes all the components of an entire system. It has features like dual mini-cartridge tapes, a 1920-character video display and up to 48K bytes of memory. And it’s the first video display-based intelligent terminal on the market that offers a built-in 80-column printer.

For multi-copy and 132-column capability, TI’s compact, microprocessor-based Model 810 impact printer is also available.

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Model 770 terminals are easy to program and operate with TPL 700, the flexible, powerful Terminal Programming Language. TPL 700 is a high-level business-oriented language that greatly simplifies forms generation and procedures for data entry and local processing. Programs can be developed interactively on the 770 without ever writing lines of code.

And, of course, TI offers total service and support, including flexible maintenance plans and a nationwide network of factory-trained customer service engineers. For your distributed processing needs, TI clearly has a better solution. For more information, mail back the coupon. Or call your nearest TI sales office or Terminal Systems Marketing, (713) 494-5115, ext. 3116.

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August, 1977
4. Keep all updates involving narrative information (especially those that have frequent updates) on some kind of word processing medium such as "mag cards" to facilitate updating.

5. Using the checklist, prominently display an item number in the upper right hand corner of each documentation page. The page(s) of each checklist item should be numbered independently (each item starts with its own Page 1) to facilitate updating as item changes take place. Also, to prevent confusion between prior pages and replacement pages, all pages should be date stamped (lower left hand corner) to indicate data of publication.

6. Keep supplies of preprinted forms readily available.

To ensure orderly and timely disposition of the documentation packages, it is advisable to establish a schedule for submission, review, and distribution. As new projects are initiated and updates to existing packages are received, add these to the unit's work schedule.

When management sets a completion date for a new project or a change in an existing one, documentation time should be built into that schedule. Documentation preparation should be ongoing, not left till the end. When the project manager announces completion of a system change, the documentation must be given to the documentation unit for review. Until this is done, the job should be considered incomplete. Copies of schedules should be supplied to operations, too, to ensure uniformity of workflow between the systems and the operations departments.

**Keeping it secure**

Systems documentation should be maintained with reasonable safeguards. The recommended method is to have a hardcopy library under the care and control of the documentation unit staff. It should be their responsibility to update system packages as changes are submitted by departmental personnel. Access to systems manuals should be controlled through a sign-out procedure and should be restricted to those directly involved with the maintenance of the system.

At American Mutual, documentation manuals are locked up at the close of each business day. Manuals that have been charged out to departmental personnel need not be returned at day's end, but must be kept in desks. If someone needs a system manual after-hours or on weekends, he can contact the Building Security staff which has duplicate keys to all storage cabinets. But no originals of manuals leave the building without prior approval of the documentation manager.

As each new systems package is developed, the original and a working copy are placed in the documentation library. The original is closely guarded and the working copy is charged-out to personnel as needed.

Twice yearly, all production packages are microfilmed and the film is stored at a remote location. Between filmings, extra copies of all hardcopy updates are packaged monthly and stored on-site in a flame-retardant vault. Should a physical disaster occur, we can recreate all systems documentation in two steps: first, convert the most recent microfilm to hardcopy; second, combine the hardcopy (from microfilm) with the interim updates. And we're back in business. (Incidentally, the cost of microfilming and possible conversion to hardcopy is very reasonable.)

An operating guide for each production system should be maintained in the computer room. It should include all operations items indicated on the checklist (See Fig. 1). Responsibility for updating the operations manuals (as new information is generated by the documentation unit) should be the responsibility of the operations unit and someone should be delegated to carry out this task. (It is inadvisable to delegate the updating of manuals to computer operators.)

As with most computer rooms today, the one at American Mutual is kept locked at all times. Personnel who work there have keys, others who need to enter the area follow a rigid sign-in/sign-out procedure. Because of the degree of security exercised in operations, we are able to use an open-shelf filing system there.

To ensure the integrity of the information contained in the operations manuals, the documentation unit conducts unscheduled audits in which they check a particular system's operating guide against the original in the documentation unit. Any discrepancies in the operations manual must be explained and justified.

**Finding the people**

The documentation staff consists of a manager, a documentation assistant and sufficient typists/aides to handle the workload. In selecting personnel for this program, it makes sense to select as documentation manager a person with sound experience who has a reputation for thorough and complete documentation of any systems projects with which he or she has been involved. The technical expertise required by the documentation manager and/or his assistant will vary by organization. If you have a strong technical advisory staff that can be supportive in establishing technical standards in addition to the review of program listings to assure continued standards compliance, you can employ someone with administrative talents rather than a data processing technician. Skills in such areas as technical writing, forms design, record keeping, or communications should all be considered pluses in selecting the individual who is to be in charge of the documentation unit.

As with programming, the workload doesn't taper off as systems go into production.

Bear in mind, too, that the documentation load doesn't taper off as new systems go into production. As each system becomes documented and the physical number of systems increases, the balance simply changes. The amount of update documentation (to maintain these systems) will begin to exceed the amount required for new production packages. If each project—new development or maintenance—is planned properly and documentation is required as an integral part of future systems, there will always be plenty for the documentation staff to do. And plenty that the documentation staff can do for you.
Take a close look at the most cost-effective 4800-bps modem on the market.

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The SEL 32/35 can be configured from 64K bytes to 512K bytes of 900 nsec memory. Resembling its more powerful brothers, the SEL 32/35 is a complete package, including control processor with floating-point arithmetic, memory, chassis, power supplies and cabinet.

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Just circle our number on the Reader Service Card, or call us today. We’ll send you the powerful story of the SEL 32 family.
Penril's new 4800 bps microprocessor-based modem, the 48 MICRO, has comprehensive diagnostics that DO NOT require operator assistance at the remote end. These features allow checking of segments of your communications system using test patterns from an external test pattern generator, a business machine, or the modem's built-in test pattern generator.

A master 48 MICRO shows status of interface signals between modem and data processing equipment and provides controls and indicators for locally controlled tests. The master modem also shows status of interface signals between a selected remote modem and remote data processing equipment with controls for remote modem test mode configuration and displays of the response of the remote modem.

With the Penril 48 MICRO in your data communications system, you won't have tiresome and perplexing trouble locating network problems!
As the history of digital computing devices grows toward initial maturity, its cast of characters and contributors expands accordingly.

In the beginning few were called, but today many are chosen.

For now the number of those designing, building, selling, profiting from, programming, using, and suffering trauma as a result of computers equals the count of the hosts of Shishak, King of Egypt, before Jerusalem.

Clearly in such a mind-boggling number, there are some who serve unwillingly, who are present through mistakes of their draft board, who came seeking to avoid a greater horror. In brief, distasteful as it may seem, the data processing industry has, and has had, its appropriate share of misfits. It is to these lost souls that this recounting is dedicated, and for them it expresses concern and understanding.

* * * * * * *

JOE BFTSPLK
This gentleman got his name from the noted author, Mr. Al Capp, who correctly depicted him as perennially perambulating beneath a dark cloud.

Joe began his educational career as a major in physical education. In his sophomore year he suffered a separated knee cap while a member of the quoits team, and, sweating through a lingering recovery, changed his major to civil engineering, choosing a department with a momentary shortage of undergraduate candidates.

Joe obtained his degree in c.e., doing particularly well in courses in estimating and corporate billing, but being marginally low in transit placement and operation, and in slope calculation.

He was fortunate in being hired, upon graduation, by a progressive firm that made use of a capable, albeit rudimentary, drum computer in engineering calculation. By the time the senior partner discovered that it was indeed Joe's error of a trivial 53 square miles in a survey for which he was responsible which had brought on the lawsuit bankrupting the firm, Joe had inflated his resume to the point where he was already gone, and headed up software development for a manufacturer of computers.

Since Joe knew nothing about software, other than how to spell it correctly most of the time, he had to do a most vigorous song and dance in this particular management position. By the time top management found out, three years into the current major project, that software development was already more than two years behind schedule, Joe had become the vice president, development, of a software firm.

When the over-inflated stock of the software firm had fallen completely off the board and onto the floor with the rest of the waste paper, Joe had moved on to become the senior corporate honcho of computing with a leading supplier of important devices.

Joe is still in this respected position, and is much listened to because of his important-sounding vapid pronouncements. Some of his junior employees seem actually to believe that he is God, and they have formed a small church in the vicinity of the plant where his image, portrayed incorrectly under a silver cloud, is on continual display.

Joe seems to be at ease, but his close associates occasionally note that he is careful never to look up.

DEAN DECISIVE
Dean was sent to a leading university through the Ph.D. level by doting parents. He went into the blossoming field of digital electronics with a high rank and much respect from day one.

In the shuffle of divisions, companies, mergers, acquisitions, etc. in which Dean was a participant, he was always at the vice presidential level. But after years of changes, and shuf-
All at once, it’s Harris.

Harris now delivers the most cost/performance effective multi-use computer system in the industry.

Our new family of high performance systems—S115, S125 and S135—together with our powerful VULCAN Virtual Memory Operating System supports more than 50 terminals. Simultaneously.

This is a whole new line of medium-scale, multi-use systems with increased reliability and new state-of-the-art technology. You get greater I/O throughput. MOS memory with error correction. Powerful microprocessor based CPU. Broad selection of highly reliable peripherals. And all operate with ANSI 74 COBOL, FORTRAN, RPG II, FORGO, SNOBOL, and extended BASIC.

The Harris S100 systems take on many different jobs all at the same time. Multi-stream batch processing. Multiple concurrent RJE’s, both host and remote. Multiple interactive time sharing. Real-time processing. And this new generation of high performance computer systems from Harris delivers these all to you, concurrently.

If your need is distributed processing, time sharing, data base management, or any type of concurrent multi-use application, benchmark our new computer system against any other system in the industry.

Harris Computer Systems, 1200 Gateway Drive, Fort Lauderdale, Florida 33309. Telephone (305) 974-1700. Europe: Harris Intertype, Ltd., 145 Farnham Road, Slough, SL1 4XD, England.

All at once, it’s Harris.
with time or people. He is driven to corner the market in 15 minutes, never mind the cost. And his long trail of consummate crap outs is a monument, not only to himself, but to the skill and wisdom of professional investor/stockholders.

Today Fred sits in the park playing checkers daily with the other park inmates. He gives speeches, wonderful to hear, on how the world ought to be organized, and on how he could corner all the action in 15 minutes if there were just some way to get the idiots out of the line of fire.

GUS GENIUS
Gus was the sole designer and guiding light of several of the very best early-day computers. In a great financial merging, the company which had been built primarily upon Gus’ skill was made a part of a much larger company, and Gus was promoted up to the headshed as executive v.p. of technological pontificating.

In the new scheme of things, all was done by committee, but Gus was poor at committee work. He took to long, three-martini lunches which soon became seven-martini lunches, and breakfasts, brunches, and suppers. Gus got so far into the sauce that it typically took two young men accompanying him everywhere to keep him from bodily harm.

Gus was much sought after as a speaker, and, after a friendly assistant had carefully guided him to the podium, he underwent a remarkable metamorphosis, giving forth with some of the most wise and brilliant words ever heard about digital electronics. But as soon as he finished being on stage, he crawled immediately back in the bottle.

Gus dropped instantly dead of a massive heart attack while waiting to register in the lobby of the Jack Tar Hotel. Fortunately for the world, his conference fees had been prepaid.

ETHELBERT EXPERT
Actually Ethelbert retired immediately after his university graduation. His first job was with a rapidly growing think-tank, and Ethelbert soon became in charge of arranging, scheduling, and attending conferences. At each of these he was certain to have in a prominent place on the program a most impressive paper on some topic of vital human concern, such as "The Social Responsibilities of the Bit Register."

Ethelbert was the ideal man to sit on advisory boards, to testify before Congress, and to write prefaces for books. He was much quoted by the secular and technical press, especially for his in-depth observations on such questions as "Why are People?"

It is only fitting that Ethelbert should, today, head up the study efforts of a most prestigious research laboratory affiliated with a university of truly gigantic stature.

There, while his pronouncements are not as frequent as formerly, they are clearly more mature. Meanwhile, he continues work on his book, a magnum opus entitled "The If Bit Through Man's History."

BUSTER BACKROOM
Buster was born with a highly developed sense of proprietorship. He carried this with him into his various jobs as chief design engineer for a number of former companies.

Buster permitted only one expert in the vicinity, and he was it. He became noted for the brief tenure of a long list of competent people who reported to him. And his view of the rest of the world as having zero Need To Know extended especially to company top management. With Buster on the job these people had a continual struggle trying to know what remarkable item was to be next in their product line, but it is a tribute to Buster’s methods that they never found out.

Buster has moved on to the petroleum industry where he does fabulous and remarkable, albeit secret, things. He is well-remembered in electronics, however, as the true inventor of the black box.

Author’s note It has been my rare privilege to know many wonderful, fine, and fascinating people in the computing industry. But as man is usually beset by the need to live in his own, self-generated circumstance, we can, on occasion, find the square peg crammed into the round hole.

None of those so shamelessly depicted here are "real" in the sense of being particular individuals, past or present. But their characteristics have been, and possibly still are, known at various places and times.
What makes General Electric's new UPS a breakthrough in reliability?

Its brains.

The electronic brains of General Electric’s sophisticated UPS (Uninterruptible Power System) provide computer operation centers with an improved level of protection against power problems.

These brains command the UPS to take input power disturbances in stride. And they go a step beyond to provide a continuous, regulated ac supply to the critical load.

The exclusive GE Logicenter continually monitors and analyzes the system performance. Independent, redundant communication networks assure continuity of service. And hard copy printout (shown above) provides an automatic report on any changes in the system operation.

Reliability. The kind of extra value you get in more than 40,000 GE control products in 80 product lines. Ask your GE sales engineer, or write General Electric Company, General Purpose Control Department, P.O. Box 2913, Bloomington, Illinois 61701.

There's more to GE control products than meets the eye

GENERAL ELECTRIC
Digital introduces DECstation.
A big computer system that's small enough for anyone.

Digital put an amazing LSI version of the PDP-8 inside a DECScope, added some ingenious interconnecting devices and created something new. The DECstation. A complete computer system big enough to do all kinds of work and small, simple and inexpensive enough to do it for almost anyone.

DECstation. A complete computer system in disguise. It looks like a terminal, but look again. The DECstation has a powerful general purpose computer, a video terminal, a dual diskette drive, and its own special operating system. What's more, you can hook up two different printers and a second dual diskette drive. Then put the whole thing in a mini-desk, and when you're done you'll have the smallest big computer you've ever seen.

The Video Data Processor. It's the big reason the DECstation's so small. The VT78 Video Data Processor is a computer wrapped in a terminal. Inside the familiar DECScope you'll find an LSI version of the PDP-8 with 16K words (32K characters) of MOS memory and built-in interfaces. Two serial asynchronous ports feature speeds from 50 baud to 19.2 kilobaud. A disk port interfaces with up to 4 diskette drives. A parallel I/O port for printers and custom interfacing provides data transfer rates up to 180 kilobits/sec. All standard.

You can go from carton to computer in less than an hour. If you can push a button, you can run a DECstation. Because one button is all it takes to start things up. The bootstrap and self-test routines are built in.

Put it together, plug it in, and immediately you can begin to run anything from the PDP-8 software library. Which means you start with one of the most comprehensive sets of software tools available in a small system. Including two proven operating systems: OS/78 for stand alone applications and RTS/8 for real-time. OS/78, an extension of OS/8, supports a number of languages, including FORTRAN IV and BASIC. So all you have to do is load the operating system and start programming your application.

Whatever that application, if you're looking for a sophisticated little system, at the right price, and a remarkable OEM tool, consider DECstation. $7995 each. $5436 OEM quantity 50.

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A typical meteorological satellite system pours out a wealth of digital data to be translated into weather forecasts. Temperature, wind conditions, humidity, cloud cover, solar flare activity and other weather factors are all reported in the constant transmissions.

But the job of digesting the billions of bits of data for the computation of weather forecasts can give even powerful conventional computers indigestion. That's where Goodyear's STARAN® parallel associative processing can help.

Ordinary digital computers process only one or a few discrete points of data at a time. But the STARAN system combines content addressability with parallel array arithmetic to process hundreds, or even thousands, of data points at once.

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Indifferent treatment by the vendor led to an annual savings of $17,500.

In September 1964, the Ministry of State for Urban Affairs in Ottawa, Canada, got the green light to acquire a minicomputer system to be used in a service bureau mode for scientific work.

A contract was eventually awarded to a mini manufacturer, one of the top two or three in terms of market share, to provide a system with several oem peripherals and two processors. Specifically, the minis were connected to a dual-spindle 2314 type disc unit. For back-up purposes, a card reader, a line printer and some telecommunication equipment were made switchable from one processor to another. One cpu was to work in a foreground mode while the other with three magnetic tapes was working in a batch mode.

The contract included the hardware, at a cost of approximately $170,000, and maintenance, which was based on 10% of the hardware cost per year.

Soon after delivery, the system was accepted and the total amount of the contract was paid in full. Without realizing it, from that time on we were at the mercy of our supplier for the maintenance of the system. Our mistake had been to include the maintenance contract in the original deal. (We did so because the money was available and we were at the end of the fiscal year. That's the way things happen in government agencies.)

During the first six months, the system was used to create new system software, modify existing system software, and on internal projects. The number of users was quite restricted and we could afford to divert our activities from the programming and debugging of computer programs when the system was not working satisfactorily. We learned during this time that the response time of the repairman of the company with which we were dealing was between a half to two working days.

From our point of view, we thought our maintenance contract was not being taken seriously: effective troubleshooting was not started before 10 a.m. and rarely extended beyond 3 p.m. In addition, if we were unfortunate enough to tell the field service representatives that a repair was not immediately required (such as one magnetic tape of the three giving parity errors), then things were never fixed.

Needless to say, we warned the local representatives several times that "things will have to change when we open the system to our users."

By the way, for those who believe this story is too bad to be true, at that time the distance between the computer and the office of the service man was approximately five miles. Later we both moved and that distance got...
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shortened to three miles. So travel time was never an excuse.

Our system was opened to the users six months after delivery. As it became more heavily loaded we found we could not guarantee anything better than an average of three consecutive working days of down time every three months. And we obviously could not afford to turn our programmers away from the machine for that long a period, nor can anyone else in a service bureau environment, governmental or otherwise.

We soon tried almost all means in our power to improve the efficiency of our maintenance contract, but no appreciable or lasting results were ever noticed.

Seeing that there was no way that we could change the spirit of the field service, our next step was to try to find an alternative.

The first thing which came to our mind was to ask that regular checks be made on the system. We discovered that no preventive maintenance whatsoever was included in our contract and that if we wanted it we had to pay extra for it—even though we were paying nearly $17,000 per year for "maintenance services!"

Talks with our vendor led to a proposal stipulating simply that each week a repairman would run some tests for a fixed monthly cost. Nothing in the proposal even mentioned which tests were to be run and for how long. Obviously this pass was discarded.

Our next step was to get involved ourselves.

Getting involved

We had noticed that the first thing the repairman did on coming to our site was to run reliability tests to see if any anomalies could be detected; we found that we could do this easily.

With no more background than that, we established a procedure whereby we would run overnight tests every week in the following rotation:

memory week 1
cpu week 2
discs week 3

The reason for choosing the above tests is that an undetected fault originating in the memory or the cpu or during the transfer of information to or from a disc has a good chance of becoming catastrophic for the system. This is the kind of fault we were after. Faults originating from the card reader, the line printer, magnetic tape units, etc. could be detected almost immediately anyway, so we decided to adopt the wait and see attitude for those parts of the system. At any rate, after several months of operation we saw that most of our problems were due to faulty memory boards, not from electromechanical components.

With our increased involvement in hardware maintenance, things were going a little bit better and the repairman from our original contracting firm was apparently pleased. (He should have been; we were doing his work for him.) However, we were not quite satisfied. Once we localized a fault in the system, the next step was to isolate the bad component or unit and if possible reconfigure the system in a degraded mode of operation. Then we could send the bad component for repair, wait until it came back, and reinsert it in the system. We thought that with this solution we could benefit from having a stock of repaired and adjusted parts, but were reluctant to jump all the way into doing our own work.

Forcing our hand

Once we developed our "do it yourself" capabilities we were almost at the end of our original maintenance contract and not in a mood to extend it. Prices were up, too. We were told that our maintenance contract was originally set up at 1964 prices and in early 1966 an increase was seriously considered by the vendor.

We decided to go shopping around for suitable maintenance firms willing to trouble-shoot our equipment on an on-call basis. This solution promised to be much cheaper than the full parts and labor maintenance contract, and could be tried without risk; after all, we had nothing to lose with respect to response time and repair time. In the meanwhile, with part of the money saved by not paying for maintenance we decided to buy one or two extra memory boards and wait.

However, our top management thought that the story sounded a little bit like a fable and they were heavily in favor of a maintenance contract negotiated with our original contractor.

Administratively, logically, and on paper, the full parts and labor maintenance contract sounds like stability, security, and relief. But should things go wrong, as was expected by the working level staff, a major accusation would have been brought up. We knew
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what it would sound like: "This minicomputer system should have never been bought to be used as a data-processing center for the Ministry." And this would have been the coup de grâce for the mini center.

For a while some negotiations were carried out to define a fool-proof contract which, among other things, would have given us total assurance—on paper—that the response time of the field serviceman and the mean time to repair were well within a working day.

Estimates for the cost of such a contract were well over $25,000, but a written proposal never reached our desk. Our impression was that our contractor would not enter into such a deal. Their idea, as we understood it, was to sell us their standard maintenance contract again with the assurance that things would get better "within the next six months."

It was nice to hear comforting words but how much credibility could we give them?

Fortunately or unfortunately, at the time that a decision should have been made, the Ministry was being reorganized and this gave us the time to prove that doing the management of the maintenance ourselves—finding the bad component and selecting the right maintenance firm for the right equipment—was a cheaper alternative than vendor service, and would lead to a higher availability of the mini system for our users.

If the hardware has a bug, it's certain to get worse.

Profiting from the fact that for a while things were unsettled in the Ministry, it was relatively easy to enter into selecting and requesting the services of maintenance firms and to switch from one to another for better service.

Finding our way

So, suddenly we are maintenance men.

The cyclic tests run on memory, cpu, and discs make us somewhat confident that the system will be fairly reliable, but the worst can always happen, an undetected bug which turns out to be uninterpretable by our diagnostics. The time required to diagnose an intermittent fault is potentially very long, but it would be for the outside serviceman as well.

It has been our experience that the first indication of any kind of a fault is the progressive destruction of the system software residing on disc. So, as soon as we suspect something is going wrong, we recreate a system disc. Using a 2314-type unit, this takes less than 15 minutes, including restart.

The recreation of a user disc takes much longer, from one to two hours for a three-quarters full disc. However, this procedure is rarely necessary since we separated the user disc files from the system disc after noticing that the user disc rarely gets clobbered. During prime time we have had to reconstruct up to several user files, however; this causes us to interrupt our batch processing for 15 to 45 minutes, depending on the situation.

Should a disc, or a processor, go down completely, we are still not completely stymied. We can load data onto the other disc and/or operate with a single processor. The possibility of the whole system going down at once is rather remote.

Admittedly, once in a while. It is a great while we are faced with a problem we cannot trace to the hardware, operating sys-

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known results. So far these runs have not found anything wrong, but they do reassure the users that problems being experienced are not due to faults in the system.

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Saving $17,500 per year

We have now been doing our own maintenance management for a year, the second year of our operation. The cost to maintain the system has not

The low price of minis has been to the detriment of the support provided.

been over $2,500 (while a 9-to-5 parts and labor service contract would have run not less than $20,000). During that year we have used the on-call services of four maintenance firms in Ottawa. Our availability, measured as a percentage of prime shift time, has been 97% to 98%. Not bad for non-professional maintenance managers.

Pessimists are quick to say we've been lucky. This may be partly true, as we've never had a head crash, for instance, or run into problems in the electronics of the printer. We think our "good luck" has been due to the fact that our equipment was well engineered to begin with, and that we have attempted to work around—even reprogram around—errors we could not fix immediately.

In our one year of operation, we have made practically no investment in maintenance; the exception being one extra memory board purchased for under $5,000, plus my time and that of a programmer/operator.

However, we have three potential areas of exposure: the single line printer, the single disc controller, and the dual cpu's (both are needed for our present mode of operation). For $70,000 we could back up all these pieces; for an additional $30,000 we could back up the discs too, making the configuration nearly completely redundant and giving us more processing power to boot. Since we're talking about minis, the cost of redundancy isn't all that high.

For several years now, prophets have been announcing that minis would soon take over a good share of the large computer market. That day has not yet come. One reason is that mini systems have low prices, and this is to the detriment of the support provided the users. That support has not been geared toward non-professionals who don't know how to fix their own problems. However, the minicomputer field is close to being a goldmine for persons who are willing to learn how to do some of their own maintenance, or are willing to find ways to live with some of their problems for short periods. And it isn't that hard to do.

Mr. Francois is computer systems chief at the Ministry of State for Urban Affairs in Ottawa, Ontario, Canada. He has previously worked for the Ministry of Transport, for Quebec Hydro, Control Data, and at the ground station of Telecommunication by Satellite, in Pleumeur-Bodou, France.

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August, 1977

CIRCLE 76 ON READER CARD

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And count on the lowest cost per terminal. Available now, General Automation’s new 440 Data Series, starting below $45,000, recognized for the best price/performance package in the computer field: “...it always works...far superior to any other full systems less than $80,000. Any comparable system will cost over $175,000.”

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CIRCLE 18 ON READER CARD
A Survey of Hardware Maintenance Firms

by Michael Cashman, Technology Editor

There are alternate sources for maintenance services for almost anyone using name-brand equipment in or near a major city. Here are 45 of them.

So you're unhappy with the maintenance being performed on your present equipment and are considering another source for your needs? Or you are responsible for maintenance of a small system your new company is selling, and you're wondering which vendors might be able to lift the maintenance responsibility from your shoulders?

This survey is intended to help you in either case, for changing maintenance sources or arranging for them in the first place is not a step taken easily. To a great extent, the performance of your system bears a direct relationship to the quality of the maintenance performed on it.

The survey is an attempt to list all major maintenance firms in the 50 largest cities in the U.S. (according to the 1970 census), excluding vendors that concentrate on unit record equipment service.

We have excluded associations, and have tried to "shop" for this list the same way you might: by calling some companies we thought might be in the business; talking to very cooperative people at companies we knew were in the business; and finally, in an effort to build as complete a survey as possible, spending several hours scanning the Yellow Pages of the 50 largest cities.

This last search helped us pull out a number of very small vendors we would have ordinarily missed, but wasn't totally satisfactory because a few directories (including Boston, Dallas, Houston, Tulsa, New York, San Antonio, and St. Louis) lumped all data processing references under a topic generally called "Data Processing Services, Supplies," and trying to separate the maintenance firms from everyone else was just too much walking for our fingers to do. Maintenance vendors in those cities would do themselves and their potential customers a favor by attempting to get the phone company responsible to break out the maintenance listings. It should be noted, too, that many companies claiming to be in most cities around the country don't show up in the Yellow Pages.

And, as in all surveys, a number of companies could not respond quickly enough for us to determine whether they were even in this industry, and those companies have been excluded. Given their non-responsive. one might not wish to deal with them anyway.

In all cases, the vendors were contacted and interviewed directly by us. Their representatives have provided the information contained in this feature, and are basically responsible for its accuracy.

The survey will primarily interest users who have purchased equipment,
especially those who have purchased equipment from a mix of manufacturers. This is where a great portion of independent maintenance is performed, and most maintenance vendors interviewed let it be known that they “love” mixed-vendor installations.

Users of rented or leased equipment should check with the company policies of their equipment supplier. In many cases the use of an alternative maintenance source will void the equipment warranties, but some users have been willing to risk this providing they could get adequate service on their equipment. That isn’t always possible with many vendors, especially for some mainframes. Independent maintenance vendors were nearly unanimous in their praise of IBM for that firm’s cooperation in supplying parts and information required to work on IBM systems. But specifically noted for lack of cooperation—not listed in any particular order—were Burroughs, Honeywell, and NCR.

Two listings are presented here. One is a city-by-city survey of the 50 largest cities, showing which vendors claim to have offices there. (We had to take them at their word except in instances where we could show that the vendor did not, in fact, have even a White Pages phone listing there!)

The vendor names listed under the city name then can be looked up in the services list for a profile of the company and what it claims it does or can do. You’ll find firms in the listings ranging from multimillion dollar companies that do only maintenance, to electronics houses willing “to work on anything so long as we can get our hands on the schematics”—which in many cases, as already pointed out, they won’t be able to do.

Some of the vendors perform maintenance at “your place,” others have to do it at theirs—an important point to bear in mind when screening them. Also important to remember is that not all services listed are offered at every branch office, and not every last piece of equipment they work on was mentioned. Also, some offices are in towns we can’t identify as suburbs of the 50 largest cities, so those locations have been listed under the vendor profile sketches, together with other cities which do not rank in the top 50.

A corollary to all this is that no service firm is listed unless that firm has at least one office in one of the top 50 cities. So we offer our apologies to the “Farmer's Tractor, Combine, and Computer Repair Services” of the world, many of which we realize are seriously in business although difficult to find.

And finally, in reading the information, remember that we printed what they told us. For example, some vendors may take “installations” to mean pieces of equipment. But by and large the numbers should place the vendors in perspective.

The third party maintenance business is a troubled one. It has never seen the popularity (read profitability) predicted for it earlier in the decade when it began to take hold, and many companies have given up trying to make money at it, including University Computing, Comain Corp., and others. Many of the numbers currently listed in the Yellow Pages lead to intercepted calls and “I don't show a current listing” epitaphs. And it seems that companies like Comma, which tried to go head-on against IBM in providing maintenance on IBM systems, might have succumbed had it not found a home under Control Data’s wing. Other vendors like Sorbus and Ford Aerospace & Communications found refuge in doing much of their maintenance for other parts of their own corporate empires.

On the other hand, the future would seem to be brighter for the survivors than it was three years ago. The microprocessor/microcomputer boom hasn’t escaped their attention, and they know that as these devices get into more and more critical applications, somebody is going to have to perform maintenance on them. And systems houses that are only interested in serving a specific locale, or vertical application, will undoubtedly use the independent maintenance companies until they can build up their own maintenance force. Perhaps the frustrations that led one vendor to state that it should have had its corporate head examined “before getting into this business” are easing.

### SOME MAINTENANCE SOURCES
### IN THE 50 LARGEST U.S. CITIES

**Atlanta, GA**
- **Comma**
- Dyneics
- **Formation**
- General Electric IS & E ICE
- Information and Control Systems
- Integrated Automation
- Memorex
- Pertec
- Raytheon Service Co.
- RCA Data Services
- Sirvess
- Sorbus
- Syntonic Technology
- Telefile Computer Products

**Baltimore, MD**
- **Comma**
- General Electric IS & E ICE
- J.H. Leskin Associates
- Memorex
- Pertec
- Raytheon Service Co.

**Buffalo, NY**
- General Electric IS & E ICE
- Memorex
- Raytheon Service Co.
- RCA Data Services
- Sirvess
- Sorbus
- Syntonic Technology
- Telefile Computer Products

**Boston, MA**
- **Comma**
- General Electric IS & E ICE
- Memorex
- Pertec
- Raytheon Service Co.
- RCA Data Services
- Sirvess
- Sorbus
- Syntonic Technology
- Telefile Computer Products

**Cincinnati, OH**
- General Electric IS & E ICE
- Memorex
- Pertec
- Raytheon Service Co.
- RCA Data Services
- Soffbus
- Syntonic Technology

**Chicago, IL**
- **Comma**
- DP Service
- Ford Aerospace & Communications Corp.
- Information and Control Systems
- Integrated Automation
- Memorex
- Pertec
- Raytheon Service Co.
- RCA Data Services
- ServiTech
- Sirvess
- Sorbus
- Syntonic Technology
- Telefile Computer Products

**Cleveland, OH**
- CIG Computer Products
- **Comma**
- Formation
- General Electric IS & E ICE
- Memorex
- Pertec
- Raytheon Service Co.
- RCA Data Services

(Continued on page 107)
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<thead>
<tr>
<th>Vendor</th>
<th>Coverage offered</th>
<th>Monthly minimum charge?</th>
<th>Additional services offered:</th>
<th>Contract is usually</th>
<th>Agent for</th>
<th>Equipment serviced</th>
<th>Notes</th>
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<tbody>
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<td>Action Electronics</td>
<td>on-site or periodic</td>
<td>none</td>
<td>installation, relocation, consulting, Interfacing, diagnostics</td>
<td>vendor's</td>
<td>Harris Corp. and Wavetek</td>
<td>Harris terminals, Wavetek equipment, DEC PDP-11.</td>
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<td>Addéco</td>
<td>demand or temp, on-site</td>
<td>none</td>
<td>installations, relocations, site planning, diagnostics</td>
<td>vendor's or negotiated</td>
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<td>Minicomputer Systems</td>
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<td>Border Electronics</td>
<td>periodic or time &amp; materials</td>
<td>none</td>
<td>installations, relocations, site planning, warehousing, refurbishment, diagnostics</td>
<td>vendor's</td>
<td></td>
<td>DG Nova, Eclipse, DEC PDP-8 series, and peripherals; Lear Siegler ADM-1, 2, 3; Interton and Beehive crt's; DECwriter and Teletype model 33 terminals.</td>
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<td>Comma</td>
<td>on-site, temp, on-site, time &amp; materials, periodic</td>
<td>none</td>
<td>installation and relocation</td>
<td>vendor's, or negotiated</td>
<td></td>
<td>Hazeltine, GE Terminet terminals; DG Nova, Interdata 16- and 32-bit minis; Wangco, Diablo, Ampex discs; Tally, Okidata printers; Mohawk data preparation equipment; Beehive terminals.</td>
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<td>Communications Engr.</td>
<td>on-site, temp, on-site, time &amp; materials</td>
<td>not usually</td>
<td>system design, refurbishing, site planning</td>
<td>negotiated</td>
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<td>Beehive terminals plus DG Nova minis.</td>
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<td>Compusetics</td>
<td>on-site or time &amp; materials</td>
<td>none</td>
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<tr>
<td>The Computer Room</td>
<td>on site, temp, on-site, periodic</td>
<td>none</td>
<td>installation, relocation, site planning, customizing, reconditioning 360/370</td>
<td>vendor's</td>
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<td>360 (models 22, 25, 25, 30, 40, 50, 65) &amp; peripherals; all 370 series and peripherals.</td>
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<td>Cptr. Hardware Maint.</td>
<td>on-site, temp, on-site, time &amp; materials, periodic</td>
<td>none</td>
<td>installation, relocation, site planning, diagnostics</td>
<td>vendor's</td>
<td></td>
<td>Univac 1108 &amp; peripherals; DECsystem 10 &amp; peripherals; DECwriters and ADDS 5805/5805 terminals; Lear Siegler ADM-1, ADM-2, ADM-3 crt's.</td>
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<td>Cptr. Hardware Support</td>
<td>time &amp; materials or periodic</td>
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<td>Data Force Service</td>
<td>on-site, time &amp; materials, periodic</td>
<td>none</td>
<td>installations, relocation, site planning, customizing, diagnostcis</td>
<td>negotiated</td>
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<td>All DG Eclipse and Nova minis; DEC LA38, LA180, LASS printers; Micordata Reality; Data 100 systems; Digital Computer Controls products; Konerl minis; Wangco discs; Printronics, Centronics, and Data Printer printers.</td>
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<td>Data Systems</td>
<td>on-site, temp, on-site, on-call, time &amp; materials</td>
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<td>DP Service</td>
<td>time &amp; materials</td>
<td>depends on machine</td>
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<td>DP Services</td>
<td>on-site, time &amp; materials, periodic</td>
<td>depending on machine &amp; location</td>
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<tr>
<td>Equipment serviced</td>
<td>IBM 5100 and S/3, DEC PDP-8 and PDP-11, DG Nova, micros, Imal, DEC printers, Research crt terminals, Centronics printers, Qume &amp; Diablo printers, Lear Siegler ADM-2, ADM-3 crt's.</td>
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<tr>
<td>Digital Systems</td>
<td>on-site, temp, on-site, on-call, time &amp; materials</td>
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<td>Marshall disc, Mohawk equipment, Juki equipment, most IBM peripherals (except typewriter), and IBM 1401 cpu's.</td>
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<tr>
<td>Equipment serviced</td>
<td>IBM unit record equipment, Tab Products, Tion equipment, Graphics computers.</td>
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<td>Vendor</td>
<td>Coverage offered</td>
<td>Dynetics</td>
<td>Engr. Service Systems</td>
<td>Ford Aerospace</td>
<td>Formation</td>
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<td>Vendor</td>
<td>Monthly minimum charge?</td>
<td>time &amp; materials or periodic</td>
<td>none</td>
<td>on-site, temp., on-site, time &amp; materials, periodic</td>
<td>none</td>
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<td>Additional services offered:</td>
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<td>installations, relocations, site planning, refurbishing, diagnostics</td>
<td>none</td>
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<td>vendor's, customer's, or negotiated</td>
<td>site planning</td>
<td>vendor's, customer's, or negotiated</td>
<td>vendor's or negotiated</td>
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<tr>
<td>Equipment serviced</td>
<td>Equipment serviced</td>
<td>Wanco tape &amp; disc formats and drives; DG Nova; DEC PDP-8; Data Printer, Centronics, Data Products, Versatec printers; and most tape drives.</td>
<td>All DEC PDP-11, PDP-8, PDP-12; DECsystem 10 SS-310; DG Eclipse, Novas, Superminis; Martin Wolfe systems; interdata 16- and 32-bit equipment; Kennedy and Pertec tape drives; Diablo, Ampex, ISS, Memorex, Diva discs; Standard and Flessey memories; DECwriter terminals; Delta Data CRT's; Telecopy by's; DECscopes; DEC graphic systems; NCR 386 accounting machines; NCR 657/658 tape drives; CalComp 216-type drives; Burroughs L6000 and L7000 systems.</td>
<td>IBM 360, 370, 1400, 7000 series and peripherals; DEC PDP-11, PDP-8, PDP-16; General Automation, Westinghouse, DG Nova minis; Mohawk printers; Telex tape and disc drives; Ampex, CMI, FMF memories; CalComp discs; Storage Technology tape drives.</td>
<td>DEC PDP-11/70, RDA Spectra, and associated peripherals.</td>
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<td>Vendor</td>
<td>General Electric</td>
<td>Integrated Automation</td>
<td>Information &amp; Control</td>
<td>J. H. Leskin Assoc.</td>
<td>Minnetek</td>
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<td>time &amp; materials or periodic</td>
<td>on-site, temp., on-site, periodic</td>
<td>time &amp; materials</td>
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<td>Additional services offered:</td>
<td>installations, relocation, site planning, refurbishing, diagnostics</td>
<td>installations, relocation, site planning, refurbishing, diagnostics</td>
<td>installations and site planning</td>
<td>warehousing and site preparation</td>
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<td>Contract is usually</td>
<td>Contract is usually</td>
<td>vendor's, customer's, or negotiated</td>
<td>vendor's</td>
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<tr>
<td>Agent for</td>
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<td>Metromation</td>
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<td>Management Computer Systems</td>
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<td>Equipment serviced</td>
<td>Equipment serviced</td>
<td>DEC PDP-11; Honeywell H-316, H-316 minis; CDC discs; Hazeltine CRT's; and associated thermal printer and cassette; Lockheed System III; Printec printer; Pertec disc; GE Terminals; no Teletype.</td>
<td>DEC PDP-8, Centronics, Data Products; DEC printers; Data 100, Lockheed Sue computers, Pertec discs, Pertec key-to-tape gear, Pertec data transmission equipment, some Singer point-of-sale equipment, Flexwriters and data collection equipment, Kybe tape perforators.</td>
<td>IBM, H-P, Interdata, DG, and DEC systems; Versatec, Printronics printers; Entrex equipment.</td>
<td>IBM, H-P, Interdata, DG, and DEC systems; Versatec, Printronics printers; Entrex equipment.</td>
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<tr>
<td>Vendor</td>
<td>Memorex</td>
<td>PERC</td>
<td>Pertec</td>
<td>Raytheon Service</td>
<td>Potter and Cambridge Memories</td>
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<td>Vendor</td>
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<td>on-site, on-call, temporary on-site, time &amp; materials</td>
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<td>on-call</td>
<td>on-site, temp., on-site, time &amp; materials, periodic</td>
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<tr>
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<td>none</td>
<td>none</td>
<td>none</td>
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<td>Additional services offered:</td>
<td>installations, relocations, site planning, consulting, diagnostics, refurbishing, warehousing</td>
<td>installations, relocations, site planning, refurbishment, diagnostics</td>
<td>installations, relocations, site planning, consulting, and refurbishing</td>
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<td>vendor's or negotiated</td>
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<tr>
<td>Agent for</td>
<td>Agent for</td>
<td>Vendor will not release data.</td>
<td>—</td>
<td>—</td>
<td>Numerous vendors (primarily vendor oriented)</td>
<td></td>
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<tr>
<td>Equipment serviced</td>
<td>Equipment serviced</td>
<td>IBM 370 models 158, 168, and System/3, 370 peripherals and communications processors (3700, 3705); DEC PDP-11 and associated peripherals.</td>
<td>DEC PDP-8 and PDP-11; DG Nova and Eclipse; General Automation 100, 200, 300 systems; CDC 1600, 3200 and peripherals; CDC 3320 disc; IBM 3270’s, 3280, 3380, 3930, 3931 systems and Sigma 1, 2, &amp; 3, 11 systems; IBM 942, IBM 6400; and Ivel, DG, Diablo, Xerox, Century Data peripherals.</td>
<td>Numerous vendors include: Caldata, Wanco, Concor, Molerex, Infotek, Ann Arbor Terminals, Docomation, GDI, Diablo, Calcomp, Memorex, Burroughs, Centronics, Data Products, Control Data, Printronics, &amp; Tally.</td>
<td>IBM 360 and 370 series; Honeywell 200 and H 2000 systems; Standard Memories, Cambridge Memories, Ampex memories.</td>
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<tr>
<td>Vendor &amp; Associates</td>
<td>Additional services offered</td>
<td>Tele-Tee Hawaii</td>
<td>Vendor</td>
<td>Additional services offered</td>
<td>Tele-Tex</td>
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Honolulu, HI
Tel-Tec Hawaii
RCA Data Services
Sorbus
Syntonic Technology

Houston, TX
Comma
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Dallas, TX
Comma
Communications Engineering Co.
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirsess
Sorbus
Syntonic Technology
Telefile Computer Products

Detroit, MI
Comma
Ford Aerospace & Communications Corp.
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
ServITech
Sirsess
Sorbus
Syntonic Technology
Telefile Computer Products

El Paso, TX
Border Electronics
General Electric IS&E
Memorex
RCA Data Services
Sorbus

Fort Worth, TX
Memorex
Pertec
Raytheon Service Co.
RCA Data Services

Honolulu, HI
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Tel-Tec Hawaii
Territorial Electronics

Houston, TX
Comma
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Indianapolis, IN
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Jacksonville, FL
Formation
General Electric IS&E
Integrated Automation
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus

Kansas City, MO
General Electric IS&E
ICE
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Long Beach, CA
(possibly handled out of Los Angeles offices)
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Los Angeles, CA
CIG Computer Products
Comma
Data Force Service Co.
Engineering Service Systems
General Electric IS&E
International Computer Equipment
Memorex
Perc
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Memphis, TN
Action Electronics
Formation
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Miami, FL
Computer Hardware Support
Formation
Integrated Automation
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Tymsahre Computer Maintenance

Milwaukee, WI
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Minneapolis, MN
CIG Computer Products
Comma
The Computer Room
Ford Aerospace Communications Corp.
General Electric IS&E
ICE
Memorex
Minnetek
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology
Telefile Computer Products

Nashville, TN
Formation
General Electric IS&E
Integrated Automation
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Newark, NJ
Comma
Formation
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

New Orleans, LA
Formation
General Electric IS&E
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Staff Computer Technology
Syntonic Technology

Norfolk, VA
Comma
Computer Maintenance
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Oakland, CA
BP Services
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Philadelphia, PA
Comma
Computer Hardware Maintenance Co.
Ford Aerospace & Communications Corp.
General Electric IS&E
ICE
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sorbus
Syntonic Technology

Phoenix, AZ
Addco
Business Products Services
General Electric IS&E
Memorex
Pertec
RCA Data Services
Sorbus
Syntonic Technology

RCA Data Services
Sorbus
Tymsahre Computer Maintenance

RCA Data Services
Sorbus
Syntonic Technology

Syntonic Technology
Telefile Computer Products
Tymsahre Computer Maintenance

Syntonic Technology
Telefile Computer Products

Syntonic Technology
Telefile Computer Products
Tymsahre Computer Maintenance

Tymsahre Computer Maintenance

Tymsahre Computer Maintenance
Rochester, NY
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

Portland, OR
Comma
Datatek
General Electric IS&E
ICE
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

St. Paul, MN
Comma
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

San Antonio, TX
General Electric IS&E
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

San Diego, CA
Computer Hardware Support
Datasyncs
Engineering Service Systems
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

San Francisco, CA
Comma
General Electric IS&E
ICE
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

St. Louis, MO
General Electric IS&E

Tampa, FL
Comma
General Electric IS&E

HARDWARE MAINTENANCE VENDOR INDEX

For more information about maintenance services, either contact the vendors listed below or circle the appropriate number on the reader service card bound into this issue.

ACTION ELECTRONICS, INC.
427 North Angelus
Memphis, TN 38112
(901) 272-3111
Est. 1975; 5 service employees
Sales $40K
Servicing 6 installations
Additional offices in Tupelo, MS.
FOR DATA CIRCLE 401 ON READER CARD

ADDCO, INC.
4542 W. Greenway Road
Glendale, AZ 85306
(602) 242-3195
Est. 1976; 2 service employees
Vendors will not release sales data.
Servicing 12 sites.
Additional offices in Baton Rouge, LA.
FOR DATA CIRCLE 402 ON READER CARD

BORDER ELECTRONICS, INC.
1704 E. Paisano
El Paso, TX 79923
(915) 532-2524
Est. 1974; 3 service employees
Vendors will not release data on sales or sites serviced.
FOR DATA CIRCLE 402 ON READER CARD

BUSINESS PRODUCTS SERVICES, INC.
1220 W. Alameda
Tempe, AZ 85282

Additional offices in 23 cities in TX, NM, LA, OK.
FOR DATA CIRCLE 406 ON READER CARD

COMPUTER HARDWARE MAINTENANCE CO.
Subs. of Compaq
370 Pheasant Run
Newtown, PA 18940
(215) 968-5900
Est. 1973; 15 service employees
Vendors will not release sales data.
Servicing 8 installations
FOR DATA CIRCLE 407 ON READER CARD

COMPUTER HARDWARE SUPPORT, INC.
P.O. Box 22234
San Diego, CA 92122
(714) 453-4688
Est. 1973; 5 service employees
Vendors will not release sales data.
Servicing 50 installations
FOR DATA CIRCLE 409 ON READER CARD

THE COMPUTER ROOM, INC.
3928 Beau d'Rue Drive
Eagan, MN 55112
(612) 452-2567
Est. 1975; 5 service employees
Vendors will not release sales data.
Servicing 50 installations
FOR DATA CIRCLE 409 ON READER CARD

SURVEY
Pittsburgh, PA
CIG Computer Products
General Electric IS&E
Instrumentation Industries
Memorex
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

St. Paul, MN
Comma
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

San Jose, CA
Comma
Computer Hardware Support
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

Seattle, WA
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
RCA Data Services
Sirvess
Sorbus
Syntonic Technology

Tampa, FL
Comma
General Electric IS&E

Integrated Automation
Memorex
Raytheon Service Co.
RCA Data Services
Sorbus

Toledo, OH
Memorex
Raytheon Service Co.
RCA Data Services
Sorbus

Tulsa, OK
General Electric IS&E
Memorex
Pertec
Raytheon Service Co.
Sorbus

Washington, D.C.
Comma
Ford Aerospace & Communications Corp.
Formation
General Electric IS&E
ICE
Memorex
Pertec
Raytheon Service Co.
Sorbus

Syntonic
Sorbus
Sirvess
General Electric
Comma
Pertec
Memorex
Raytheon
Ford Aerospace
North Carolina
Sorbus
Syntonic Technology
Tymshare Computer Maintenance

108
Gould's electrostatic printer/plotter is the fastest graphic hard copy peripheral available today for your Tektronix 4000 Series interactive graphic terminal. You get permanent graphics direct from the terminal in as little as 4 seconds, regardless of image complexity. In an on-line CPU configuration, you can plot at up to 3.25 paper in./sec. and print at up to 1600 lines per minute. Yet Gould's hard copy still possesses exceptional resolution and extremely high contrast. Only Gould offers you both unmatched speed and unsurpassed image quality.

And Gould lets you select a $0^\circ$ or $90^\circ$ image orientation at will. In $90^\circ$ mode, images are enlarged up to 72%. You are able to select 1024 or 2048 point sampling and high or low speed graphic operation, letting you optimize image size, resolution and speed.

As with all Gould systems, your software is all-Gould. You never need worry about third party variables.

Gould images don't deteriorate. The system requires no warm-up. Gould paper costs a fraction of silver paper. Up to 2 interfaces are accommodated in the plotter, allowing you to use it with up to 8 Tektronix terminals or 4 terminals and a minicomputer, or 2 minicomputer CPU's.

Your CRT work deserves the best hard copy you can get. You get it from Gould.

For more information and a sample graphic output, contact Gould Inc., Instrument Systems Division, 3631 Perkins Ave., Cleveland, Ohio 44114. Or Gould Advance Ltd., Raynham Road, Bishop Stortford, Herts, United Kingdom.

FOR FREE BROCHURE CALL GOULD TOLL-FREE AT (800) 325-6400 Ext. 77. In Missouri: (800) 342-6600
SURVEY

DATA FORCE SERVICE CO.
Subs. of Randal Data Systems, Inc.
2807 Oregon Ct. Bldg. F-6
Torrance, CA 90403
(213) 328-2950
Est. 1977; 8 service employees
No sales data available yet.
No number of sites data available.
FOR DATA CIRCLE 416 ON READER CARD

DATATEK CO.
604 N.E. 21st Street
Portland, OR 97232
(503) 228-1339
Est. 1976; 2 service employees
Vendor will not release sales data.
Servicing 36 customers (principally vendors)
FOR DATA CIRCLE 441 ON READER CARD

DATASYSTEMS CORP.
2333 Camino del Rio South #310
San Diego, CA 92108
(714) 291-0806
Est. 1977; 6 service employees
Sales: approx. $150K
Servicing 3 customers
FOR DATA CIRCLE 444 ON READER CARD

DP SERVICE INC.
5505 No. Menard
Chicago, IL 60630
(312) 774-2556
Est. 1967: 7 service employees
Sales $100K, 40% from service
Servicing 500 installations
FOR DATA CIRCLE 411 ON READER CARD

DP SERVICES
2966 Teagarden St.
San Leandro, CA 94566
(415) 351-0801
Est. 1974; 3 service employees
Sales to $125K, 99% from service
Servicing 91 installations
FOR DATA CIRCLE 412 ON READER CARD

DYNETICS, INC.
P.O. Box 1091
Decatur, GA 30031
(404) 289-7879
Est. 1972; 3 service employees
Vendor will not release sales data.
Servicing 150 installations
FOR DATA CIRCLE 413 ON READER CARD

ENGINEERING SERVICE SYSTEMS, INC.
2196 Cable St.
San Diego, CA 92107
(714) 223-8193
Est. 1972; 16 service employees
Vendor will not release sales data.
Servicing 25 installations
FOR DATA CIRCLE 419 ON READER CARD

FORD AEROSPACE & COMMUNICATIONS CORP.
ENGINEERING SERVICES DIV.
Subs. of Ford Motor Co.
3900 Welsh Road
Willow Grove, PA 19090
(215) 659-7700
Est. 1973; 80 service employees
Vendor will not release sales data.
Servicing 80 installations
Additional offices in Dearborn, MI;
Martinsburg, WV; Austin, TX.
FOR DATA CIRCLE 415 ON READER CARD

FORMATION, INC.
823 East Gate Drive
Mt. Laurel, NJ 08057
(609) 234-5020
Est. 1972; 150 service employees
Vendor will not release sales data.
Servicing 200 installations
Additional offices in Agana, Guam; Arlington, VA; Birmingham, MI; Bloomfield, NJ; Center Line, MI; Charlotte, NC; Columbus, SC; Dayton, OH; Decatur, GA; Docena, AL; Enid, OK; Ft. Lauderdale, FL; Jackson, MS; Jefferson City, MO; Kaneohe, HI; Lawton, OK; Macon, GA; Orlando, FL; Portsmouth, VA; Princeton, NJ; Rockville, MD; Shreveport, LA; Summit, NJ; Wippany NJ; and Winston-Salem, NC.
FOR DATA CIRCLE 416 ON READER CARD

GENERAL ELECTRIC CO.
INSTALLATION AND SERVICE ENGINEERING DIV.
Section 950-17
Schenectady, NY 12345
(602) 264-1751
Est. 1967: 200 service employees
Vendor will not release sales data on sales or sites serviced.
FOR DATA CIRCLE 417 ON READER CARD

ICE, INC.
740 N. Church Road
Elmhurst, IL 60126
(312) 279-1960
Est. 1961: 60 service employees
Vendor will not release sales data.
Servicing 2,000 installations
Additional offices in Anaheim, CA; Hartford, CT; Phoenix, AZ; Augusta, GA; Atlantic City, NJ.
FOR DATA CIRCLE 418 ON READER CARD

INFORMATION & CONTROL SYSTEMS, INC.
P.O. Box 351
Roswell, GA 30077
(404) 971-5689
Est. 1973; 3 service employees
Vendor will not release sales data.
Servicing 3 sites
FOR DATA CIRCLE 442 ON READER CARD

INSTRUMENTATION INDUSTRIES INC.
215 Thomas Drive
Pittsburgh, PA 15236
(412) 884-5161
Est. 1967; 4 service employees
Vendor will not release sales data.
Servicing 17 installations
FOR DATA CIRCLE 419 ON READER CARD

INTEGRATED AUTOMATION, INC.
1745 Tully Circle N.E.
Atlanta, GA 30329
(404) 325-8100
Est. 1975; 22 service employees
Vendor will not release sales data.
Servicing 25 installations
Additional offices in Huntsville, AL; Charlotte, NC; Greensboro, NC; Orlando, FL.
FOR DATA CIRCLE 420 ON READER CARD

INTERNATIONAL COMPUTER EQUIPMENT, INC.
2030 Union St.
San Francisco, CA 94123
(415) 573-4016
Est. 1972; 16 service employees
Sales $500K, 9-10% from service
Servicing 6,000 pieces of equipment
Additional offices in Foster City, CA.
FOR DATA CIRCLE 421 ON READER CARD

DATAMAX 6
the first UNIVERSAL DATA COMMUNICATION PROCESSOR

APPLICATIONS
- TDM
- Telex SWITCH
- SELECTIVE CALLING
- SPEED CONVERTER

- CODE CONVERTER
- 32K BUFFER MEMORY
- POLLING
- TECH CONTROL

BOARD COMPLIMENT
- CPU WITH PORTS
- 1200 / 1800 / 2400 MODEM
- 4, 8, 16 K MEMORY CARDS
- 2, 8, 64 PORT BOARDS
- 2 CHANNEL FDM
- TTY UTILITY WITH EPROM PROGRAMMER
- 6800 SYSTEM ANALYZER
- VIDEO CRT CARD
- FLOPPY DISC

Copyright 1977 by TELEVOICE INDUSTRIES, INC. 801 South Rosecrans, Los Angeles, CA 90044
Megastore goes where a disk drive used to go.

More to the point, Megastore keeps going long after a disk drive quits. Without motors, bearings, heads or platters, there's nothing to wear out, burn out or crash. No moving parts.

Megastore is the astonishing new fixed-head disk memory replacement from Ampex that uses reliable cores instead of rotating media. In the long run it saves a lot of money.

Megastore provides increased throughput, increased system availability, increased system uptime and reduced maintenance costs. A vastly better return on investment.

Unplug your disk and plug in Megastore. You'll get a half-million to four million bytes of capacity (in half-megabyte increments) that your existing software can't tell from the disk it was designed for. The only difference you'll see is a major improvement in throughput, because Megastore has a data access time that's anywhere from 1000 to 3000 times faster than the disk it replaces.

Megastore. Ready now as a software-transparent replacement for Novadisk (Megastore 1223) and DEC's RJS03/RJS04 Disk (Megastore 11). Also available as Megastore 4666 for users who wish to provide their own controller. Other versions on the way. Contact Ampex Memory Products Division, 200 North Nash Street, El Segundo, California 90245. Phone (213) 640-0150. Ask for Megastore. The disk that doesn't spin.

AMPEX

Novadisk is a trademark of Data General Corp.
J.H. LESKIN ASSOCIATES, INC.
2360 Avenue "A"
Bethlehem, PA 18017
(215) 865-3350
Est. 1974; 8 service employees
Vendor will not release sales data.
Servicing 150 installations
Additional offices in Valparaiso, IN.
FOR DATA CIRCLE 442 ON READER CARD

MEMOREX CORP.
San Tomas at Central Expressway
Santa Clara, CA 95052
(408) 987-1106
Est. 1974; 500 service employees
Vendor will not release sales data.
FOR DATA CIRCLE 442 ON READER CARD

LARGE-SCALE OPPORTUNITIES IN ADVANCED-TECHNOLOGY EDP SYSTEMS DEVELOPMENT

In the part of San Diego that even San Diegos dream about

Even though we're in the "country"—about halfway between La Jolla and Torrey Pines—we're still just minutes from downtown San Diego. Our mission is broad: development of advanced, high-technology EDP systems for customers worldwide. You'll be creating for the long term, drawing from the full spectrum of NCR technical resources. You'll enjoy an excellent salary, generous benefits and the advancement potential that accompanies NCR's policy of merit reviews. If one of these new positions describes you, get set to make your last move.

Please submit your resume including salary history to Thom W. Harris, Employment Specialist

NCR
Special Systems Division
4043 Sorrento Valley Blvd., San Diego, Calif. 92121 □ (714) 452-1020
An Equal Opportunity Employer M/F
CIRCLE 108 ON READER CARD

PERTEC SERVICES DIV.
Div. of Pertec Computer Corp.
12910 Culver Blvd.
Los Angeles, CA 90066
(213) 822-9914
Est. 1976; 350 service employees
Vendor will not release sales data.
Servicing 20 customers
Offices in 70 cities.
FOR DATA CIRCLE 445 ON READER CARD

RAYTHEON SERVICE CO.
Subs. of Raytheon Co.
2 Wayside Road
Burlington, MA 01803
(617) 272-9300
Est. 1970; 2,600 service employees
Vendor will not release sales data.
Servicing more than 2,000 installations.
FOR DATA CIRCLE 425 ON READER CARD

RCA DATA SERVICES
Subs. of RCA Corp.
Bldg. 204-2, Cherry Hill Offices,
Camden, NJ 08101
(609) 963-8000
Est. 1967; 600 service employees
Sales $30-40M, 20-30% from service
Vendor will not release number of sites serviced.
Offices in 180 cities.
FOR DATA CIRCLE 426 ON READER CARD

ROGER COMPUTER SERVICES, INC.
157 Kenwood Ave.
Rochester, NY 14611
(716) 235-4890
Est. 1973; 2 service employees
Vendor will not release sales data.
Servicing 25 installations
FOR DATA CIRCLE 427 ON READER CARD

SERVITECH, INC.
1409 Centre Circle Drive
Downers Grove, IL 60515
(312) 620-8750
Est. 1972; 17 service employees
Sales $500K, 95% from service
Servicing 410 installations
Additional office in Southfield, MI.
FOR DATA CIRCLE 428 ON READER CARD

SIRVESS
490 S. Riverview Drive
Totowa, NJ 07512
(201) 785-4950
Est. 1969; 160 service employees
Vendor will not release sales data.
Servicing 500 installations
Additional offices in Boulder, Co; Salt Lake City, UT; Chattanooga, TN; Sacramento, CA
FOR DATA CIRCLE 429 ON READER CARD

SORBUS
Subs. of Management Assistance Inc.
150 Allendale Road
King of Prussia, PA 19406
(215) 265-6700
Est. 1962; 1,300 service employees
Sales $37.5M, all from service
Servicing 67,000 pieces of equipment in 16,000 locations
Offices in 160 U.S. cities
FOR DATA CIRCLE 430 ON READER CARD

STAFF COMPUTER TECHNOLOGY CORP.
10457 Roselle St.
San Diego, CA 92121
(714) 453-0303
Est. 1969; vendor will not release data on
number of employees.
Vendor will not release data on sales or
sites serviced.
FOR DATA CIRCLE 431 ON READER CARD

SYNTONIC TECHNOLOGY, INC.
Subs. of Control Data Corp.
7150 Airport Highway
Pennsauken, NJ 08109
(201) 574-1003
Est. 1964; 500 service employees
Vendor will not release data on sales.
Servicing 3,000 installations
Additional offices in Albuquerque, NM;
Saginaw, MI; Orlando, FL; Raleigh, NC;
Harrisburg, PA; North Haven, CT; Syra­
cuse, NY; Charlotte, NC; Columbia, SC;
Ft. Lauderdale, FL; and Spokane, WA.
FOR DATA CIRCLE 432 ON READER CARD

TELEFILE COMPUTER PRODUCTS, INC.
Subs. of Telefile Computer Corp.
17131 Daimler St.
Irvine, CA 92714
(714) 557-6660
Est. 1974; 75 service employees
Vendor will not release data on sales.
Servicing 75 installations
Additional offices in Tobyhanna, PA; New
Cumberland, PA; Chambersberg, PA;
Rockville, MD; Richmond, VA; Anniston,
AL; Lexington, KY; Green Bay, WI; Tex­
arkana, TX; Corpus Christi, TX; Salt
Lake City, UT; Sacramento, CA; Sunny­
vale, CA.
FOR DATA CIRCLE 433 ON READER CARD

TEL-TEC HAWAII
Subs. of Honofed Corp.
815 Alakea St.
Honolulu, HI 96813
(808) 546-5082
Est. 1972; 13 service employees
Vendor will not release data on sales or
sites serviced.
FOR DATA CIRCLE 434 ON READER CARD

TEL-TEX, INC.
3203 Audley
Houston, TX 77098
(713) 526-8326
Est. 1969; 15 service employees
Sales $3.5M, 10% from service
Servicing 500 pieces of equipment
FOR DATA CIRCLE 435 ON READER CARD

TERRITORIAL ELECTRONICS, INC.
1221 Kapiolani Blvd. #240
Honolulu, HI 96813
(808) 536-4690
Est. 1948; 8 service employees
Vendor will not release sales data
Servicing 250 installations
FOR DATA CIRCLE 436 ON READER CARD

TYMSHARE COMPUTER MAINTENANCE
10231 Bubb Road
Cupertino, CA 95014
(408) 446-7000
Est. 1965; 100 service employees
Vendor will not release sales data
Servicing 40 sites
FOR DATA CIRCLE 437 ON READER CARD

VARDON & ASSOCIATES, INC.
Subs. of Pioneer Texas Corp.
930 N. Beltline
Irving, TX 75060
(214) 252-7502
Est. 1972; 50 service employees
Vendor will not release data on sales or
sites serviced.
FOR DATA CIRCLE 438 ON READER CARD

---

Our New EDP 11/75 Flatbed Drafting System Beats the Drum Plotters... with High Performance at Low Cost!

Foster's New High-Speed, Flatbed Drafting System provides performance and features previously available only with large, expensive systems, at the price of a drum type plotter.
Resolution: .001"
Repeatability: ±.003"
Precision: .006" RMS
Speed: 35 in. per sec.
Active working surface: 42" X 64"
3-position, universal drafting head accepts 3 ball or wet pens and may be positioned on either side of arm.
Furnished with standard I/O interface, and more!
The modular EDP 11/75 system may be tailored to meet a broad variety of applications from simple online to elaborate off-line configurations. As your needs require it, the 11/75 stand-alone plotter may be augmented with all the necessary hardware and software to provide a complete interactive graphics capability.

And if you'd rather have your flatbed on the slant... you can tilt it to a functional and space-saving 55°.

To all this... add Foster's quality and reliability and you'll understand what all the "drum beating" is about.

Call or write: H. Dell Foster Co., P.O. Box 32581, San Antonio, TX 78216
(512) 494-5511

H. DELL FOSTER CO.
A Subsidiary of Keuffel & Esser Company
Versatec challenges pen plotters to a "draw-out."

Name your plot. Scientific graphics or business PERT charts. Maps or production drawings. Engineering simulations or circuit designs. Versatec will draw them faster, more reliably, and with far more expression than any other plotter.

Why wait minutes, even hours for pen plots? Versatec can produce a typical E-size drawing in less than sixty seconds.

Think what this speed could do for your own computer plotting. More throughput. Faster turnaround. Practical updates that give you visualizations now, not later.

Draw with more eloquence. High data density slows pen plotters to a crawl, but Versatec maintains constant speed. Produce subtle shading, toned patterns and variable line widths that are impractical, difficult, even impossible for pen plotters.

Print as you draw. Lettering is a problem for pen plotters, but not for Versatec. Display captions, legends and other alphanumeric data without losing a second. A simultaneous print/plot feature permits overlay of plot data and hardware generated print characters on the same scan line.

Enjoy troublefree plotting. Versatec electrostatics write without cranky mechanical arms and sputtering pens. No smears, skips or overshoots. Plot with fewer adjustments, less waste and less downtime.

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Tests were performed with IBM 360/65 computer, OS/MVT operating system, EZPERT™ application software (Systonetics) and Versaplot™/Version 7 plotting software (Versatec).™Trademarks: CalComp (California Computer Products), EZPERT (Systonetics), Versaplot (Versatec).
Proposed Tax Revisions Could Cripple Innovation

Computer industry critics worry over elimination of preferential treatment of capital gains and end of double taxation of earnings.

The Carter Administration appears to be moving towards implementation of a tax revision package that could severely jeopardize future growth and innovation within the computer industry.

So argue a number of prominent industry executives plus several industry trade associations which recently have mounted major lobbying efforts to modify possible tax changes before they're put into effect and make government officials aware of their potentially harmful impact.

Of specific concern is the President’s strong endorsement of a future elimination of the preferential tax treatment of capital gains, a move that would shut off what sources of new capital remain to the dp and electronics industries, those who are apprehensive about the proposal believe.

Also worrisome is the possible elimination of double taxation on corporate earnings. This, in effect, could force high technology companies to distribute higher dividends to their investors at the expense of R&D, internal growth, and possibly their own payrolls, some concerned observers argue.

The critics

The more vocal critics of the possible tax revisions include top executives at companies like Hewlett-Packard, Intel, Data General, and Mohawk Data; a group of venture capitalists involved in the computer business, and two industry organizations, WEMA (Western Electronic Manufacturers Assn.) and the Computer and Communications Industry Assn.

These critics fear that the Carter plan, though not yet official (its proposed components have been leaked repeatedly to the press, however) will hit technology companies particularly hard.

Because of earlier tax reforms and new pension laws prohibiting fund managers from investing in anything but established companies, money for startup situations or expansion is already extremely hard to come by, executives like Edson de Castro, president of Data General, claim. “I don’t believe you could start up a Data General today, given the situation that exists now,” de Castro says. De Castro and others fear that a further reduction of investment incentives as represented by possible tax revisions could stymie technical development here and open the door to greater foreign takeover of American firms or cause the U.S. to lose ground in the technology race.

Capital starvation

Speaking of the investment incentive problem, especially as it relates to small, high technology companies that require extensive capital to get started, Edwin V.W. Zschau, chairman of System Industries, a Sunnyvale, Calif., based mini-computer peripheral manufacturer, says: “The situation has become so bad that many would-be companies don’t get started and those that do either fail or grow slowly because of capital starvation.

“Recently,” he adds, “several have obtained capital from foreign investors, often selling part of their technology in the process.” Zschau, who heads up the WEMA task force on the capital problem, is himself currently negotiating to sell part of a System Industries subsidiary, Silonics, to Japanese interests.

The WEMA group as well as the National Venture Capital Assn., which is concerned with the same problem, point
out that in 1969 American investment markets raised more than $1 billion in new capital for small companies. By 1974 that figure had declined to $16 million.

They also stress new firms, especially those in high technology, make an invaluable contribution to the American economy because of the new jobs that open up. "They create jobs at a rate nearly 70 times greater than large, mature companies," Zschau says.

A recent M.I.T. study underscores the contribution new companies have made to the U.S. job market and economy. The study compared a group of what were termed "Innovative Companies" with a second group of "Young High Technology" firms. The innovative group, which included IBM, Xerox, and Texas Instruments, had an average sales growth of just over 13% and an average job growth of 4.3% from 1969 to 1974. For the same period the sales growth of the young high technology firms—a group that included Digital Equipment, Data General, National Semiconductor, and Compugraphic—was 42.5% and the job growth 40.7%.

**Hot bed of innovation**

In arguing for more liberal investment incentives, the anti-tax revisionists point up that the dp and electronics industries contributed well over $13 billion to the U.S. balance of trade since the late 1960s. They further maintain that the smaller firms in these industries, the ones which would suffer most if the money faucets were turned all the way off, have been the hotbed of technical innovation.

"The major achievements in the semiconductor business didn't come out of the major companies," offers Reid W. Dennis, a managing partner with Institutional Venture Associates in Menlo Park, Calif., and chairman of Recognition Equipment Corp. "The same thing is true of the minicomputer and microcomputer industries. "Development and growth came through small companies and not the GE's and IBM's."

**For or against competition?**

Ironically, the government is fostering a tax package that would enable the big companies to get bigger at a time when it's spending millions and trying to encourage competition in its antitrust case against IBM, these critics argue. "It (the tax package) is going to reduce the competition to IBM and force small companies to sell out to larger concerns at an earlier stage," Reid Dennis maintains.

"And while the critics are all concerned about the potential effects of the package, there's some dispute as to which of its aspects is potentially the most harmful. Groups like WEMA are focusing exclusively on capital gains problems, while companies like Data General appear more concerned with the prospect of eliminating double taxation on corporate earnings. A Wall Street analyst who follows the company explains why.

"Data General, DEC, and a lot of other companies in this business don't pay a dividend," he notes. "The investor buys the stock for growth, not dividends. But if Carter removes the double tax on earnings, dividends could be tax-free. That means investors are going to be attracted to stocks with high divi-

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"The upshot? A firm like Data General would have to cut back on its expansion plans and distribute money earmarked for that purpose as dividends to its shareholders in order to remain competitive in the investment market. This is not only true of Data General but any technology company with a rapid expansion rate, a high R&D budget, and a low shareholder payout, the analyst asserts.

**Many don't know**

Some executives are skeptical that the package will get through Congress. "I don't believe in virgins, unicorns, tax reform, or other mythical beasts," Lester M. Gottlieb, president of Data Dimensions, Inc., of Greenwich, Conn., observes. At the same time, other industry figures seem oblivious of its possible consequences.

"An awful lot of people have lost sight of the financial consequences of this," de Castro says.

"They're so tied up in technology and their day-to-day problems, they may not realize the significance of the issue," adds Ralph H. O'Brien, chairman and president of Mohawk Data Sciences.

Still, the package isn't on the books yet. "There's still time for us to get our licks in and make this work for us rather than against us," a trade association executive notes. "This is an unusual opportunity if people will only seize it."

Perhaps even more significant than the tax bill itself, however, is the overriding question of the availability of capital. In a recent statement before the Congressional Subcommittee on Economic Growth and Stabilization of the Joint Economic Committee, A.G.W. Biddle, president of the CCIA noted capital requirements over the next five years for the minicomputer companies have been estimated at half a billion dollars. For central computer companies, excluding IBM, the figure is twice that, while the microcomputer industry needs approximately four hundred million.

Where the money is going to come from is anyone's guess, but Biddle proffers some specific suggestions to improve the investment climate. "We believe that a return to lower taxation of capital gains would provide a necessary incentive both for existing and new investors of capital," he said. "Also, dividends should be treated as a deductible expense, as is interest on borrowings, to make equity capital more competitive with debt equity. In addition, we are in favor of a graduated corporate income tax which would provide smaller businesses with higher retained earnings for the internal financing of current operations and future growth."

—Laton McCartney

August, 1977
Reorganization Hits DP

Critics bothered by bureaucratic bosses running the show

The word in Washington is reorganization. Following President Carter's "bottom-up" approach to overhauling the Executive Branch, the President's zealous retinue of reorganizers have set out to cure the plethora of ills plaguing federal ADP management and policymaking. The proposed panacea is a sprawling study run under the auspices of what's come to be called the Federal Data Processing Reorganization Project.

Even before word of the plan was released officially in early June, Washington was buzzing with rumors that a major ADP revamp was in the works. And now that the game plan has been formally announced and the strategy flushed out, dpers both in and out of government have raised serious questions about the study's aims and methodology. They are also bothered by the bureaucratic bosses that are running the show.

Heading up the ADP rehabilitation effort are officials at the Office of Management and Budget, the top hand on the project being Wayne G. Granquist, associate director for administrative management. A former Connecticut banker and newcomer to the budget office, Granquist has appointed veteran OMBer Walter W. Haase to take direct charge of the study. Haase, as deputy associate director for OMB's Information Systems Div., was a likely choice for the job since he is reported to have brainstormed the original idea for the computer probe.

Selection of these top ADP policymakers to spearhead the reorganization investigation, however, has spawned a backlash of criticism. Says one outspoken federal dper: "You don't take the people who are the problem and put them in charge (of the study). There's not a single person who does not blame OMB for the chaos and mismanagement of information in government." The seemingly incestuous nature of the OMB approach also has worried other nonfederal computer specialists. Says one technologist: "OMB's leadership role in this study represents an absolutely clear conflict of interest."

Credibility problems

"Having OMB at the helm," bluntly comments another federal dper, "could create serious credibility problems for the study because the very people in charge—the ADP officials inside OMB—are the very same people who've done very little over the years to help establish effective computer policies. So what makes you think they're going to do anything now?"

Pot shots also have been aimed at the way the budget office is handling the study. As originally configured, the study was targeted to take about one year. But since then several other reorganization schemes have had an impact, "throwing some pall of doubt over the scheduling dates," says one OMB source. As a result, the scope of the study, he notes, has been expanded "to cover more of telecommunications than was originally intended." Also, the recently announced reorganization plan in administrative services, partially aimed at the General Services Administration, will have an effect on the ADP probe, although it isn't clear exactly what that effect will be, he explains.

Whatever that effect is, OMB project planners are sure to ask the General Services Administration's new Automated Data and Telecommunications Service Commissioner Frank J. Carr for his input. Carr, who spent more than 20
years at Westinghouse, was involved 10 years ago in setting up the company’s Univac computer center in Pittsburgh, which, according to one source, “was considered a very advanced real-time system in its day.”

Carr, among other top government ADPers, is expected to play a key role in the OMB overhaul drive. His criticism, if indeed he has any, is expected to be muted since he’s so new on the job.

Apparently the project team thinks they are planning the “perfect” study. Their goals, laudable to some, have nevertheless been sharply attacked for focusing too much attention on computers rather than on information systems to control, manage, and plan government operations. These objectives include: improving productivity in the delivery of governmental services through the application of computer technology; improving the acquisition, management, and use of these resources; and eliminating duplication and overlap in agency jurisdictions dealing with computer issues.

Four action areas

The project planners have set their sights on four specific action areas where they hope to come up with solutions. In the policy area, they want “to consolidate and simplify” the 17 different policy circulars currently sent out by the central ADP management agencies. But the “central theme” of the project, maintains one OMB official, will be in “strengthening ADP management” within the various agencies and departments.

Explaining this need for increased ADP managerial muscle, the OMB says that lack of computer management might in the agencies is “a major gap in the existing process. We think there should be a particular individual within the agencies who has ADP management responsibilities . . .”

So, the project staff has decided to assign six or eight of the task forces to take a look at three to four agencies each and make recommendations on how to structure this ADP management capability.

It also will get down to specific reorganization proposals for the ADP policy setters—the National Bureau of Standards, GSA, and even OMB itself. Through this effort, the reorganizers hope to identify and resolve conflicting overlaps between all the various ADP authorities.

Lastly, the study team may make legislative proposals, such as an amendment to the landmark but faltering Brooks bill (named after its author, Rep. Jack Brooks—D.—Texas), which spells out the rules for government-wide coordination in the procurement and use of ADP systems. While one OMBer on the project admits legislative action is “a possibility,” he adds that it’s “probably unlikely.”

One source close to the reorganization work being done at OMB argues that the Brooks bill “has really not worked well” and that the study group should not rule out amending it. But he also understands OMB’s current reluctance to tamper with the bill. “They’re (OMB) wary,” he confides, “because they want to try and keep Brooks as a friend for as long as possible.”

According to knowledgeable sources on Capitol Hill and at the agencies, though, Brooks’ interest in computers has waned considerably since his intense involvement with ADP in the early ’60s. As evidence of his disinterest, one source close to Brooks cites a conversation he had with the Texas Democrat a year ago in which Brooks unabashedly admitted he didn’t care about ADP matters anymore. But the source also pragmatically points out, “If you were involved in reorganizing the entire federal government (as Brooks is) would you want to be bothered by the procurement of terminals?”

Rep. Charles Rose (D.—North Carolina), head of the House Policy Group on Information and Computers, who has been plugging computer usage by House members, says he “would also like to see more attention focused on government-wide computer policy questions.” The chances are that if Brooks drops the ball in this area, Rose would be more than willing to pick it up and run with it, possibly creating a subcommittee on information.

Very much in the picture

But Brooks is still very much in the picture, and as long as he is, the OMB ADP revampers will have to deal with him. And they’ll also have to deal with anxious agency ADPers who are less than enthusiastic about the study. “The subject has been studied to death,” protests Clagett Jones, chief of the Census Bureau’s Systems Software Div. “Somewhere along the line,” he asserts, “some-

FRANK J. CARR
The GSA’s Commissioner for Automated Data and Telecommunications Services

‘Everything but The Kitchen Sink’

The Office of Management and Budget’s ADP rehabilitation team has put together a preliminary shopping list of federal computer issues which they have carefully noted is “not intended to be comprehensive.” But as one more savvy federal dper has pointed out, “comprehensive or not, the ‘grab bag’ of issues includes everything but the kitchen sink.” These issues getting the once-over from the OMB probers include the following:

Dp application program evaluation Integration of program and dp budgets Management audits of dp operations Processing of agency procurement requests Delegations of procurement authority to agencies Dp planning and budget information Interim upgrade policy Software conversion cost policy Software development and acquisition Goals and objectives of standards program Standards enforcement authority Computer resource management systems Dp work accounting systems Dp job classifications Certification of dp personnel Career development and training Computer security policy Full cost recovery policy Dp fund policy Functional performance specifications policy Software Exchange Program

August, 1977
news in perspective

body has to take some action." Echoing Jones, Norman Ream, first head of NBS' Center for Computer Science and Technology, says the "government computer problems that exist today were recognized and addressed back in the early '60s. And since then," he contends, "there's been a lot of money spent and nothing accomplished."

Calling the OMB study a "fishing expedition," Ream says that instead of setting up another study, the government "should establish a new department to define federal ADP objectives and pull them all together so they can be worked upon." Top Agriculture Dept. dper Head says, "The study is overstructured. If I were organizing it, I would have assembled a small group of experts, some from within government and some from outside, to take a much less intensive and much less structured look at the problems."

Responding to these comments, an OMB spokesman insists the agency is just trying to live up to the Presidential reorganization mandate for "maximum public participation." He adds, "It's a big project. I don't think we'll probably achieve everything we set out to, but I think we will achieve enough to make the study of benefit to the government."

Focus still on equipment

Others are less optimistic. Jon Turner, the director of advanced systems of Columbia Univ. computing center, spent three months as a consultant to the President's reorganization project for the Executive Branch. As a former insider on the reorganization scene, Turner has very definite opinions on the OMB project. The study's emphasis on ADP and ADP-oriented objectives, he contends, "perpetuates the current focus within government on ADP equipment instead of on the use to which that equipment is being put. A better approach," he suggests, "is not to study computers but to study administrative practices."

Turner also feels strongly about OMB's leadership role in the project. "It's clear," he asserts, "that the result of this study will be to put the stamp of reorganization on much of the-existing government ADP mechanism. As a bureaucratic gambit, the proposal is a masterpiece. As an effort likely to achieve any of the President's reorganization goals, the proposed study is unlikely to succeed."

This bleak view obviously isn't shared by the OMB reorganization team. With the right help and cooperation from the computer community, they believe they can crank out a good study. Acknowledging past failures, one candid OMBm states, "There are studies being done all the time in the federal government. Unfortunately we spend an awful lot for them and we don't get as much benefit from them as I think we could. I'm hopeful that this won't be a continuation of that pattern."

—Linda Flato

Auditing

Edp Auditors: Explosive Growth

Dp Auditing: Is It an Art Or a Science

Few professional organizations have experienced the explosive growth that the Edp Auditors Assn. has.

Formed in mid-1969 as the Edp Auditors of Los Angeles, the association had three chapters and 100 members when it held its first national conference in June 1973. The conference attracted an attendance of 225 which immediately swelled the membership, and by early 1974 there were 300 members.

Convening nationally for the fifth time in Houston this June, members heard past president and director, Bud Friedman of Cooper & Lybrand, Los Angeles, announce that the group now has 23 chapters and 2,000 members with eight new chapters in the formation stages which will bring in another 400 members.

Friedman was honored at the Houston conference with a plaque and a standing ovation for his work on behalf of the association over the past five years. The conference this year attracted some 600 members.

Friedman noted that three of the existing chapters are abroad: in Mexico City, Mexico; Sydney, Australia; and Toronto, Ontario, Canada. Today the association has two publications: a quarterly magazine, The Edp Auditor, and a newsletter, The Edp Auditor Update, which comes out every two weeks. It has spawned the Edp Auditors Foundation for Education and Research to develop and improve education and conduct related research to assist in the study of auditing. The Foundation, in turn, has formed the Edp Auditors Foundation Affiliates for computer manufacturers, software firms, computer service companies, CPA firms, and computer user organizations.

Certification

At the Houston conference, a proposal by the Institute for Certification of Computer Professionals that the Edp Auditors Assn. join ICCP and work with the certifying organization on certification examination for dp auditors was favorably received by the EDPA's directors.

But the question, "What is a dp auditor?" is still being asked. Dr. Dennis Branstad, National Bureau of Standards, asked in a Houston session whether dp auditing is an art or a science. "An art," was the resounding answer. One audience quipped, "Ask an edp auditor what it is and he'll tell you how to build a clock."

Nick Campbell, director, edpaudit, IBM Corp., talked about the minimal education requirements for dp auditors at IBM. They (the dp auditors) "consist of both internal auditors who have been trained in data processing and data processing personnel who have been trained in auditing," he said. "An internal auditor who chooses a career path as an edp auditor should have two years' experience as an internal auditor and should take 6 to 12 weeks of formal classroom education in basic programmer training, and should work as an application programmer a minimum of six months. Data processing personnel, to be hired as dp auditors, should have two years on-the-job experience and be required to work a minimum of six months as internal auditors learning basic auditing routines and fundamentals."

Campbell said the dp auditors at IBM are not expected to maintain proficiency as programmers, but will be expected to "obtain continual, ongoing training in various aspects of data processing as required to meet the dp needs of the internal audit staff and to keep them up-to-date with the current state of the art in data processing." He said the ongoing education should include such topics as: data security, privacy, remote computing, programming standards, performance measurement, system design, large data base systems, audit software, and equipment utilization.

Campbell described the dp audit mission at IBM as "to conduct audits and reviews of data processing organizations, installations, and existing applications to ensure the adequate safeguarding of IBM assets, the effective utilization of data processing resources, and the adherence to management policies."

One of the dp auditor's duties at IBM, Campbell said, is "to ensure that separa-
tion of duties exist within the data processing organization, and that manual and system controls are adequate to deter fraud in computer-based applications.

He listed some others: "to ensure that adequate controls and procedures exist within both computer installations and applications to prevent unauthorized access to IBM proprietary data and employee data files; to ensure that adequate disaster protection and recovery programs exist within data processing installations; to ensure effective utilization of data processing resources including both manpower and equipment; to ensure that access to live data is controlled during a system development cycle; to develop audit software; and to develop and maintain a high level of edp technical knowledge and expertise on the audit staff."

Arnold Barnett, partner, Barnett Data Systems, Rockville, Md., talked of the dp auditor's role in computer performance improvement programs. Dp auditors, he said, "should team with data processing personnel to effect a performance improvement program."

Patrick T. McGuire, manager, corporate audit, The Pillsbury Co., Minneapolis, talked about auditing "distributive processing systems," noting that manual techniques play a bigger role than in auditing a centralized system. "One area to challenge," he said, "is to see to it that modular and orderly expansion capabilities are present in initial design that will cause minimal impact on those functions that already exist in the system."

He raised a political issue. "Before distributive processing is looked at with any serious implications, you must look at the various groups and how they interact and conflict with each other." He doubted that many honest answers would be forthcoming "but at least you can ask the questions."

Maintain control

The most important result of a distributive computer network, McGuire said, "is the distribution of the function and decision-making process while maintaining centralized control, and this won't occur unless it begins to evolve way back in the planning stage and the impetus has to come from the user."

A former dp auditor for New York's Citibank in McGuire's audience complained of the difficulty of maintaining control in an environment where "minis were growing like mushrooms. We (the auditing staff) had to decide whether to increase staff or set priorities, covering the essential minis and letting the others wait."

He said he "didn't like the proliferation of minis at Citibank. The bank is going to lose control. Everyone's putting this on and that on. They're not communicating and they are duplicating."

McGuire advised fighting against "letting each user go his own way." He said a common technology base is essential in a distributive system.

In another session on "Security, Control, and Auditing in a Dispersed Data Processing Environment," John B. Wardlaw, manager, Seidman & Seidman, Houston, emphasized the importance of assuring that "local managers have a good idea what's going on in their systems," which, he said, is not always the case.

Wardlaw said any firm with 75 or more employees is a prospect for dispersed data processing and cited as one of its advantages "getting the responsibility for data right down where it belongs."

The ideal time

He said conversions in a dispersed environment "are an ideal time to either start or come into effect." He said auditors should assure that proper safeguards are taken during a conversion and should write programs to verify the results of the conversion.

Wardlaw observed that some local managers tend to treat their computer equipment as "just another office machine," located on a factory or warehouse floor. "It should be in an office that is dry and equipped with at least two fire extinguishers located on a wall where you can find them, not hidden under six boxes of paper." He advocated training personnel in firefighting at least once each year and said most fire departments will do this. "Test security measures," he told the dp auditors. "Be a bad guy and do it."

Bill Newcomer, president of Dylakor Software Systems, Inc., Los Angeles, told the Houston conference that he likes the idea of distributed processing because it "puts intelligence right where it's needed." He said his firm "opted for our first mini in 1975. We're back face to face with the device again... back to something physical."

Newcomer, whose talk basically was on microprocessors, titled it "The Intellegent Tooh Brush" because I thought that was the ultimate in ridiculous applications of microprocessors. Turns out my lawyer has a client whose thinking along those lines."

He talked of other off-beat applications of microprocessors such as an intelligent fire hose with a safety device in its nozzle causing it to shut off if dropped; an intelligent sprinkler system which senses water content in a lawn...and even a newspaper in a driveway; and an intelligent tombstone that plays hymns and waters flowers. The prerequisites

For the hobbyist considering building a microprocessor-based system piece-by-piece, he suggested as prerequisites: "a degree in electronics and computer science, programming experience, and a friend with unlimited test instruments willing to do unlimited favors for a frivolous project. If you don't have these things, I suggest you try a kit."

It was noted during Newcomer's session by NAS's Branstad that "the edp auditor's role in computer perfor­mation algorithm has been implemented on a processor chip. In his own session, which was on encryption, Branstad said he believes it will be widely used for security in the next five to ten years "especially in the banking environment. It will be implemented in hardware, stuck down in the terminals. You (the dp auditors)," he said, "will be responsible in the future for making recommenda­tions as to whether to use cryptography and as to whether or not it's being used properly and adequately."

He said the state of Ohio now requires encryption of medical information sent from Ohio to the Contagious Disease Center in Atlanta. Cryptography is so good, he noted, that 72 quadrillion different keys are possible.

Wardlaw, in his session, wasn't so sure about hardware encryption. "It can be broken in a few minutes by a skilled cryptographer. I have not seen an effective hardware encryptor yet."

Robert Keith, manager, systems development and programming, Southwest Banishes Inc., Houston, in a session on "Controls on EFT Systems," suggested cryptography as something to look into when developing security for an electronic funds transfer (EFT) system. He said financial institutions, in using EFT, are "doing nothing more than extending their services to you in an electronic environment. A great deal of the responsibility for input and output belongs to you." He said current paper-based controls "are not sufficient even though they're adequate." He suggested as things to look at in an EFT audit: the transaction initiation area, the physical terminal location, the concept of the plastic card and its issuance and control procedures, the customer identification process, common channels and lines, line monitors, and transaction processing in the switch.

Wayne Boucher of the National Commission on Electronic Funds Transfer (NCEFT) told the dp auditors that the commission, in one two-week period, received 6,000 letters of which only 11 favored EFT. Ten, he said, were uncertain, and the remainder "were desperately and utterly opposed." He said reasons for the opposition included fear of unemployment, the ability to stop payment, of loss of control, of loss of proof of transaction, of increased costs, errors and thefts, of Big Brother, and something from the Book of Revelations. "EFT is just another sign that the end of the world is at hand." Boucher said the last fear was the only concern the commission had not addressed.
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What you really need is the one multiple processor system designed for multiple processor operation. Tandem's NonStop System.

The four major "on-line" considerations.

When anyone is considering an on-line system, regardless of size, there are four primary points to consider. Throughput, Availability, Data Integrity, Transaction Protection. The system must be able to handle the job. It must be there when you need it. You must be sure of the integrity of your data base. And you must be sure you don't lose or duplicate a transaction. Even during a failure. No single processor system anywhere can provide that assurance. It takes a multiple processor system designed for the on-line environment, and Tandem is it.

For better throughput, spread the files.

We built the Tandem NonStop System with geographic independence of programs and files. They're handled automatically under Enscribe, our Data Base Record Manager. And instead of having one processor with one bottlenecking channel and a...
fixed priority system. Tandem's NonStop System distributes the work and the files across multiple processors, multiple discs, and multiple channels. Enscribe controls the pattern and the flow for maximum efficiency. Because of simultaneous disc accesses, there's a dramatic improvement in response time. It's one of the performance benefits about a multiple processor system which you can't get on a single processor system.

**Ease of programming, by design.**

Historically, multiple processor systems have been a bear to program. Not with Tandem. Guardian, Tandem's operating system, lets you write your programs as usual. You can add more processors, or memory, or terminals as you need them. No need to rewrite programs. Ever. And we make it easy to write the programs in the first place, with COBOL or with TAL, a powerful language designed for fast, flexible programming. The software development tools of this mini-based system rival those of far more expensive systems, and include NonStop operation, data communications, mirror volume capability, full file protection, screen formatting programs, and a host of housekeeping utilities.

**When you're thinking "on-line," think in Tandem.**

Which means think in multiples. Few, if any, "on-line" systems can be installed and forgotten. The number of transactions, the number of terminals on-line, or the number of applications programs to be run on the system keep growing. Most likely, all three will multiply. Which is traumatic unless you've started with the one system on the market which can grow with you—even if the growth occurs during the initial configuration phase—without having to start all over again.

**NonStop growth and NonStop protection, too.**

Because the Tandem System was designed for NonStop operation in both hardware and software, it offers an extraordinary measure of protection against a failure in any processor, I/O channel, disc drive, or in the software. No other system offers this measure of assurance. When a failure does occur in any segment of the system, its back-up counterpart completes the task, without a hitch. Since all programs are geographically independent, and the operating system both distributes and monitors all work-in-process, recovery from a failure is instantaneous. There is no restart; no backing up to a hopefully safe point. All indices are automatically entered and maintained in software. And the system monitors its own operations, performing all tasks in a distributed fashion across the multiple processors. Even when a CPU goes down, another CPU is immediately aware of the failure and picks up the task in process and completes it. No data and no transaction need ever be lost or duplicated. The integrity of the data base can be fully protected. It is truly unusual, but it's one reason why we say no single processor system anywhere can touch us in the "on-line" environment.

**NonStop software.**

- **Guardian: Operating System.**
  - NonStop operation.
  - Automatic re-entrant, recursive and shareable code.
  - Virtual memory system.
  - Geographic independence of programs and peripherals.

- **Enscribe: Data Base Record Manager.**
  - Provides relative, entry-sequenced and key-sequenced files.
  - Each file may be up to four BILLION bytes.
  - Up to 255 alternate keys per file.
  - Optional mirror copy by disc volume.

- **Envoy: Data Communications Manager.**

- **Languages:** COBOL, TAL.

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20605 Valley Green Drive, Cupertino, California 95014 or Tandem Computers GmBH, Bernerstrasse 50, Frankfurt 56, West Germany.

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news in perspective

Newcomer foresaw a problem of another sort when he predicted that dp auditors of the future could have their own computer-in-a-suitcase. "You'll walk into a site, plug into its machine, and do your own processing with a system you already know." The problem—getting through airports.

—Edith Myers

Crime

A Crook By Any Other Name...

Col. David Winthrop was charming, believable, and seemed every inch the retired Air Force colonel he professed to be to the men who were to become his associates in DataSync, a Santa Maria, Calif., firm formed to market an educated terminal and a 16K RAM memory board, primarily to the hobbyist market.

The only unusual trait of Kenneth Allen was that the stories he told fellow employees at Cubic Data Systems, in San Diego, of the houses he owned seemed to vary as to their location in San Diego.

Neither man was exactly what he seemed to be. Neither was he who he said he was. The Federal Bureau of Investigation says Allen's real name is Henry Joseph Manning, III. The police department in Santa Maria says, as nearly as it can determine, Winthrop's real name is Norman Henry Hunt, Jr. Both men have used a long string of aliases.

Hunt showed up in Santa Maria last October as Col. Winthrop, just retired from the Air Force after 18 years in which he worked in digital electronics, and formed a company called Santa Maria Research to market what he said was a 16K RAM memory board to which he worked in digital electronics, not only wasn't a 16K board, but he didn't own it. It was a 4K memory board developed by SD Sales of Dallas.

Around Christmas of last year, Col. Winthrop met two of the four men who were to become fellow-principals with him in a successor firm to Santa Maria Research. He met David Faiman, a software expert who then worked for Polyomorphic Corp., at a meeting of the Santa Barbara Computer Club, a hobbyist group. He met Ron Waffle, who then worked for California Computer Products, at the Santa Barbara Byte Shop where Ron was moonlighting as a technician. He told them of the memory board and how he wanted people to help him market his device. They told Ron Yager, who was running a camera store in Santa Maria, and Dennis Levinski, a field service rep for General Electric.

"The man was charming. You'd buy anything from him. We actually approached him," recalls Waffle ruefully. The four quit their jobs, invested what they could, and got DynaSync going with Col. Winthrop as chairman of the board and chief financial officer.

The firm began accepting prepaid orders. Waffle said Winthrop would pledge his house to get credit from suppliers. Winthrop claimed the house was worth $100,000 and that he had clear title to it, having paid for it in cash. It subsequently was learned he was renting.

What blew the whistle on Winthrop? A prospective customer, skeptical of the prices quoted in the company's ads (thought they were too low), called the Santa Maria police to check out the company. The police learned the firm did have a business license and was a California corporation. They next checked out the principals through driver's license records and vehicle registration. "The other four were fine," said a police spokesman. "They had driver's licenses and registered vehicles, but we found nothing for Winthrop." A closer check with the DMV, police said, turned up three strange applications for duplicate licenses under three different names. The duplicates were never granted because there were no originals on record and all three pictures were pictures of Col. Winthrop.

Was awaiting trial

The good colonel was in jail in Santa Maria in mid-July awaiting trial on three felony charges of theft by false pretenses. Other jurisdictions were waiting their turn. The FBI wants him for bank fraud, and there are indictments out on him in Texas for a variety of allegedly fraudulent activities committed under a wide variety of names and on behalf of an almost equally wide variety of businesses the man formed. Santa Maria police said they know of 28 different aliases he's used and 15 different businesses he's started, many in the computer industry.

And the other four principals in DataSync are working hard to keep the firm going and honor its commitments. "This has set us back one and one-half to two months," said Waffle. They now have a design for a 16K RAM memory board that is their own, and they expect to deliver on all the prepaid orders.

But Manning is free

While Hunt, alias Winthrop was in jail last month, Allen, alias Manning, was still at large.

Allen didn't make many waves at Cubic. Except for the discrepancies in the stories about his houses, the tall, Colorado-born programmer, who worked with the company for nearly 11 months, seemed well suited for the job, "not a super programmer, but we got our money's worth," says Paul Burns, v.p. and general manager of the service bureau which is owned by and does service mainly for Cubic Corp., a diversified San Diego company which also holds defense contracts.

When Allen suddenly left the company in May 1976, supposedly to visit his ailing father in Arkansas, leaving behind a wife and a trail of bad checks cashed at local banks, Cubic officials began to suspect that there was more to Allen's background than that of a competent COBOL programmer with experience on Honeywell equipment. His programming experience, it was learned later, was acquired in part at California's San Quentin Prison from which he'd escaped June 19, 1973, during the second year of a 10 year sentence for grand theft of $14,000.

FBI agents in Kansas City, Mo., where a warrant for his arrest was issued in March 1976, said their file on Manning fills two volumes. Among the data is a note of his employment in Houston in 1966-1968 by one of the Big 8 CPA firms, which the FBI won't name.

His Kansas City warrant is for allegedly giving false statements concerning his net worth in the summer of 1974 to
outwardly loyal to their company; have more than they fear

white collar criminal was not possible, never heen in trouble before; are bright beating the system. And they fear detection, unauthorized access such as the man who stole a three-million name list from the Encyclopedia Britannica; theft of services, which is the use of computer time for a person's own benefit; and vandalism, the intentional sabotage of company records.

Rosenquist, formerly of the FBI headquarters in Washington and now an assistant special agent in Dallas, is of the opinion that "perfect computer security is not attainable," and in his speech he called on management as well as the technicians to set up audit trails and other programs to ward off unauthorized computer access. He said it was highly important for management to continually attempt to penetrate their own systems and to have audit trails run on a regular basis by independent outside personnel.

Security checks now

Cubic's Mr. Burns said the company was distressed that a more careful check of Manning's background wasn't made. "We needed a Honeywell programmer and once his knowledge of COBOL was affirmed, he was hired without a check." Burns, who said the company now requires applicants to apply for security clearances, is glad to talk of the incident because he hopes others will be more careful.

In his post with the company, Manning had access to a vault full of payroll and account checks. That was the first place Cubic looked when it learned the true story of Manning, but fortunately it hadn't been touched, Burns said.

Just as their names are hard to put down, ages of both men are not certain. Allen has given Nov. 8, 1937, Dec. 19, 1941, and April 16, 1942, as his birthdates at various times. Winthrop gave Santa Maria police 1938 as his birth year but the police, from other facts uncovered in his background, are inclined to think it was 1932.

Schools for agents

Neither case relates to "computer crime"—rather to computer criminals—but the FBI now operates special hands-on schools for agents who will investigate computer crimes. "Computer crimes are rampant," says an agent in Kansas City, "but they're hard to prosecute." Few people understand really what's happened, he said, and prosecutors and juries don't have a sufficient grasp of the computer industry to convict suspects.

Last spring, FBI agent Glenn Rosenquist said many of the computer robbers who get caught with their hand in the hardware get off with probation and later set themselves up as "computer security consultants."

Rosenquist, who talked at a software user seminar sponsored by Inyte Datacom Corp. in Dallas, has supervised a number of computer fraud cases. He said a personal profile of the average white collar criminal was not possible, but the FBI does have a profile of the average computer criminal:

"They range in age from 18 to 30; are outwardly loyal to their company; have never been in trouble before; are bright and are challenged by the prospect of beating the system. And they fear detection more than they fear punishment."

He said his agency lumps computer crimes into five groups: financial, wherein funds transfers are made to the criminal's account; property, where bogus orders are placed for products that are later resold or fenced; information theft, unauthorized access such as the man who stole a three-million name list from the Encyclopedia Britannica; theft of services, which is the use of computer time for a person's own benefit; and vandalism, the intentional sabotage of company records.

Mainframers

'You Hit IBM on the Flanks or in a Very Narrow Product Area'

A new family is about to move into the block, and people already are worrying about what it will do to the neighborhood. Itel Corp., the leasing and financial services company in San Francisco, Calif., has been forced by news leaks to announce prematurely that it is about to begin marketing large-scale IBM-compatible computers manufactured in Japan by Hitachi Ltd.

The full and formal announcement by Itel is expected this fall, when the operating machine is installed at Itel's facility in Palo Alto, Calif. For now, company spokesmen say only that the first model will be three to five times more powerful than the AS/5-3, which reportedly has the power of a 370/158-3. Physically it will be half the size of a 168-3 in the one- to four-megabyte range, and consume half the power at the 4MB level. It is air-cooled, in contrast to the expensive water cooling required by the 168s and the newer 3033. And first customer shipment is expected in February 1978.

I tel, which sells packages of miniframes and peripherals in a variety of financial arrangements, rarely quotes prices, and will not disclose them at this time. But Richard A. Whitcomb, v.p. for systems marketing in the Computer Products Div., says the company must be competitive with the IBM 3033 and the Amdahl 470V/7 being developed with another Japanese firm, Fujitsu Ltd. "So it's not a one-machine program," says Whitcomb, but rather a family.

(A two-page ad, which appeared by mistake in Computerworld last month, said the new machine will cost "up to $1 million" less than a 168-3. Richard H. Lussier, president of Itel's Data Products Group, said none of the details mentioned in the ad are final and attributed its erroneous publication to a "communications problem" at the company's advertising agency.)

A family of medium to large-scale mainframes is being manufactured for Itel by National Semiconductor Corp., labeled the Advanced System. The

CHALLENGE TO IBM: John H. Clark, left, executive v.p. with Itel's Data Products Group, says company has determined Hitachi machines are compatible with IBM. Richard A. Whitcomb, v.p. for systems marketing, says it's not a one-machine program.
Joint development

The people at Itel, for what some observers believe are political reasons, are quick to point out that the new computers from Japan are the result of a joint development project between Hitachi and Itel that began with discussions some four years ago.

Hitachi, the manufacturer, and Fujitsu, which is manufacturing parts of the Amdahl 470s, were the recipients of government subsidies to jointly develop a family of four computers, called the M Series. Fujitsu makes and sells the bottom and top of that family, the M-160 and M-190, the latter closely resembling the Amdahl 470W/6, while Hitachi does likewise with the 170 and 180 (see September 1976, p. 100).

Thus the point is made that Itel's new mainframes will not be from the M Series. "The machines that we'll be offering will be entirely different," says John H. Clark, executive v.p. of the Data Products Group. "These are machines that we wrote the specifications for and then were jointly developed with Hitachi." The distinction, he adds, is that the Hitachi mainframes were designed to run Hitachi software, while the new models were designed to use IBM software. "We've completed running all the IBM operating systems and job streams," he says, and have determined that there is 100% compatibility with IBM. Users will be offered all the OS, VS, SVS, and MVS operating systems.

Foot in the door

All this is only a foot in the door for the Japanese. Hitachi's agreement with Itel represents the first all-out effort in the U.S. to market mainframes made entirely in Japan.

To be sure, Fujitsu has been manufacturing parts of the Amdahl mainframes, and Hitachi in the early 1970s conducted discussions with Telex Corp. about the latter marketing the Japanese concern's computers in the U.S. The Telex program was dropped. Going back even earlier, Fujitsu and a company called Automation Science Inc. went through the motions of selling a batch processing computer in the '60s, a venture that was short-lived. But the Itel arrangement has to be the first believable effort by the Japanese to crack the U.S. market for mainframes.

Anyone who has watched the costly withdrawal of RCA and General Electric, and Xerox and Memorex from the general purpose computer market, while all others except IBM struggle to achieve a viable position in it, might question the ability or desire of the Japanese to do so. Ability?

Leo Feltz of Input, a research firm in Menlo Park, Calif., observes that the Japanese have a record of establishing a niche for themselves in established markets already populated by dominant companies. Feltz, now with Memorex, cites the automobile market in the U.S. where a new vendor has to go up against the likes of General Motors, Ford, and Chrysler. The same can be said in motorcycles, shipbuilding, cameras, and radio/TV. In all of these markets, Japanese firms have not just established a foothold but are doing outstandingly well. "What's to keep them from doing the same thing in the computer industry?" he asks. "We feel: nothing."

Huge marketplace

Desire? Feltz notes that for Japan to survive it must export. The country is poor in natural resources but rich in human resources. It is thus attracted to the electronics business, which not only is a clean industry but also does not require a massive importation of steel, oil, or lumber. "Of course," he says, "the electronic industry over all, which the computer industry is a part of, will be the largest single industry in the world, from the revenue standpoint, within the next couple of years. So Japan must get into that marketplace."

Adds Input's Robert Colten, "There is absolutely nothing subtle or diabolical about this. It's out in the open for everyone to see. Anyone who cares to read (the Japanese) literature, their publications, can see it."

An Input study published in June entitled "Plug-Compatible Mainframes: The New Hardware Economics" states: "It is imperative that the Japanese achieve a 12% to 15% share of the total computer market if they intend to become a recognized force in the marketplace. The market share objective could be achieved in the early 1980s if the Japanese companies continue to implement their plan."

In the North American markets, that strategy is to affiliate with local companies. Fujitsu is doing so with Amdahl Corp. in the U.S. and with Consolidated Computer Inc. in Canada. Hitachi is now affiliated with Itel Corp. "They're picking out these relationships on a very well-planned basis," says Feltz.

Different elsewhere

By contrast, according to the people at Input, the Japanese strategy in China, Eastern Europe, Africa, and South America is to sell directly and retain their own trademarks. In Western Europe, it will vary from country to country, but perhaps be a combination of the two approaches above, "Whenever possible," the study says. "Japanese companies are strongly motivated to sell all computer products with recognized Japanese labels to achieve product identity..."

Still, it might be questioned whether it isn't too late to begin marketing IBM-compatible mainframes and whether there are any more gaps in the 370 line. But Colten explains that there no longer is a gap strategy in going after IBM. Instead the strategy is to concentrate on a narrow segment and attack. Or as Feltz explains, "You hit IBM like the Viet Cong: on the flanks or in a very narrow product area."

Itel's Whitcomb says the plug-compatible mainframe vendors are still shooting for a "window," saying, "and we want to be there as early as we can. But the whole market is now so big—the 360s, 370s, and 3033s—that there's always somebody who wants to get a new piece of hardware to do something. And we're very pleased that the so-called window is much larger than people tend to believe it is."

Amdahl's window

The veracity of this statement is illustrated by the success of Amdahl Corp. The Sunnyvale, Calif., company was late in completing development of its 470, which is compatible with the 370s and competitive with the 168. First delivery of the 470 occurred in May 1975, some 22 months after the initial installation of the 168. "They missed the window," observers said, intimating that Amdahl had missed its chance to sell enough machines to recoup its investment before the market, or window, for it closed.

But as of July 1, the company had installed 54 machines and was turning them out at the rate of five a month, up from four a month during the second quarter of this year. And additional capacity is planned. It's hardly what you'd expect of a company that supposedly had missed its window (see this issue's Benchmarks, p. 144).

The success of Amdahl Corp. and the subsequent entry of Itel/National and of Control Data Corp. into this marketplace have caused IBM to respond with lowered prices on its large-scale mainframes and the introduction of the 3033.
The latter machine, of course, creates still another window to shoot for—and apparently it's an immensely large market.

IBM is said to have 3,000 orders for the 3033; at $4 million each that represents a value of $12 billion. Says Itel's Whitcomb: "That would be the largest product in the history of American industry." Adds John Clark, "If those 3,000 orders are real, why would IBM overreact to a competitor like Itel or Amdahl or CDC?" Even if a competitor acquired 5% or 10% of that market, it would be but a dent in a $12-billion coffer. As Whitcomb says, IBM's problem would be in manufacturing all those machines, and going after competitors won't change that. "Our exact sentiments," say the new kids on the block.

—Edward K. Yasaki

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August, 1977

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News in Perspective

SUMITOMO BANK in Japan, with five Century 350 systems (about to be upgraded to Criterion systems) and 3,000 teller, CRT, and teleprinter terminals, handles 250,000 transactions per hour.

quired, Data Pathing, there is no factory floor data collection system that IBM can produce that is better than mine ... But in every one of those areas, I am meeting IBM head on in every deal."

Still, NCR has profited handsomely all over the world from lucrative contracts in which it surrounds an IBM central site with millions of dollars worth of terminals, minis, and communications equipment. Why, some insist in asking, shouldn't it leave the headaches of a large central utility to the likes of IBM.

Not too proud to interface

Anderson noted that, "I'm not so proud that I won't interface whatever I've got to a system from IBM or Burroughs or CDC or anybody else. That is more than IBM is doing, but they don't have to do it.

I've never underestimated them since I joined the business—and that's 30 years ago." The NCR executive is clearly aware of the IBM strategy with its Systems Network Architecture, in which every element from terminal to computer is inextricably intertwined by software, microcode, and protocols that can be changed at will. If he is not underestimating NCR's need for a total system offering in the face of this strategy, he feels analysts and others are short-changing NCR's proven capability in providing all elements of a massive network.

"Wall Street doesn't write about my huge real-time system in Japan, the Sumitomo Bank," he says. (Anderson ran NCR's Japan operation before being named president in 1972.) "Montgomery Ward's whole network architecture is being done by us—probably the most extensive business communications network that's being implemented in this country today. Wall Street doesn't write about that. Why not? Because they can't believe it."

Ward, which already has much of its network installed, ultimately will have 18,000 retail terminals, 3,000 CRT's, and an assortment of minicomputers at 14 communications nodes around the country—all from NCR. (The network is linked to four sites with dual IBM 370/158s.) The Sumitomo Bank, with five Century 350 systems (about to be upgraded to Criterion systems) and 3,000 teller, CRT, and teleprinter terminals, is already handling 250,000 transactions per hour. This is perhaps the biggest EFTS operation in the world.

Anderson, during the interview, seemed to mix "I" and "NCR." Perhaps it's a figure of speech, but in his five years at the helm, the two have become synonymous. Of course, the public thinks of the man and the company in tandem because Anderson is a highly accessible, outspoken executive—a model of British candor. But NCR's strongest push into the computer age has come under his direction.

For five years, NCR has been decentralizing manufacturing facilities, retraining people, and cutting back parts of the force, reorganizing, and developing more computer products than it has ever had to offer before. The company has been in total transition—from electromechanical to electronic manufacturing and from cash registers and accounting machines to computer-based systems. It has been traumatic in many ways, said Anderson.

A damn foreigner

"In physical plant or in organization, it's easy. You just say, 'tear down this plant or build a new one, or remodel this plant for electronics.' You just take the organization chart and restructure it. But what do you do inside the heart and mind of every man? . . . It's like a language change. From speaking English, we're teaching him COBOL. All his life he's been very articulate, spoken English well, and now he finds he's a damn foreigner. This goes throughout the organization. The field engineer used to have pliers and a screwdriver in his tool chest. Now he carries a scope."

Many have gone because "they couldn't handle it, or weren't happy." Many, mostly in the plants, were simply "redundant." The NCR force has diminished to 67,000 from 103,000 in the last five years. The numbers in sales, R&D, programming, and support have not dwindled, said Anderson but the "caliber of people has changed." College degrees are required for the salesmen, along with some dp training or experience.

"It's interesting. Today you can walk into a branch and find a lot of young people who have never touched an accounting machine and they certainly don't know what a cash register is." Yet Anderson, who started with NCR as an accounting machine salesman in 1946, recalls that "in the old days" the goal was to work up from selling cash registers to accounting machines. "This is our heritage."

Replacing accounting machines

With the exception of a plant in Brazil, NCR doesn't make mechanical cash registers anymore, and it is about to announce an $100 series of minicomputers this fall aimed at replacing the old Class 31 accounting machines (of which about 100,000 are installed) and the 399 and 499 (about 17,500 installations).

While it has been opening and closing plants around the world, NCR also has been reorganizing its manufacturing so that specific facilities have set charters for development and production. Charters for special and general purpose terminals are divided among plants in the U.S., Canada and Japan. Four U.S. facilities have primary responsibility for computer and communications systems, but NCR is giving more responsibility to its remaining facilities in Europe—in Dundee, Scotland, and Augsburg, Germany. (Three European assembly plants are being closed.) Dundee, which has been producing the Century series, is cutting over to the Criteri-
on line and will have a charter for some software development. Augsburg will be the second source for the new 8100 family and will be primary source on "one of the peripherals." It too will have a research and development charter.

These charters of responsibility for the foreign plants also should help NCR in its growing nationalism and Europeanism that measures American firms by their contribution to local GNP, employment, and technological advancement.

The Internationalist

Anderson made it clear he's an internationalist, but that doesn't mean an accommodating diplomat. In numerous speeches, he has railed against the characterization of the multinational as "villain" and the increasing governmental, union, and other pressures put upon them worldwide. He is even more disturbed by the "recent trend away from the global economy concept—a concept which made possible the unprecedented expansion of international business since World War II. In its place we are seeing the emergence of nearsighted nationalism, economic blocs, and commodity cartels."

The NCR's, IBM's and other multinationals have to live within most constraints abroad and cope with nationalistic support for local industry, but Anderson is most perturbed that American trade has its strongest adversary at home—the U.S. government.

In a speech last winter, Anderson jabbed Congress, which "readily concedes that export growth is an essential national goal. Has it therefore sought to stimulate exports? Quite the opposite. The so-called Tax Reform Act of 1976 actually weakened the few trade growth incentives previously offered American business."

Anderson is not enamoured of the Carter administration so far, either, since many facets of its planned tax package go even further than the 1976 act. He had disagreed with the 1976 provision that sought to cut back the tax deferments on overseas profits allocated to DISC's (Domestic International Sales Corporations). Now indications are that Carter wants to do away with DISC's altogether.

Taxing overseas employees

There are several other reforms Anderson opposes, but one that upsets him most is the provision that would tax as income any company-paid expenses for Americans working overseas. He noted that, for example, an American living in Japan might have to pay $4,000 a month for housing that equals his home in the U.S. with $500 a month. If the company pays, he is taxed for $48,000 above his earnings. The same is true for education or travel home or other expenses.

While many U.S. multinationals say that the percentage of American employees working abroad is dwindling rapidly in favor of hiring nationals, this certainly does not help the new company just starting up abroad. Nor, said Anderson, is it wise to trim it too far back since the leading edge of technology is still in the U.S. But he is most concerned about the long-range effect.

"Fewer young American managers will be sent abroad to gain international experience. That means fewer internationalists in the future. I am one, and that worries me." The point is that corporations like NCR are placing increasing importance on the development of people who are able to operate effectively—both culturally and professionally—in an international environment, a long, demanding, and selective process.

NCR developed a chief executive that way.

—Angeline Pantages

Security

Hard Day's Night

Leland H. Amaya, president of the Securities Industry Automation Corp., was at home in Darien, Conn., when it hit, knocking out power in New York City and engulfing millions in total darkness.

It was Wednesday night, July 13, about 9:30. Amaya had finished dinner and was watching television. The picture began to fuzz and then went out altogether. "What the hell's the matter?" Amaya said to himself. Lightning illuminated the sky in quick, brilliant sequences. And it was pouring. Amaya changed channels. Nothing. And then the calls started coming. Sam Alward, SIAC's senior v.p. of operations, was on the line. Alward lives in New York City. All he had to do was look out the window to confirm what Amaya already feared—a full-scale blackout was in effect.

Amaya mentioned blackout to a computer person and he or she is likely to break out in a cold sweat. And Amaya had far more to lose that most people. Not only is SIAC's own system enormous, but it's the processing hub for dozens of other systems that interconnect with it.

And all four SIAC computer sites had been up doing program testing and post-trade operations for the stock market—at least they had been until the blackout hit and the power went off.

The impact

While Amaya was making up his mind what to do, the impact of the blackout was being felt sharply in the affected areas. The two national news services, United Press International, which is heavily automated, and the Associated Press, which is less so, were knocked out, putting the news flow, and information about the power outage, at a standstill. Citibank cut over to its two diesel powered generators downtown and continued processing without any major interruptions. Similarly, New York Telephone went to its backup battery systems, then moved over to its own diesel and gas turbine powered generators to keep its electronic switching systems in operation. The phone system functioned effectively throughout the emergency, as a result handling a record number of calls.

Other users were not so fortunate. Con Edison's three IBM 370/168s, a 158, and a 360/65 were out, but did not lose any data. Insurance giant Equitable Life, also an IBM user, had its system ko'd. Moreover, the two 30 HP communications links to the firm's backup system in Easton, Pa., were also out of commission. Fortunately there was no lasting damage to the system, however. Chemical Bank and Chase's computers would also go out, though an auxiliary power system enabled them to phase down slowly and thus escape damage or lost data. Even so, Chase's system would not be operational until late Friday night, more than 48 hours after the lights went off. And Equitable would come back at 4 p.m. Friday.

No time for sleep

In Darien, Amaya had made an effort to grab some sleep before going into the city. But the effort was futile. He kept lying in bed imagining the consequences of what would happen if all the computers that kept Wall Street running were down. Probably no computer system in the country is more conspicuous when out of operation. Five minutes of downtime usually mean big headlines. Imagine what a major outage would produce? A little after 2 a.m., he made the decision to drive into New York. Sleep was out of the question.

Others were wide awake too. IBM had established a communications center to track computer sites in lower Manhattan that might be affected. Other centers also opened up around the city. The firm’s office at 2 Penn Plaza, however, was shut tight and IBM customer engineers were unable to get into the building. Frustrated, they gathered in the lobby. Meanwhile, IBM users and users of other vendors' equipment who had UPS (Uninterruptible Power Supplies) were congratulating themselves on their foresight.

At the same time, Univac was flying service people in from neighboring areas, putting those who were not immediately needed up in darkened hotels on standby and bringing the others into affected sites. Some Westchester Univac users—as well as those of other ven-
dors—were having additional problems because of power burps, sudden surges of power that would come from down the lines, put a system on again, and then dissipate. The Univac people drew up a priority list of customers. National defense came first, then the hospitals, the securities industry where they had customers like SIAC, next communications, and finally the commercial users. Hundreds of calls were made by all the major cpu vendors to customers suggesting the course of action to take. An initial power surge when the electricity came back up could raise havoc if it hit a machine that was still operational. Users were told to turn their cpu’s off. The mini vendors were slightly less harried. Many of the 4,000 DEC machines in the area were not in operation. Those that were powered down automatically, thereby avoiding serious damage.

“Cat scanner” down

Same story with Data General’s 140 users in the area. In fact, the firm received only a few more calls than usual. There was at least one emergency, though—at Eastside Radiology, a hospital using a “Cat Scanner,” a computerized scanning system that in effect provides automated x-rays of the brain and body. It went down. EMI Medical, which supplies the system, and Data General, which provides the minis that drive it both rushed service people in and within a short time the scanner was working, operating under emergency power generated by the hospital. By now Amaya was at SIAC’s offices at 55 Water St. So were a number of other executives plus service people from Univac, Collins, and the firm’s other vendors. One major computer room is on the 21st floor, a long walk in the dark. Amaya and the others went up to gauge the damage. The water cooling system on the floor above had gone off and water was pouring down on the computers. Further, an auxiliary power source located in the basement of another site was also flooded. “It’s absolutely dead,” Amaya said of the giant SIAC system.

The long march

Luckily, SIAC has a reciprocal agreement with Merrill Lynch and Merrill’s three IBM 370/1685s and its 370/155 were operating on auxiliary power. It was absolutely essential to complete the post-trade processing, particularly options clearance and settlement. Amaya and the other SIAC employees present started a brigade over to Merrill, marching up and down seemingly endless flights of stairs to the Merrill data center carrying tapes, discs, and files throughout the night.

The following day, Thursday, the New York and American Exchanges were shut down. Amaya and his crew could assess the damage in daylight. Leaky air conditioning units had been a principle cause of harm, as they would prove to be at other sites around the city. SIAC employees and vendor service people employed hair blowers, water vacuums, and fans to dry things off, squeezing the last juice out of the UPS service batteries.

The real problem, however, was a power spike that preceded the blackout and went clear through the UPS buffer, registering an increase of over 10 volts on the computer side. This was after the system had filtered down the power. A big Honeywell user recorded a similar impact. Amaya theorized that one of the lightning bolts which had originally knocked Con Ed out of business had actually gotten into the electrical system, causing the tremendous power surge.

But there was little time for theorizing. Despite the one day respite, the SIAC crew had to have its processing capabilities operational by the beginning of the trading day Friday. The regional stock exchanges which hadn’t shut down Thursday couldn’t report their trades on the consolidated ticker unless SIAC was up. And options trading would be absolutely chaotic if SIAC’s system was down another day. In various parts of the city power began to go on Thursday afternoon. Even so, service companies like Sorbus discovered that some of their customers, big users who had always had their systems operating 24 hours a day, now didn’t know how to turn them on again. They simply had never had the systems off in the past, and consequently weren’t familiar with the turning on procedure.

Tight schedule

SIAC itself was situated in the last part of New York to gain power. It went on at 10:15 Thursday night. At least another hour and a half would elapse before the concern’s computer sites could be thoroughly dried, cooled, and the machines put on. The crew, most of them, had been up for close to 40 hours now, but the work was necessary. Options trading processing had already been completed on the Merrill system, taken out to a bank in New Jersey, an area not affected by the blackout, and from there transmitted to Chicago where final settlement occurred. Now with SIAC’s own system, the firm had less than 11 hours to complete its post-trade processing and be ready for the opening bell at 10 a.m. Friday—a deadline SIAC met with some luck, and what Amaya terms “a hell of a lot of hard work.” It had been a hard day’s night.

—Laton McCartney

Communications

Computer Inquiry: Opinions From Bell, IBM, and the Justice Dept.

AT&T doesn’t want its 1956 consent decree modified because this would automatically exclude computer-based information services from the offerings the company can market as a regulated communications carrier. Bell insists that many such services are communications, as that term is defined in the Communications Act of 1934, and thus must be offered only by suppliers who have received a license from the FCC.

The phone company is one of some 50 organizations filing comments this summer in the FCC’s second Computer/Communications Inquiry. A basic purpose of this proceeding is to determine which services should be offered exclusively by regulated carriers and which by unregulated suppliers of on-linehardware/software. Rules splitting up the market between the two groups were adopted by the commission in 1971—essentially they consist of definitions differentiating between data processing and data communications—but the march of technology has led the FCC to take another look, and propose a new set of definitions.

Two other key respondents to the current inquiry were IBM and the Dept. of Justice:

IBM, insisting that the distinction between dp and datacom is fuzzy and getting more so, proposed deregulation of all communication carrier offerings, other than basic transmission service, together with modification of AT&T’s consent decree so the phone company could compete in this new market environment.

The Justice Dept. contended that modifying the consent decree would be difficult, basically because there isn’t a compelling need to do so—computerized information services have proliferated in recent years even though the decree has restricted AT&T’s freedom to offer them. But the department’s key point was that it isn’t necessary to let AT&T into the on-line information ser-
Call it as it is

"We believe the commission could adopt regulations in this area under which devices or services perceived by customers as 'data processing services' would be so classified, even if they included significant, indeed generous, 'communication' components. Such an approach would be especially sustainable insofar as it would, under existing law, minimize the potential that FCC economic regulation would intrude into the currently unregulated data processing field. A reviewing court might decline to approve commission regulations that both broadened the ambit of the term 'data processing' and sanctioned increased carrier involvement in the resulting unregulated field. However, there appears to be little likelihood that a court would upset commission regulations which (narrowed) the potential for economic regulation of non-carrier activities in what should by all measurement be a non-regulated field, data processing."

A little later, the department added that it would "endorse such an approach" if the commission adopts it. One result would be to put "many of the new 'value-added carriers' beyond the scope of FCC economic regulation. Such firms have few... of the traditional indicia justifying full-fledged common carrier regulation." Rather, they provide "services the marketplace perceives as data processing... even though (some of these services) resemble 'communications' offerings."

Another result, although it was unstated by the Justice Dept., would be to alter subtly the historic basis for communications regulation: FCC rules, instead of applying to suppliers of communication services and not applying to others, would be applicable on a selective basis to suppliers in both camps, as needed to maintain a desired level of competition.

Incidental components

AT&T's argument was based on the 1934 Communications Act, which says that "wire communication" and "radio communication" include the "providing of instrumentalities, facilities, apparatus, and services incidental to... transmission." The company's key point was that subsequent development of technology and user needs makes dp an incidental component of regulated communication. But the FCC hasn't fully recognized this relationship, AT&T contends, in its newly proposed definition of data processing allegedly bars regulated carriers from providing significant dp-based communication services.

The phone company wants the definition rewritten to, among other things, encompass only those operations which change the information content or meaning of input information. AT&T objects to the second part of the FCC's proposed definition, which says that dp can alternatively include processing "where the output information constitutes a programmed response to input information."

One reason for opposing the latter option is that "common carriers... have traditionally provided communication services... include capabilities for text editing, translation, and message retrieval." But another, possibly more significant reason for AT&T's opposition is that "in the future, it is expected that inter- and intraoffice communication services would ideally provide closer integration of voice, video, text, and data communication. For example, the telephone set could be combined with a terminal, perhaps with a cathode ray tube viewer, which would permit the storage and later display of a message... when the recipient is ready to receive it... As new electronic communication applications of this sort develop, the communication common carrier will be a vital option to which users can turn for new services."

While AT&T was trying to squeeze data processing into the tightest possible mold, IBM was doing likewise to "communications common carrier service."

Limited to transmission

The computer giant wants the telephone giant's monopoly limited to transmission of message information that is delivered to the recipient in the same form as it was input by the sender, and without any difference in content.

Under this definition, IBM explained, the translation of information to make it intelligible to a cpu, or to a terminal, would not be a regulated common carrier service, nor could a tariffed service "take programmed actions on the basis of the content of the user's message... to produce a response or control the routing of a message." This latter restriction, if implemented, would reduce the appeal of systems like AT&T's Transaction Network Service (TNS). They could not decide automatically, based on the amount of the transmission, what credit authorization source—e.g. a "negative" file or general credit file—to access at the customer's central computer. Bell would have to offer TNS on a non-tariffed basis, as a data processing rather than a communications service, if it wanted to include this capability.

Promote competition

The commission has ample power, said IBM, to redefine communications common carrier service along the lines described above, and to seek modification of the 1956 consent decree. Both actions would promote competition, the company said, and "to the extent that pro-competitive policies have been adopted by the commission with respect to interconnection, specialized common carriers, and domestic satellites, these policies have been uniformly sustained judicially."

However, the Justice Dept. argued that "it is not realistic" to assume the consent decree can be modified. "The economic strength of a protected market should not be used to gain advantage in tenuously related competitive markets," the department pointed out. Justice also argued that although the communications industry has changed since 1956, AT&T hasn't—"Its dominance has not... become attenuated... Thus, "It is still true... that the entry of an enterprise with the size and... power of AT&T into unregulated data processing might raise serious questions... of economic policy... We do not believe the record shows that regulatory bodies have been markedly successful in regulating or controlling the cross-dealings between AT&T and its present unregulated, separate subsidiaries, such as Western Electric. Could an equity court be assured that what has not worked particularly well in the past... will nonetheless work well in the future?"

Each respondent to the inquiry now gets a chance to attack the views expressed by the others, after which the commission will take a look at what everyone has said and decide whether the proposed rules should be adopted, changed, or completely rewritten. When this latter event will occur is anybody's guess. Don't hold your breath, however; it won't be soon.

—P.H.

Bell Must Start Over Again on WATS Rates

Revised WATS rates—reducing charges for about 60% of the users and increasing them for the other 40%—were rejected by the Federal Communications Commission last month. AT&T, which had submitted 56 volumes of backup material containing 16,000 pages, was told in effect to start all over again.

However, one part of the filing was accepted: it extends WATS to Hawaii and Alaska.

The rejected portion of the tariff was "unlawful on its face," said the commission in a unanimous decision. AT&T allegedly failed to satisfy a number of requirements imposed by two previous FCC orders, issued last year. (AT&T Long Lines president Richard Hough categorically denied this charge in a statement
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news in perspective

issued shortly after the WATS rejection was announced.)

One requirement, which grew out of a lengthy investigation of the WATS rate structure (Docket 19989) that ended in May 1976, called upon the phone company to submit detailed cost of service studies showing that WATS either is or isn't a bulk rate offering of dial-up long distance telephone service.

The phone company's basic position has been that such studies aren't necessary, and that WATS charges can be justified solely by maintaining "consistent" rate relationships with dial-up rates. The FCC argues this "alignment" approach is unacceptable because, among other things, it results in preferential rate treatment for long haul outward and inward WATS subscribers against short haul subscribers.

**Order to switch**

Another bone of contention involves the method used by the phone company to allocate costs among its various services. Last October, the commission told AT&T to switch from long run incremental costing (LRIC) to fully distributed costing (FDC). The proposed WATS tariff was rejected last month partly because the supporting FDC cost data was "either out of date or trending forward without required new cost studies," as the FCC put it.

The commission's order requires AT&T to submit within 15 days a proposed schedule for filing "a fully justified and lawful WATS tariff." Also, an "accounting order" remains in effect. It forces the company to continue keeping track of WATS revenues by class of service (Measured Time; Full Business Day, etc.) so that rebates may be paid for a while. AT&T has asked for a 75-day delay to prepare detailed implementation plans with the participating carriers.

The phone company also was told in last month's order to file plans within 30 days for extending WATS to Puerto Rico and the U.S. Virgin Islands.

**Disagreement over revenue**

Last April, AT&T, in a letter to the commission, reported that service to these points could not begin because of disagreement with the other carriers over how to split up the revenue. Thus, it isn't clear whether the 30-day deadline will be obeyed.

The rejected WATS tariff provided reductions in usage rates for 89% of all inward WATS customers, and 56% of all outward WATS customers, according to AT&T. The beneficiaries, generally, would have been customers using WATS circuits 91 to 150 hours per month. Those using WATS for longer periods would have paid higher rates. AT&T said the increases amounted to more than 10% for 8% of all inward and 7% of all outward WATS users. The FCC pointed out in last month's ruling that these increases would have ranged as high as 70%.

In addition, charges for extension stations, terminal installations, and moves, for access line conversion, and for suspension of outward WATS service were restructured and generally increased. Other major changes included: reduction of the present five WATS bands, covering the contiguous 48 states, to three bands; reduction of the present 18 rate steps to eight; combination of measured time (MT) and full business day (FBD) services, and separate rates for inward and outward WATS.

**Line Sharing Offer Extended Again**

Telpak users won another temporary victory last month in their battle to continue leasing bulk private line channels at bargain basement rates. At the same time, rate decreases for many non-Telpak users were deferred.

Last March, AT&T announced that it was ending Telpak because of two earlier FCC orders: one declared the present tariff illegal and the other required the phone company—if it filed new bulk rates—to allow sharing of the circuits by virtually all private line users. Subsequently, after being inundated with protests from Telpak users, the commission rescinded its termination order, pending the outcome of a hearing. AT&T then announced it would continue Telpak, but only until June 21—the date on which sharing was supposed to begin. Shortly before the 21st, a federal appeals court in New York City deferred sharing one month, and AT&T extended Telpak accordingly. That set the stage for the latest act in the drama:

On the 21st of last month, the New York appeals court refused to defer the sharing order any longer. The phone company then announced that Telpak would cease at midnight. But immedi-
Atately after this announcement, Telpak users won an injunction from a federal appeals court in Washington which forces the company to continue Telpak as presently offered—i.e. on an unshared basis. This injunction remains in effect until the court has reviewed the commission’s decision declaring the existing Telpak tariff illegal, a process likely to take several weeks.

**Costs would soar**

Under the Telpak arrangement, the telephone company leases lines at the rate of 60 or 240 lines to users who can use them or resell them. The lines are offered at huge discounts by the telephone company, which would like to have the unused lines for lease by itself.

Ending Telpak would increase costs several millions of dollars for present users of the service. The Department of Defense and the General Services Administration, which lease about 65% of all Telpak’s circuits, have told the commission that the Feds will be forced to pay an additional $84 million per year in circuit charges. The news wire services estimate that their costs will increase 75% ($8.5 million per year), and ARINC—the airline communications cooperative—has predicted a 30%, $15 million annual increase. All of which helps explain why there were howls of protest when AT&T announced its intention to ax Telpak.

**Others must wait**

Although Telpak users had won another reprieve, other private line users must wait awhile longer for rate decreases that probably would have gone into effect soon after Telpak’s expiration. These reductions stem from an FCC decision last fall (Docket 18128) which ordered AT&T to file new rates for all of its private line services based on a “fully distributed cost” (FDC) method of allocating the related service expenses. The company, for years, has been using a scheme known as “long run incremental costing” (LRIC), which, allegedly, enabled Bell to cross-subsidize its competitive services with revenue earned from its monopoly services, and thereby gain an unfair pricing advantage over specialized carriers and independent terminal equipment makers. FDC is meant to eliminate this advantage.

Last March, the first of the FDC-based tariffs—covering individual voice grade private lines (Series 2,000-3,000)—was submitted to the FDC. It provided for reductions of up to 39% in the pre-existing Multi-Hyphen Schedule Private Line (SPL) rates charged for these circuits, i.e. more than 60, 100, or 200 miles, depending on the terminal cities involved. But there was a qualification: the new MPL tariff wouldn’t take effect until Telpak was terminated. And, since Telpak has not yet been terminated, the savings promised by the new tariff remained no more than that.

**Enormous stakes**

For AT&T, as well as the specialized carriers, the stakes in the Telpak battle are enormous. Because of the big discounts embedded in the present tariff, the specialized carriers have been forced to offer competitive bulk rates on which they make little or no money. In some cases—MC1 is one example—the specialized carriers are heavily in debt, so a continuation of AT&T’s bulk rate offering might push the phone company’s competition over the brink.

For Bell, the economics are reversed. Telpak is a real money maker because of the company’s real market share and greater diversity of services. “The key point to remember,” explains an FCC source, “is that a Telpak ‘C’ customer, who leases 60 circuits, can save money over the individual circuit rate, if he actually uses only 35 circuits: for Telpak ‘D’ customers, the cross-over is about 120 circuits—i.e. half of the 240 circuits they actually lease. This means that the phone company now can collect twice, in effect, for 40% to 50% of its Telpak circuits: once from those customers who lease these facilities but don’t actually use them, and again from the actual users. The latter group is large because Telpak circuits can be used alternatively for MTS, WATS, or as individual private lines. The FCC’s sharing decision erases these benefits because it allows virtually all private line users to lease Telpak jointly. This will increase utilization significantly and drastically reduce the opportunity to collect from two customers simultaneously for the same circuit line.”

**Marketing**

**DEC’s Bill-Back Deal Explained**

Recently revealed qualification rules for DEC’s new and controversial “no-bill-back” contract for DEC terminal sales outline a market strategy which should effectively isolate two major segments of the data communications market for DEC’s in-house sales force—even as their new 56% super discount for distributors who take 5,000-plus terminals concedes most of the open market sales to their largest resellers.

Both the “no-bill-back” contract and the 5,000-plus terminal purchase discount rate evolved from DEC’s negotiations with AT&T last year, which culminated in the January contract in which AT&T signed for 5,000 DECwriters annually for three years. Now, in the light of background provided by DEC executives, it appears that DEC expects the Bell operating companies to purchase double the face-value volume of the contract, or 30,000 terminals over the three-year term. In fact, said DEC terminal product manager William Chalmers, the double-apparent-volume formula is the bottom line on “no-bill-back” contract.

The term “no-bill-back” refers to the elimination of a clause in the DEC component’s standard sales agreement whereby DEC holds the option of retroactively billing the purchaser at a higher price if the customer does not take the number of machines he was committed to purchase. DEC prices terminal products according to the purchase plans of large end users (or, as with oem’s and resellers, expected sales goals), and then bills as the units are shipped to the purchaser; the bill-back clause is DEC’s insurance policy.

For two kinds of customers

Although it is theoretically available to all purchasers, oem’s and resellers as well as end users, the no-bill-back contract was developed specifically for two types of customer who have a history of large volume purchases, but are either incapable of committing themselves to a given volume because of decentralized purchasing, or are simply unable to risk retroactive billing for re-
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troactive discounting) because their annual finance package is subject to government regulatory tariff review.

The first category, explains DECTman Chalmers, includes numerous national and international firms with histories of constant terminal purchases in volume, but with no centralized buying and policies that forbid any one department from committing other departments to buy.

The second category, which includes not only the Bell sisters and the independent telephone companies, but "hundreds, maybe thousands," of regulated businesses under the authority of local, state, national, and international rate-setting boards, has been legally and practically blocked from signing contracts that carried any risk of bilback that would change, even in a minor way, the financial package upon which they claimed tariffs. Consequently, they too were unable to claim DEC's volume discounts.

"So what we did," said Chalmers, "was to try to understand the tariffing problems and this other problem of decentralized corporations. We worked closely with our legal department and we came up with a plan: the no-bill-back contract.

The essence of the deal is a trade-off. The buyer accepts a discount set at approximately half the volume level they would commit for (if they could pledge company credit); and DEC, for its part, gives up its bill-back clause. Buyers pay more for an uncluttered contract.

AT&T, said Chalmers, was the first to sign a no-bill-back contract, but since January, Digital has signed several others, "and they go from a large manufacturing company to an insurance-type company to a banking type company." In practice, he added, DEC has been very conservative in assigning the expected or potential volume figure for no-billback—the figure which is halved to get the actual discount level. When DEC gives up the bill-back, the buyer gives up the right to claim a higher discount on true volume, "but we do our homework on individual companies," said Chalmers, "and we believe we have almost no risk."

"Public knowledge"

Chalmers claims the no-bill-back policy has been "public knowledge" since January, but in practice the existence of the new purchase policy seems to have been held in tight confidence—apparently for competitive advantage against other terminal manufacturers and DEC's own independent reseller network—until a DATAMATION item two months ago (June, p. 15) detailed the secret provisions of the AT&T contract. In April, for instance, Chalmers himself told executives at Carterfone Communications, one of DEC's largest leasing resellers, that DEC was then "considering" a new type of contract and "hinted that it might contain a no-bill-back type of clause," according to Carterfone marketing director Pat Houston. "It wasn't offered to me. He said it was a prospective arrangement, still up for internal committee review at DEC."

Chalmers, with the approval of AT&T, explained the nature and pricing of the previously confidential optional service clauses in the AT&T contract, describing the earlier report (on which AT&T at the time refused comment) as incomplete and misleading. Chalmers conceded that the Bell operating companies, which will purchase separately under the umbrella of the AT&T contract, can choose several options DEC's factory options integration; whole unit warranties; and small order/shipment alternatives—that had not and have not been made available to their normal resellers and other volume buyers. The options were offered at AT&T's insistence, he explained, in a competitive situation, "and while we gave them what they wanted, we expressed that we didn't want to do it in dollars."

Pricing is high

The pricing for these extra service op-

The DEC plan

DEC has required that the purchasing Bell operating companies pay the surcharge on all terminals they order if they want any one of the optional services on any machine. (The DATAMATION story, which raised a furor among DEC's resellers, listed and priced the options, but did not explain that they were offered to the operating companies on an all-or-nothing basis.)

Because of the confidentiality clause in the contract, DEC previously had been unable to discuss or explain the widely rumored "extras" in the AT&T deal, said Chalmers. "Rumors are rumors and there has been very little I could do about them," he added forcefully, "but when the smoke clears, I can assure you that nothing was done by this company that was not morally and ethically correct... I'm an honest person. If you run the math out, you will quickly see that I have kept the faith and DEC has kept the faith (with the DEC resellers). There are no losses in that contract."

V.M.

James R. Bradburn

"He was one of two or three of the smartest students I had in eleven years of teaching at Cal Tech," said Philip S. Fogg of James R. Bradburn.

Bradburn, who died last month at his home in Mirror Lake, N. H., at the age of 66, was described by another associate from his early days in the computer industry, Bill Loneragan, now with Xerox Development Corp., as "a pioneering dp executive." Indeed he was one of the first, and Fogg had something to do with that.

"After he left Cal Tech, I persuaded him to go to Harvard Business School," Fogg said. Bradburn received an engineering degree from Cal Tech in 1931. He was graduated from Harvard Business School in 1933. Fogg's task at Cal Tech was to teach business subjects to engineers. He kept track of his prize pupil after he'd left school. "He was one of the finest young men I have ever known. After the war I persuaded him to join my company." That was Consolidated Electro- dynamics, Pasadena, Calif., of which Fogg was president and which later was acquired by Bell & Howell."

James R. Bradburn

"He (Bradburn) was basically responsible for our investigation of computers. He started looking into computers in 1948," Fogg recalled. Between school and joining Consoli-
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August, 1977
dated Electrodymanics, Bradburn held engineering positions with General Electric and Eastman Kodak, and served as a major in Army Ordnance.

Consolidated Electrodymanics spun off its computer operations, which was developing the Datatron computer, in 1953, as ElectroData Corp. Bradburn became president of ElectroData. "Bradburn recognized relatively early the value of concentrating on the commercial side of the computer market rather than on the scientific side," recalled John Alrich, who worked at ElectroData as an engineer and now is with Xerox Corp. "All State Insurance bought our first system."

Alrich also credits Bradburn with "bringing in (to ElectroData) one of the finest logic designers in the world, Dr. Ernest Selmer, now a professor of mathematics at the Univ. of Bergen, Norway."

Burroughs acquisition

ElectroData was acquired by Burroughs Corp. in 1956. "We put Burroughs in the computer business," said Fogg of the sale. In 1960, Burroughs underwent a corporate reorganization, ElectroData was folded into the overall corporate structure, and Bradburn moved to Detroit as corporate v.p. for manufacturing and engineering.

Ed McColllister, who was hired by Bradburn at ElectroData in 1954 and worked under him for five years, takes credit for Bradburn's next career move, to the RCA Computer Operation where he was v.p. and general manager from 1966 until early 1970.

"I was the key person in bringing him into RCA," said McColllister who was then marketing manager of that firm's computer organization. "I felt he could contribute to the success of the operation because of his excellent administrative abilities."

When Bradburn left RCA in 1970, the official line was he had "resigned because of pressing personal requirements." RCA insiders said at the time he was fired abruptly by Robert Sarnoff. Securities and Exchange Commission records indicate RCA agreed to pay Bradburn about $230,000 when he left.

A consultant

From 1970 until the time of his death, Bradburn operated as an independent computer industry consultant. At the time of his death he was involved in a consulting assignment for Systems Development Corp.

A native of Los Angeles, he operated his consulting business on both coasts. In addition to his Mirror Lake home, he maintained one in Santa Barbara, Calif. He was a member of the board of directors of Electronic Memories and Magnetics Corp.

A devout Christian Scientist, Bradburn also was an avid skiing enthusiast and outdoorsman. "Earlier this year," an associate recalled, "he had scaled the walls of the Yosemite Valley."

Bradburn is survived by his wife, King, a daughter, Mrs. John C. Schierholz, two sons, James H. and Kenneth, and eight grandchildren.

Software Taxes

The Tax Fight Goes On... And On

For those fighting the big battle against imposition of sales taxes on computer software and services, particularly retroactive imposition, there's been good news and bad news and the waters are still muddy.

In New York, where the state has been auditing software and service com-
companies based on rules adopted last Sept. 1, and occasionally levying retroactive assessments (May, p. 155), the state’s Dept. of Taxation and Finance has said it will conduct an “informational hearing on the problems of the computer industry,” on Aug. 23. The hearing will be held at the department’s headquarters in Albany.

In a letter to interested parties, Thomas H. Lynch, Tax Commissioner, said the purpose of the hearing “will be to obtain information necessary to promulgate an industry regulation which will cover the application of the sales and use tax to various facets of the industry.”

Robert Sherin, president of Nova Computing Services, Inc., Miami, who is fighting the New York assessments, was encouraged by the granting of a hearing. In a letter thanking Lynch and the commission for granting the hearing, Sherin requested “the opportunity at the hearing to know and to meet, with the use of rebuttal evidence, cross-examination, and argument, unfavorable evidence of adjudicative facts.”

He said his request isn’t granted; he will request that the “Florida transcripts be read into the record.” He was referring to transcripts of his successful legal battle in Florida to offset software sales taxes.

Sherin’s firm and Informatics Inc., have filed petitions under New York State’s Administrative Procedures Act protesting taxation on software sales. Informatics is seeking a revision of its “letter of determination,” a state document indicating taxes are owed.

No luck in Wisconsin

In Wisconsin, Mike Zeidler, an independent computer consultant, fought a clause in a state budget bill which would impose a 4% sales tax on software and dp related services, and lost. The budget bill, with the clause, was passed in late June and became effective Aug. 1.

Zeidler was alternately encouraged and discouraged during his fight. In early May, just after the bill, with the bothersome clause, was passed out of the Joint Finance Committee and on to the Senate, he wrote to the governor, members of the state Senate and members of the state Assembly congratulating them on their “win.”

“This very day I have started to work to dismantle my business. It’s all over. All that hard work. All that creative effort. All that hard effort,” he wrote. “You won! You won big! I lost! I lost big.”

But, in early June Zeidler was more encouraged. The state Assembly on May 31 voted 80-19 to remove the 4% computer sales tax from the budget. “There appears to be more sympathy for the data processing industry in the state Assembly than there was in the state Senate,” he said at the time.

But the lawmakers ultimately decided to include the tax “for reasons of consistency.” State Rep. R. Michael Ferrall, assistant majority floor leader, said in a letter to Zeidler: “The sales tax law currently applies to some but not all sales of computer and dp services… This situation may lead to confusion as to what is and what is not taxed. This proposal would impose the sales tax more uniformly on dp services.”

The TI case

Another event seen as a setback in the fight against sales taxes was the overruling by a U. S. Court of Appeals in New Orleans of the Texas Instruments vs. U.S. case in which a lower court had ruled that TI could not claim investment tax credit for software because software is intangible. The earlier decision was a much used argument by those opposing sales taxes on software.

The Data Processing Management Assoc., at a meeting in Florida in mid-

August, 1977
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July, decided to get into the fight with funds. The move is the first by a user group. The Assn. of Data Processing Service Organizations (ADAPSO) has been in the fight since early last year. George R. Eggert, v.p., industry and government relations, will be spearheading DPGA efforts. Sherin will be working with him. "All my work is free," emphasized the Floridian.

Sherin sees the flight as "limited in scope...we shouldn't take on every package." "This very day I have started to work to dismantle my business. It's all over. All that hard work. All that creative effort."

state. I wouldn't want to take on California. The whole thing started there."

But there are those in California who want to fight. "The fiscal problems of the state have, at least in part, been converted and transferred onto our industry," said Albert A. Eisenstat, v.p. and corporate counsel of Tymshare, Inc., Cupertino, Calif., at a recent meeting of the Computer Law Assn. in San Francisco to discuss taxation issues and problems.

"We are a ripe and ever-expanding industry," Eisenstat said, and various jurisdictions "are aggressively seeking ways to levy taxes on our industry's services to bolster sagging coffers."

To date, he said, state and local efforts often have been inconsistent or misdirected, and have been handled on an ad hoc, case by case basis. "Ultimately our industry will have to become more involved with legislative solutions" to these problems so that uniform ground rules and guide lines may be developed.

—Edith Myers

Applications

Underwater Business

Back in 1958, a small group of divers in Lahaina, Maui, Hawaii, banded together under the name Maui Divers, practicing their skills for whatever income they could obtain.

Among the things they did then was finding underwater locales for Hollywood movie crews and providing technical help with the filming. During that time they discovered rich colonies of black coral in the Lahaina waters, 200 to 250 feet down. They brought some of it up and began fashioning crude jewelry that was an immediate success. But it was still small business. They hardly needed a computer.

In 1962, a young man named Cliff Slater joined the group. Over the years, ownership of the company changed hands and Slater became president. The company moved to Honolulu. Sophisticated jewelry manufacturing techniques were initiated. Maui Divers today is a multimillion-dollar a year business.

"Today they need and have a computer—an IBM System/3, Model 12, installed late last year.

Since the discovery of the black coral, Maui Divers has discovered supplies of gold and pink coral at greater depths, creating a need for another bit of modern technology—a specially engineered, two-man submarine, built for Maui Divers by General Dynamics Corp.

The sub makes more dives on a regular basis than all the rest of the world's civilian submarines put together. It harvests the coral using a hydraulic claw and clippers to snip the coral trees and store clippings in a wire basket in front of the vessel. Clippings are kept in the basket until the sub surfaces. The procedures, said Robert Taylor, v.p. of Maui Divers, have the endorsement of leading ecologists.

Optimum use

When the sub surfaces, the clippings are carried from the pier to a production plant where the raw coral is sorted and inspected. When optimum use of each coral specimen has been determined, Maui Divers' technicians cut, polish, and mount the coral in a variety of rings, pendants, brooches, earrings, and special pieces.

"Our business has grown from 25% to 65% per year," said Taylor. "Having the resources to harvest our own gold and pink coral, and to buy large quantities of black coral from independent divers is just part of the story."

"Keeping close tabs on the manufacturing process, and doing the best possible job of processing orders and managing our inventories is the other part." That's where the computer comes in.

Maui Divers has been using some form of data processing since December 1965, when the firm signed up with a small service bureau. From December 1966 until May of 1969, its dp chores were handled by a Dura typewriter machine. Then, from May '69 until August '71, the job went to an IBM 403 accounting machine.

In August 1971 the company went back to a small service bureau and, as business swelled, went to a large service
bureau from November '72 until August 1973. That month Maui Divers acquired its first computer, an IBM S/3 Model 6. This was replaced by a Model 8 in August 1975 and by the current 12 last October.

Cost justification

“We cost-justified each step in both applications development and computer acquisition,” said Taylor. “We examined the alternatives of manual, service bureau, and our own computer processing options and, in addition, analyzed the financial benefits and the intangibles involved.”

For fiscal year 1977, Maui Divers expects to spend $116,172 on data processing. Taylor said it would be very difficult to duplicate many of the firm’s computerized systems. “However, assuming that all of the functions, including the invoicing, accounts receivable, sales analysis, inventory controls, purchasing, production scheduling, general ledger, and budget controls were to be done manually, a conservative estimate of the number of added people required would be in the range of 12 to 15. When you consider the office space, fringe benefits, calculators, and typewriters, and additional supervisory personnel, the cost is prohibitive.”

In comparing costs of an in-house system against those of a service bureau, Taylor noted that one in-house programmer costs $1,000 per month while the same number of hours at a service bureau would cost about $4,200 per month. “In the past three years,” he said, “we have done a considerable amount of system development and have, as a result, some very sophisticated systems. To develop the same with a service bureau would cost a great deal more.”

Taylor did a monthly cost comparison, assuming service bureau programmers are twice as efficient but four times as costly as in-house programmers (he has a staff of five), and came up with $10,189 for the in-house computer against $13,350 for a service bureau.

“Each step in our manufacturing and distribution process is under computer control,” Taylor said.

Control for customers

“In addition to maintaining constant control within our operations in Honolulu, we also provide inventory control for our customers, calculating a required inventory according to each customer’s wishes so that each maintains a 98% in-stock condition on best selling items—an industry standard.”

As a by-product of tight production and inventory control, Maui Diver’s management can see at a glance daily which items are in high demand, peaking out, or in a decline.

“By using the management reports the computer spins off from its routine operations,” Taylor noted, “we can stay one step ahead of the constant changes in taste of the jewelry buying public.”

Maui Divers’ integrated data processing applications tie production scheduling, invoicing, sales analysis, bill of materials processing, customer and company inventory analysis, purchasing, and accounting into a continuous process.

And, in the meantime, the company’s minisub pilot, Bohdan Bartko, is setting a new world’s record—the most dives in a civilian, commercial submarine—every time he goes to work.

—E. M.
News in Perspective

BENCHMARKS . . .

Buy, Don't Lease: IBM has spent considerable money training its salesmen to push purchases, not leases, to customers and it's paid off. Its net income in the second quarter of 1977 soared to an 11% increase over last year's same period, considerably better than the 5.3% rise in the first quarter, which many analysts called a disappointment. Its record income of $683.3 million in the second quarter was due to a "substantial" increase in outright purchases of computers, according to IBM chairman Frank T. Cary. NCR second quarter revenues rose 13% to $627.8 million from $556.3 million and its second quarter profit soared 86% to $34.4 million, compared with $18.5 million a year ago. Control Data Corp.'s computer industry revenue in the second quarter rose 10% from $335.1 to $369.8 million. Total earnings of Control Data soared 26% to $14.6 million. Honeywell, Inc., claiming "substantial" improvement in its computer business—about 17% ahead of a year earlier—said they contributed to the company's 60% earnings increase of $27.2 million, from $17.1 million in the same quarter a year ago. Sales were up 17.5% to $705.2 million, from $600.6 million a year earlier. Sperky Rand Corp., whose fiscal year ends next March 31, said it expects revenue from orders for its computers to rise about 15% over the previous year. Its Univac division last year had revenues of $1.44 billion out of Sperky's total revenues of $3.27 billion.

IBM's Buy of IBM Cleared: Directors of International Business Machines have authorized the corporation to purchase "from time to time" blocks of its own capital stock, "generally of 5,000 shares or more." Such blocks would be most likely to be offered by institutional investors. IBM said it would buy only through direct transactions with "principals who aren't brokers or dealers" and who offer the stock at no more than the current market price. Purchases were authorized up to the lesser of 2,500,000 shares or $700,000,000 gross purchase price. Last February IBM made a general offer to pay $250 each for as many as 5.5 million shares, then at a 3.6% interest. However, the bid drew a total of 2,567,564 shares, which cost IBM some $721 million including expenses.

An Answer in Kind: IBM's reaction to the success of Amdahl Corp. was to lower prices. It was answered in kind by the Sunnyvale, Calif., manufacturer, which instituted a 29% price reduction to its customers. Despite this the company posted record revenues of $45 million in its second quarter, during which all but one of the 13 systems recorded as sales were at the lower prices. Pretax income was $12.2 million, and that was 13% above the first quarter's income and 584% over the comparable 1976 period. In the first half of this year, Amdahl had revenues of $83 million, already 90% of what they had in all of last year, and the pretax income of $23 million is 96% of the 1976 total.

Better Things Ahead: Eugene R. White, president of Amdahl Corp., told security analysts that the big computer maker expects to increase shipments, improve product margins, and start on further production capacity expansion during the current half-year. He said the company "expects gross margins before operating costs in the third and fourth quarters to be somewhat greater than those in the first two quarters." Gross margin in the second quarter, White reported, was 45.4% compared with 44.3% in the first quarter. He attributed the second quarter improvement to volume efficiencies, reduced component cost, and the company's increased involvement in manufacturing.

Longer Delivery Cycle: Shipping dates for Honeywell's 66/85 announced early this year (March, p. 152) have slipped from third quarter '77 to sometime next year. The company, which didn't specify a month or a quarter, confirmed the fact that circuit packaging problems have caused the delay. A company spokesman said the production problems stem from the micropackaging of the Common Mode Logic (CML) chips used in the new machine. Honeywell's biggest yet. Honeywell claims yielded gate speeds for the CML chips of five to seven times faster than Transistor-Transistor Logic (TTL) circuitry. The chips are produced by Honeywell at its Solid State Electronics Center in Colorado Springs and are second-sourced by Nippon Electric and Texas Instruments. The micropackaging of the chips is done in Phoenix. Details of the micropackaging problems were not disclosed.

Revamped Reality: In the wake of an announcement by Richard Pick, president of Richard Pick and Associates, Irvine, Calif., that he was marketing a more powerful version of Microdata's Reality small business computer system, Microdata said it will do substantially the same thing. Pick was chief designer of the Reality system and says he retains rights to the software. He was a consultant to Microdata until last December. Microdata said it has revamped Reality into a new series called Reality Royale with doubled memory capacity and faster throughput. Pick had said he was going after a market above that addressed by Reality for Reality t and Basic Reality. His firm is buying Microdata 1600 small computers on an oem basis and combining them with Ampex core memory, California Computer Products disk drives, and tec crt's.

Win Some, Lose Some: Memorex Corp. completed one merger and lost out on another when merger talks between the Santa Clara, Calif., firm and Storage Technology Corp., Louisville, Colo., broke down. The completed merger was of Business Systems Technology, Inc., Santa Ana, Calif., into Memorex. BST makes storage equipment for small business systems. In an official announcement of the termination of the merger discussions between STC and Memorex, STC president Jesse Aweida said, "After giving careful consideration to all the terms and conditions, the board of directors of Storage Technology concluded that proceeding further with the merger discussions would not be in the best interests of Storage Technology and its shareholders." Under terms of the Memorex offer, STC would have been merged into Memorex on the basis of .725 shares of Memorex common stock for each share of Storage Technology Stock. There was some speculation that STC felt it was worth more than that, also that the merger was unpopular within STC and the company felt resignations might be the result of its consummation.

Make the Punishment Fit the Crime: Sen. Abe Ribicoff (D.-Conn.) and seven co-sponsors have introduced legislation which would make misuse of the computer systems of the federal government, financial institutions, and electronic funds transfer systems a crime, punishable by 15 years in prison, a $50,000 fine, or both. Sen. Ribicoff said the new legislation is necessary because the laws have not kept pace with rapidly changing computer technology. He said it would give federal prosecutors a weapon against four main categories of computer crime: introduction of fraudulent records or data into computer systems; unauthorized use of computer-related facilities; alteration or destruction of information on files; and stealing money, financial instruments, property, services, or valuable data, whether by electronic means or otherwise. "The simple fact is," the senator, "that computer technology has created vulnerability to white collar crime. The bill is designed to provide criminal sanctions at all points where computer operations are targets for criminals."
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Will Evans, Regional Manager

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(Continued from Page 16)
York user touts features like the high speed (up to 92 characters per second) inkjet printer, diskette storage, and good price performance compared to other systems he's evaluated. Drawbacks? The small screen and lack of numerical processing capabilities are mentioned, but users still give the system high marks overall.

WESTERN UNION: ADDING SATELLITE MUSCLE
Western Union, generally considered an unlikely rival of the fledgling Satellite Business Systems, may end up giving IBM's satellite venture an unexpected dose of competition. As evidence of this, communications insiders point to the added satellite service muscle the carrier could build from a repeal of Section 222 of the Communications Act. Criticized for many years for being too restrictive on international record carriers (IRC), a repeal of the antiquated provision would open up more business to these carriers and would particularly benefit WU, which is vigorously pushing for full service use of its satellite.

The big guns in Congress heading up the repeal drive are Hawaii's Sen. Daniel Inouye and Alaska's Sen. Ted Stevens—both of whom have communications oversight responsibility and both of whom represent states which, under the law, are illogically considered to be international points. Counting on this congressional clout as well as FCC support of a repeal, WU also has its sights set on another strategy to expand its satellite service base. That strategy is aimed at bringing NASA back into the communications satellite fold. Once in business again, sources close to WU say the company would then inherit NASA's Advanced Technology Satellite customers.

IF THE LEFTISTS WIN IN FRANCE
What will happen to American multinationals in France if the leftists take over in the political elections next spring? Observers who watch the scene closely say there's a long list of companies that will be pushed out—either amicably or forcefully, depending on French-American relations at the time. But IBM isn't thought to be on the list, and CIT-Honeywell Bull won't be affected immediately because the government already has a piece of the action. The future of Honeywell's interest in the company, though, is up in the air. France already has toughened its stance with U.S. computer firms, exemplified by its refusal to allow Digital Equipment Corp. to build a plant there—to protect its own mini-computer industry plans—and its constant disapproval of marketing deals struck between U.S. and French firms.

A leftist takeover isn't the certainty today that it was a few months ago, according to these observers, because of party bickering and the supposed poor health of standard bearer Francois Mitterand. Two things are clear, though: France will enjoy a strike-free period until the spring elections; if the Left loses, all French industry, including data processing, will then suffer the most strike-bound era in history.

A LITTLE MORE ATTENTION
The disturbing idea that growing data protectionism around the world—via developing privacy legislation and conventions—will block the flow of data across borders is stirring a little more notice in U.S. government circles (June, p. 115). Industry finally may have a conduit for its opinions via the State Department and an Advisory Committee on Transnational Enterprises. State's task force on transborder data flow gave up on the idea of setting up a new advisory committee because of President Carter's tough edicts against them, and went to the transnational group with the problem. A subgroup, headed by Hugh Donahue of Control Data Corp., is being formed and should have its first meeting in September.

RUMORS AND RAW RANDOM DATA
Vendors are trying to figure out the costs of a tax proposal that would tax as income any company-paid expenses to an American employee working overseas. One vendor, feeling it would have to compensate the employees somehow for the added taxes, figured it would have spent $1 million last year, based on its sales of $300 million abroad. "Computer Embezzlement" was the intriguing headline for a classified ad in a recent Wall Street Journal, but Steve Perkins of San Francisco, who placed the ad, is not an embezzler. The former CPA said he's seen few systems in many years of auditing computer systems that are not vulnerable to embezzlement, and he wants to help companies detect and/or prevent it—all for $8 per hour.
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August, 1977
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The Remex RFS7500 is a better system at lower cost than the OEM can build himself or buy from a minicomputer manufacturer or second level supplier. Don't go to pieces, go to Remex, 1733 E. Alton St., P.O. Box C19533, Irvine, CA 92713 (714) 557-6860.
Off-line

Three firms are trying to make it easier for logic designers to get custom integrated circuits. The latest in the Master Logic Corp., Sunnyvale, Calif., family of semi-custom CMOS chips, the Master Logic 200 has a capacity of 200 gates of random logic, or about 50 counter stages. Prototyping takes eight weeks and costs $6,600. Production prices range from $7 to $17 depending on quantities and packaging requirements.

Interdesign, Inc., Sunnyvale, Calif., offers a 262-gate monolithic. Developed in collaboration with Fairchild Semiconductor, the chip uses silicon-channel, silicon-gate, isoiminer technology. The vendor says the process is more efficient than 1L. The tooling charge is a constant $2,800, and the first 50 prototypes take four weeks.

A few km south of Silicon Guch, the Microelectronic Products Div. of Hughes Aircraft Co., Newport Beach, Calif., will manufacture custom LSI circuits. The new technology, called Schottky Cell Array Technology (SCAT) uses a custom interconnection process to configure LSI circuits from a library of standard MSI and SSI Schottky TTL cells. All cell designs are based on the industry-standard Schottky devices of the 54 LS series. The interconnection method used is a multilayer metallization process that uses two additional layers of thin film metallization; the desired logic function is implemented in a manner similar to the routing on a two-layer printed circuit board. Development of prototypes typically takes 10 to 12 weeks at a price of roughly $10,000.

Transistors provided a quantum jump in processing speeds and now, according to the Lead Industries Assn., Josephson junctions promise a similar increase in performance. The superconducting devices, fabricated by IBM using a lead/indium/gold alloy, are said to operate 10 to 100 times faster than equivalent transistor-based circuits. An experimental device produced by IBM containing 50 Josephson circuits is said to perform multiplications in about 12 nanoseconds.

Oops...In our description of Artisan Electronics' Microcalculator (June, p. 209), the device's add time was given as 690 msec, nearly an order of magnitude slower than the device's true add time of 90 msec.

Hobby Computers

As soon as the hobby computer market took off, we began hearing rumors that the large electronic kit retailers were just about to unveil hobby computers of their own. Now Heath has entered the market with two computers and a line of peripherals. Heath's two computers, the H8 and H11, are built around the 8080A microprocessor and DEC's LSI-11, respectively.

The H8 has an intelligent front panel with octal data entry and display, and a resident monitor with a built-in bootstrap for program loading. It has 1KB of ROM which contains the monitor program for front-panel control and load-dump operations. The cabinet is configured for 32KB of memory, with a total capacity of 64KB of addressable memory. The H8's bus is designed around a ten-slot motherboard that uses 50-pin connectors. Convection cooled, the power supply can handle up to 32KB of memory and two I/O interfaces. The mail order price of $375 includes a fully wired and tested cpu and assembly and operations documentation, as well as all systems software in audio cassette form. Memory and I/O accessories include an 8KB board with 4KB of static RAM ($140), a 4KB expansion chip-set ($95), a serial I/O interface board with 1200 baud audio cassette interface ($110), and a three port parallel interface ($150).

For users with more demanding applications, the H11 comes with a 16-bit LSI-11 cpu (fully wired and tested) and 4K 16-bit words of memory. Memory is expandable to 20KB words. The unit has a built-in back-plane and power supply with switching regulators. A complete DEC system software package, which includes an editor, PAL-11 assembler, on-line debug package (ODT), I/O executive, BASIC, and FOCAL comes with the H11. The mail order price for the H11 is $1,295. Accessories include a 4K by 16 static RAM board ($275), serial interface ($95), and parallel interface ($95).

The company also markets a 12-inch crt ($530, kit), a paper tape reader/punch ($310, kit), and DEC's L36 DECRewriter II, HEATH Co., Benton Harbor, Mich.

Distributed Processing

This vendor has topped its current line of distributed processing systems with the System IV/90, which offers faster cpu speeds, an expanded instruction set, and up to 192KB of memory. Supporting up to 32 video terminals, the IV/90 cpu operates at speeds from two to eight times faster than previous processors in this vendor's line. The IV/90 supports disc storage up to 270MB, printers with speeds from 30 cps to 1,800 lpm, both seven and nine-track mag tape, and card readers. Software developed for earlier models in the product line will run on the IV/90.

An intelligent communications controller, the model 8437, was introduced with the System IV/90. With its own processing unit and up to 16KB of memory, the 8437 supports both binary synchronous (BSC) and Synchronous Data Link Control (SDLC) network disciplines.

Monthly rental for a IV/90 with 12,920-character displays, a 192KB processor with decimal arithmetic, two 67.5MB disc drives, a 600 lpm printer, and the 8437 communication controller is $3,387 on a 42-month lease, including maintenance, software, systems engineering support, and systems education services.

A transaction-oriented software package, Vision provides system source data entry, on-line inquiry and retrieval, local data management, report and document generation, and batch communications. It runs on the vendor's IV/40, IV/50, IV/70 and IV/90 processors with 96KB of memory. Using IBM 3270 protocol, Vision communicates interactively with host mainframes. Information from local files and a central data base may be accessed for display, data validation, or direct record entry. This exchange of data may occur under operator control or automatically through format commands. Data also can be exchanged in batch mode with a host mainframe using IBM 2780/3780 protocol. Vision will be provided free of charge with the vendor's distributed processing systems beginning in September. FOUR PHASE SYSTEMS, INC., Cupertino, Calif. FOR DATA CIRCLE 386 ON READER CARD.

CCD Mass Memory

The CCDisc is a disc that doesn't rotate, according to its manufacturer. Using charge-coupled devices (CCD's) the unit has an average access time of 250usec. Capacities range from 128KB to 1,024KB in 128KB increments. Through daisy-chaining, capacities of up to 4MB can be achieved. The solid state memory is suitable for fast buffer,
Some of the biggest mainframes use the smallest tape drives.

Here’s the number one reason.

Over 2000 Wangco Mod 12 Tape Drives are in use today in mainframe applications around the world. The Mod 12, a low cost, 75 ips tape transport, measures only 24” x 19” x 19”.

What makes this compact tape transport the No. 1 choice for big computer jobs?

The Wangco Mod 12 with vacuum column design provides the super gentle tape handling required in high duty cycle operation. It has Autoload, a feature which permits control of rewind/unload by software as required in large systems.

Equally important, the Wangco Mod 12 is “ruggedized” to operate in mainframe data processing applications, even those requiring continuous operation up to 20 hours per day. Entirely enclosed in a steel chassis, the unit meets critical environmental and RFI specifications, reduces acoustic levels to NC55 and meets the stringent vibration and shock requirements of mainframe applications. The Mod 12 is UL and CSA approved.

In all applications, mainframe or mini, the Wangco Mod 12 will provide 75 ips forward and 200 ips rewind speed with no program restrictions. Data densities to 800 cpi NRZI and 1600 cpi PE are achieved individually or in switch selectable dual density.

There are more good reasons to choose the Wangco Mod 12.

Get full information from Wangco, Inc., 5404 Jandy Place, Los Angeles, CA 90066. (213) 390-8081. In Europe: P.O. Box 7754, Building 70, 1st floor, Schiphol-OOST, Netherlands. Phone: (020) 458269. TWX: 844-18822 WANGCO NL, PERKIN ELMER DATA SYSTEMS
Thermal Film
To help firms making computer-assisted presentations, this company has developed a thermal image film that rapidly converts printout from non-impact terminals to visuals for overhead projection. The thin, light blue, infrared transparency film can be used in place of thermal paper in non-impact terminals. Instead of paper printout, it produces a transparency for immediate overhead projection; no processing, cutting, or framing is required. A carton of six 15-meter rolls sells for $150. 3M CO., VISUAL PRODUCTS DIV., St. Paul, Minn.
FOR DATA CIRCLE 300 ON READER CARD

Color Graphics
A color desktop computer with graphics capabilities, a color graphics terminal, and software which supports English, Arabic, Farsi, and other characters sets have joined this company’s line of color terminal products.

The Intecolor 8031 is an 13-inch, eight-color desktop computer which carries a $5,495 price tag. It offers eight independent background and foreground colors and vector graphics. A standalone microcomputer system, the 8031 supports a high-level basic language. In its standard configuration the unit has 27KB of memory (expandable to 64KB). It also comes with front-mounted single disc and “floppy tape” drives. It can communicate at speeds of up to 9600 bps. The 13-inch screen displays 48 lines of 80 characters, and offers graphics resolution of 160 x 192-elements.

The Intecolor 8013 color graphics terminal, built around an Intel 8080 microprocessor, comes with RAM refresh memory, a separate keyboard, RS232C interface, graphics hardware and software, and a choice of 64 special characters. It displays 48 lines of 80 characters on its 13-inch screen. Space is provided for inserting a single “floppy tape” and mini disc drive combination for additional storage. The basic unit sells for $3,495.

This vendor also has developed a keyboard operating system for its existing Intecolor 8001 color terminal which allows English and numerals to be entered from left to right, while automatically switching to right-to-left input for Arabic, Farsi, and other languages used in the Middle East. Developed by the firm’s Middle East Engineering staff, the software and terminal will be priced at under $5,000, according to the manufacturer. INTELLIGENT SYSTEMS CORP., Norcross, Ga.
FOR DATA CIRCLE 287 ON READER CARD

Plotter
The 7221A Graphic Plotter can draw in four colors on its 11” x 17” bed. The microprocessor-based plotter has an RS232C interface and can accept data
When it's printout forms you handle all day, there are only two ways to have them.

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Moore Business Forms, Inc.

August, 1977
hardware

at speeds ranging from 75 bps to 2400 bps. Some of the plotter's features include built-in buffer memory (1,150 byte), internal alphanumeric character generation, internal arc and circle generation, and user-defined dashed line patterns. Any sequence of plotter instructions may be stored as macros in the plotter's buffer. Up to 64 macros may be defined at one time. Provision is made for plugging in macros stored in PROM's, and the internal data buffer may be increased by an additional 2kB. The unit is also capable of digitizing.

Printer's base price for the 7221A is $4,600, the expanded buffer is an additional $225. Hewlett-Packard Co., Palo Alto, Calif.

Printers

Three new families of printers from this vendor represent a downward thrust into new printer markets. The B-180 and B-300 line printers use a refined steel band font carrier to provide print speeds of 180 lpm and 300 lpm, respectively. In oem quantities of 200, they are priced at $3,000 and $3,300. The M-200 impact matrix head printer uses a dual column 14-wire head. It's rated at 200 lpm in a bidirectional mode, and it sells for $2,000 in oem quantities of 200. The T-80 thermal matrix printer has a non-impact single thermal dot matrix print head to offer a print speed of 80 cps. The printer's thermal technology was developed by Olivetti of Italy; this vendor has signed an exclusive oem agreement to manufacture the technology and market it worldwide in the T-80. The print head is operator-replaceable, so that after its print life of up to 20 million characters, it can be replaced by the user without a service call. Standard interfaces include both serial and rs232c.

Intelligent Terminals

With its eye on the data services, oem, and large end-user markets, this vendor has added the Microterm II and Microcomm intelligent workstations to its line of terminals. The Microterm II has a 12-inch crt capable of displaying 24 lines of 80 characters, an optional 2,200 cps non-impact printer, single or optionally dual mini diskettes, and two Z80 microprocessors. Applications software for the terminal may be written in an extended basic or Z80 assembly language. A typical configuration sells for approximately $5,000 in quantities of 100.

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August, 1977 CIRCLE 23 ON READER CARD 155
The Microcomm is an electronic store-process-forward communications system. In its basic configuration consisting of a 24 line by 80 character CRT, mini diskette storage, floppy controller, 1KB of PROM, 16KB of RAM, parallel printer interface, RS232 interface, keyboard, and a pair of Z80 microprocessors, the unit sells for $8,500. Adding a 2,200 cps printer raises the price to $9,990. DIGI-LOG SYSTEMS, INC., Horsham, Pa.

Paper Tape Decoder
The Tape Checker is a hand-held unit that can read and display the contents of paper tapes. Working on rechargeable batteries or 110VAC power, users draw a tape through the unit's reader while it displays each character. Users can locate errors on the tape, and, with an ancillary splicer/punch, make corrections. The Tape Checker can read either RS244A or RS358 ASCII/ISO code. A template supplied with the ACCUPUNCH allows the user to punch new data without referring to code tables. The Tape Checker sells for $325, the Accu-Punch is $80; purchased together, the pair sells for $350. NC TRON CORP., Granada Hills, Calif.

Multiprotocol Controller
The COM 5025 is a 40-pin monolithic integrated circuit that can replace as many as 330 integrated circuits in a universal synchronous receiver/transmitter multiprotocol communications controller. Operating at speeds up to 2M bps, the 5025 can handle all major protocols, including bit-oriented types such as SDLC, HDLC, and ACCP, and byte-oriented BISYNC and DDCMP. The manufacturer says that it is the first programmable chip controller approved for these protocols, and the only one that processes both SDLC and HDLC protocols. The 5025 is direct TTL-compatible, and contains selectable protocols and a tri-state I/O bus. Data lengths—from one to eight bits—are individually selectable for the receiver and transmitter. For bit-oriented protocols such as SDLC, the chip provides bit stuffing and stripping, automatic frame character detection and generation, and residue handling. For byte-oriented protocols the unit offers automatic detection and generation of SYNC characters, and options such as variable length data, variable SYNC characters (5, 6, 7, or 8 bits), and error checking (16 bit polynomial CRC or CCITT, as well as odd or even parity). The 5025 is compatible with specifications described in IBM General Information Bulletins GA27-3093 and GA27-3098, and IBM Systems Journal, Vol. 15, No. 1, 1976 (G321-0044), EIA standard RS334, CCITT Standard X.25 and ANSI X353 and XS34/589.
There's no quicker way to get TV, phone calls or data around the world than by the 45,000-mile satellite space route.

Earth stations send and receive messages to and from 'space stations'... the satellites. In recent months we've brought earth stations into service in the United Arab Emirates, Mauritius, Fiji, Seychelles and — shown above — the Yemen Arab Republic. The YAR earth station took just three months to complete from order to operation.

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hardware

COM 5025s sell for $61.40 each in quantities of 500 to 999. STANDARD MICROSYSTEMS CORP., Hauppauge, N.Y.

FOR DATA CIRCLE 291 ON READER CARD

Terminal
Totally plug-compatible with IBM's 3775, the Model 0752 standalone data entry terminal supports IBM's 3784, 3786, and 3788 printers. The 0752 offers features such as ocr wand, light pen, and both user and customer engineer diagnostics. The diagnostics can test the 0752 completely in local mode and also give network failure data when on-line. On a three-year lease, the 0752 goes for $98/month. Its purchase price is $3,950. Trivex, Inc., Costa Mesa, Calif.

FOR DATA CIRCLE 288 ON READER CARD

Add-on Memory
The Multimemory/148 add-on memory for IBM's 370/148 allows the user to double the 148's current maximum memory capacity. In its largest configuration, Multimemory provides 4,096KB of main memory. The Multimemory is a functionally equivalent, pin-compatible semiconductor memory using 4K NMOS static RAM devices. The system is priced at $75,000/MB. ELECTRONIC MEMORIES AND MAGNETICS CORP., Hawthorne, Calif.

FOR DATA CIRCLE 204 ON READER CARD

Acoustic Coupler
The model 1200B is a 1200 baud acoustic coupler incorporating LSI technology. It's designed to operate with high-speed printers and baud rate-selectable CRT's, allowing time-sharing and other remote computer access in a non-permanent environment. The 1200B sells for $975, with oem discounts available. Omnitech Data Corp., Phoenix, Ariz.

FOR DATA CIRCLE 290 ON READER CARD

Microcomputer System
Combining hardware and software, this vendor has produced a multiuser microcomputer system. Basic system hardware consists of an 8080-based microcomputer with 32KB of memory, dual floppy disc system, and four I/O ports. A multiuser/multitask operating system is included.

The hardware includes a software programmable real-time clock. It also supports DMA data transfer. The soft-sectored, IBM 3740-compatible diskette drive uses a voice coil head positioning system, which has an average seek time of less than 50msec. The single card floppy controller accommodates up to two dual or four single drives.

Mute, the operating system supports multiple terminals, allowing simultaneous software development by several users. Mute supports the vendor's Pascal-80 assembler (January, p. 186), linking loader, and text editor. The operating system software is said to resemble DEC's RSX-11 from a task queuing and scheduling viewpoint, and HP's MPE (for its 3000 series) with respect to the file system.

In quantities of 100, the basic system sells for less than $1,000. A single entry-level system will sell for about $8,200. Mupro Inc., Sunnyvale, Calif.

FOR DATA CIRCLE 301 ON READER CARD

Terminal
The model 1100 audio-visual communication terminal accepts 10 cps from its Touch-Tone-like keyboard. The unit transmits Touch-Tones, and accepts audio output from most audio response computer systems or Frequency Shift Keyed (FSK) ASCII at 300 baud. The fully buffered unit can display 256 characters on its screen. When not in use as a terminal, the 1100 can function as a Touch-Tone telephone. Options include a telephone handset, magnetic card reader, Personal Identification Number (PIN) keypad, and a

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printer. Prices for the basic model 110 start at $1,940 with a quoted delivery of 120 days. WAVETEK DATA COMMUNICATIONS, San Diego, Calif.

FOR DATA CIRCLE 289 ON READER CARD

Megabyte Memory

Add this vendor's 21MX and 1000-series of minicomputers to the megabyte of memory club. Using 16K bit chips, the vendor can put a megabyte in a package 12 and one-quarter inches high. Central to the memory are 128KB memory boards and optional error correction boards. In small memory error, correction may not be required; as memory size grows, users can add error correction. A 21MXE with a full megabyte and error correction sells for $59,800. With an optional memory extender, a total memory capacity of 1.8MB is possible. A 128KB memory module sells for $6,400, the fault-control memory controller is $600, and its associated check-bit boards sell for $2,750 (for blocks of memory up to 256KB) or $5,000 (for blocks of memory up to 512KB). HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 298 ON READER CARD

Floppy Disc

Plugging directly into the serial I/O port of IBM's 5100 desktop computer, the Comm-Stor/5100 file management disk storage system provides random access to any file on the diskette. The microprocessor-based unit reads and writes data in IBM 3740-compatible format. The system comes with a tape cartridge containing 10 BASIC key files and 14 APL functions. These routines may be integrated into applications programs. Data written by a BASIC program may be read by an APL program, and vice versa. A single drive system sells for less than $3,000, a dual drive system goes for under $4,000.

Sykes Datatronics, Inc., Rochester, N.Y.

FOR DATA CIRCLE 294 ON READER CARD

Terminals and Controllers

IBM has a handful of new terminal products in its 3270-series, and a new 3790-series controller. The 3770-series has been consolidated, and pricing has changed on some existing products in all three series.

The 3274 control unit handles as many as 32 terminal devices and up to 16 previously available 3270 devices can be intermixed. The 3274 can remotely or locally link to 370 processors using binary synchronous communications (BSC), or synchronous data link control (SDLC), and to 360s using BSC. Purchase prices range from $13,190 to $18,770.

Controlling up to seven 3278 displays and 3287 printers, the 3276 control unit display station is offered in four screen capacities: 960, 1,920, 2,560, or 3,440 characters. It comes with a tape

IDS now supplies quality cables with male to male or male to female connectors in 5, 10, 15, 20, 25, 30, 40 & 50 foot lengths. No minimum order necessary. Just phone or mail in your orders. Special cable configurations also available. Immediate delivery from stock.

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IDS now supplies quality cables with male to male or male to female connectors in 5, 10, 15, 20, 25, 30, 40 & 50 foot lengths. No minimum order necessary. Just phone or mail in your orders. Special cable configurations also available. Immediate delivery from stock.
municates with 370s using SDLC or BSC, and with 360s using BSC. Pricing ranges from $6,390 to $6,930.

The 3278 display station operates with either 3274 or 3276 control units, and offers the same screen capacities as the 3276. Its purchase prices range from $2,205 to $2,835.

The 3287 printer works with 3271, 3272, 3274, and 3276 control units. An 80 cps version sells for $5,680; a 120 cps version sells for $6,055.

The new 3791 model 1C controller has 10MB of storage and is field upgradable to 20MB or 30MB. Maximum control storage has increased from 65,536 bytes to 196,608 bytes. The new controller sells for $22,100.

A remote data link adaptor for the 3791 controller now permits new 3270 display stations in the 1,920-character versions to be attached over communications lines. Up to five remote data link adaptors can be attached to a single 3791. The data link adaptor sells for $1,200.

The 3770 data communication system now comprises five basic units: the 3771 models 1, 2, and 3; the 3774 models P1 and P2; the 3775 model P1; and the remote job entry 3776 models 1 and 2, and 3777 models 1 and 2.

Rental and purchase prices for some of the 3270 series were reduced about 16%. A two-year lease is also offered. Lease, rental, and purchase prices were reduced 28% and 22% respectively for some members of the 3790 and 3770 lines. Maintenance prices on some of these products increased about 15%. Lease and rental arrangements are available for the new products, as is maintenance. IBM CORP., White Plains, N.Y.

Daisywheel Printer

The Sprint Micro 5 family of daisywheel printers are aimed at oem's wanting to integrate them into computer systems. The byte input format of the printers allow direct connection to the computer's I/O channels. Previous daisywheel printers from the firm used a 13 bit input format. The printers operate at maximum print rates of 45 cps or 55 cps. Numerous options will allow oem's to tailor the printers to fit their applications. In quantities of 50 to 99 units, the 45 cps version sells for $1,675. An optional Rs232C interface goes for $100. QUIME CORP., Hayward, Calif.

Cartridge Tape Transport

The model 200 Minidrive is a tape transport for 3M's dc100A miniature data cartridge. It's available in one- and two-track versions, priced at $250 and $350, respectively, in single quantities. A complete recording capability, based on the single track transport and all necessary electronics, comes to about $485 in unit quantities. The vendor offers oem discounts. Deliveries are said to take about four weeks. NORTH ATLANTIC INDUSTRIES, INC., QANTEX DIV., Plainview, N.Y.

ENGINEERING MANAGER

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FOR DATA CIRCLE 309 ON READER CARD

FOR DATA CIRCLE 300 ON READER CARD

FOR DATA CIRCLE 308 ON READER CARD
Updates

Companies soon will be able to report Form 1099 information to the IRS on disc or diskette media, reports the Computer Law and Tax Report. The IRS accepts media prepared on IBM Systems 3, 32, and 34, as well as media-compatible systems. The program will be under the direction of Max Stringer, magnetic tape coordinator for the IRS' Southwest region, centered in Austin, Texas. The program may be expanded to include other forms, such as the 941A. Stringer adds that the 941A may become an annual, rather than quarterly, report within a few years.

The FORTRAN Standards Committee, X3J3, has finished editorial clarification of the draft proposed FORTRAN Standard, and approved forwarding the proposal for further processing as an American National Standard to replace the current X3.9-1986 standard. The proposal also is being forwarded to the International Organization as a contribution toward an international standard.

Telenet, the packet mode common carrier, has come up with a pair of microcomputer-based intelligent communications processors. The systems, called Telenet Processors, are designed to permit customer computers and terminals to simply "plug-in" to the public packet network. Micro-based Telenet Processors also will be incorporated into the network itself as packet switches and data concentrators.

In another communications application, Fairchild Camera and Instrument Corp. has awarded a contract valued at about $2 million to Computer Automation for as many as 18 SyFAMinicomputer systems to link Fairchild facilities in Asia and Europe to its corporate headquarters in Mountain View, Calif. The network, hosted by an IBM 370/368, will bring together the functions of order processing, production control, and inventory control. When completed, the network will be hierarchical in design, with SyFAMin systems communicating with other large-scale computers in addition to the host.

TDX Telecommunications, Inc., of Houston, Texas, is offering Datapost, a facsimile-based alternative to Mailgrams. The service is priced from $.60 to $1.05 per message depending on volume.

Management Game

Basically a performance evaluation and review technique (PERT) reporting system, GREMEX is a man-machine management simulation game of a research and development project. GREMEX is not a production job for product management. Projects may be studied from just after project plan development through the final construction phase. The user inputs, for each month, the amount of work performed on each activity and the computer does the bookkeeping to find the project's expected completion date. GREMEX assumes that all activities to be worked in a given month are indeed worked. The program predicts new durations and costs each month based on contractors' liabilities and the management actions taken by the players.

GREMEX may be used to train management personnel in the administration of research and development-type projects. It poses no "best way" to run a project, but emphasizes exposing players to many of the factors involved in decision-making when managing a project in a government research and development environment. Capable of operating with any research and development-type project with up to 15 subcontractors, GREMEX produces reports simulating monthly or quarterly updates of the project PERT network. Included with the program is a data deck for simulation of a fictitious spacecraft project (at this point we might note that GREMEX was developed at the NASA Goddard Space Flight Center). Instructions are included for substituting other projects.

The package is written in FORTRAN IV for execution on a 360 in batch mode. It requires about 350K bytes of central memory. The documentation sells for $48, the program for $810. COSMIC, Univ. of Georgia, Athens, Ga.

Data Base Management

Seed is a CODASYL-type data base management system which sells for $7,500 (or $375 per month) in its basic configuration. Written in FORTRAN with assembly language routines for I/O, Seed is transportable. The vendor says that to install it on a "new" computer requires only a "little" work, primarily in rewriting the assembly language I/O routines. Seed is said to run on virtually any computer supporting PDP-11, and the vendor anticipates that it will be particularly appealing to multicomputer and distributed processing users, and those thinking of changing computers. The package also has an optional interactive data base/data dictionary facility, DBLOOK, which permits any data base command to be issued directly in an interactive mode. Seed supports the languages defined by the CODASYL Data Base Task Group, including both FORTRAN and COBOL. Data Manipulation Languages.


Financial Analysis

A computerized screening system, XSCAN allows investment analysts, financial researchers, and corporate planners to analyze a wide selection of data on more than 3,500 companies and 42,000 securities. The conversational system lets a nonprogrammer screen and manipulate data from a number of data bases, including COMPSTAT and Value Line. XSCAN locates, screens, and sorts information according to any specified criteria. It can perform statistical analyses and regressions. Results can be displayed in customized formats, scatter plots, and histograms. Results also may be stored for later use. A typical session, involving screening about 1,000 companies for possible merger or acquisition, limiting the field to 10 or 20 candidate companies, and then performing a detailed analysis on the candidates ran up charges of about $50 on the vendor's time-sharing network.


Series/1 Floating Point

This company has been doing quite a bit of software development for the recently announced IBM Series/1 minicomputer. Its latest product is a floating point emulator which will execute on both the 4953 and 4955 model processors. Programmers can code the standard floating point instruction set and the emulator will interpret the resulting class interrupt and execute the required instruction. It is said that the emulator uses some of the most time-efficient algorithms available in order to execute the instructions as quickly as possible. It requires roughly 3.5K bytes of memory. Licensed on a single cpu basis, the emulator has a one-time fee of $195. Graham Computer Enterprises, Inc., Birmingham, Ala.

FOR Data Circle 274 on reader card

FOR Data Circle 271 on reader card

FOR Data Circle 278 on reader card

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More IMS and TOTAL installations have chosen the ASI-ST Data Management and Reporting System to implement data base applications than any other product. ASI-ST’s dominance in data base environments is easily explained:

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IMS users such as American Airlines, Dow Chemical, TWA, American Can, The Hartford, Union Carbide; and TOTAL users like Combustion Engineering, Northwestern Mutual Life, Anheuser-Busch, Corning Glass Works, Eli Lilly and Holiday Inns are a few who agree ASI-ST and data base belong together. In addition, ASI-ST provides an unequalled return on investment by maximizing the productivity of both man and machine. Since ASI-ST fully supports conventional data files as well as complex data bases, these benefits are not restricted to IMS and TOTAL users. To obtain more information contact:

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Mechanical Modeling
DCS automatically makes mathematical models of almost any two-dimensional mechanism or assembly of parts. Available on this vendor’s time-sharing service, DCS provides a simple method for defining mechanisms, relieving the user of the necessity of doing any arithmetic or trigonometry with the dimensions of the parts. Mechanisms are defined by overlaying a coordinate grid and specifying the coordinates of significant features, such as part interconnections. In this figure, the calipers are designed to measure the dimension D of an object placed between them. The linkage magnifies variations, and the measurement is read from the scale S. Questions that might be asked of this model include: how sensitive is it to changes in D? How should the scale S be calibrated? When a reference object is measured, how much tolerance should be allowed for variations in part dimensions? To run this problem, DCS ran up charges of about $5. FIRST DATA CORP., Wal-tham, Mass.

CIRCLE 372 ON READER CARD

For Data Circle 372 on Reader Card

Cobol Development Aid
TSOBOL helps programmers develop COBOL programs by prompting the user for information about the architecture of his intended program, and by using this information to generate COBOL source programs. The package is intended to run on an IBM 360 or 370 in an OS/VS TSO environment. At the end of the terminal session, the programmer will have a diagnostic-free COBOL program, essentially generated by entering user requirements, to which user-specific logic statements may be added.

The package supports sequential, indexed sequential, key-sequenced VSAM, entry-sequenced VSAM, print and imbedded COBOL sort files, generating all required COBOL I/O statements. An optional report layout generator allows the programmer to transfer report layouts directly onto the TSO screen. Other options include interfaces to IMS, CICS, and Total.

The package provides consistency and standardization to program structures. All programs generated by TSOBOL have sections numbered and organized in the same manner. Common code essentially will be the same. Additionally, the vendor says TSOBOL eliminates errors introduced during keypunching, missing code, and misspelled data names.

The basic TSOBOL package is sold with a permanent license fee of $13,500, and an annual maintenance and enhancement fee of $500. Additional options are priced at $2,000 each. SIGMATICS CORP., Irvine, Calif.

FOR DATA CIRCLE 273 ON READER CARD
HASP RJE

HASP/32 is a software package that lets users of this vendor's 32-bit computers use mainframe computers as HASP workstations. Both remote job entry and standalone processing are possible when HASP/32 executes as a user task under the vendor's OS/32 MT operating system in conjunction with ITAM, the vendor's telecommunications access method. A user may submit batch jobs to a host IBM processor using HASP/32, and the results are returned to his site for local storage or output.

The software supports up to seven card readers and eight printing devices, a control console, and dial-up or leased line communications at speeds of up to 19.2K bps. Multileaving up to seven jobs in each direction over a single communications line allows concurrent operation of the card readers and printers. The software package sells for $1,740 on seven or nine-track magnetic tape, $1,930 on a 2.5MB disc, and $1,970 on a 10MB disc, including installation and documentation. INTERDATA, INC., Oceanport, N.J.

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SMF Reporting

This user-developed package, built around Easytrieve, organizes an SMF variable block data base into the more easily handled fixed block format. It provides a total package for SMF reporting. The system consists of five main line programs which produce a reformatted SMF data base, and two programs to generate daily and periodic reports, including file management information. It deals strictly with records typed 4, 5, 6, and 20 and can be adapted to users' specialized report headings and various accounting needs. The Easytrieve/SMF Reporting System is available to Easytrieve users at no charge through the company's System Exchange program. PANSOPHIC SYSTEMS INC., Oak Brook, Ill.

FOR DATA CIRCLE 277 ON READER CARD

Zero-Base Budgeting

Developed in cooperation with several high-level federal agencies, this vendor's Zero-Base Budgeting system closely conforms to the Office of Management and Budget's instructions as issued in OMB Bulletin 77-9. By automatically generating detailed budget reports for each decision package, consolidating them, and producing financial summaries for all units in the organization, it is said the system virtually eliminates the paperwork crunch caused by zero-base budgeting.

The package provides summarized ranking and funding reports at all agency levels. "Cross-walk" reporting and analysis may be performed. The system can accommodate requirements unique to individual agencies and private industrial organizations. Ranking and financial summary reports are generated both before and after funding cutoffs are applied, but after funding only those decision packages funded are listed and summed together; unfunded packages are reported separately. All information, including ranking and funding cutoff data, is stored in an integrated DBMS-10 network structured data base. Each unit manager's view of the data base is limited to the data for which he is directly responsible.

Charges for using the system on the vendor's remote access computer system are the standard rates for computer resource usage. One typical job, consisting of 64 decision packages, loading the data base, generating reports, applying funding cutoffs, and generating final reports cost roughly $130. RAPIDATA, INC., Fairfield, N.J.

FOR DATA CIRCLE 276 ON READER CARD

Micro Operating System

Fast Multi-tasking Operating System, FAMOS, is a multitasking real-time operating system for 8080 or Z80-based microcomputer systems. It is said that 24KB of RAM and dual diskette drives will support two users; additional memory may be needed for more users. The software also requires a

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Central to the system is a "Super Selector" (SS) program which provides control over all tasks. There are seven SS commands, one of which is a function command for more than 30 system functions and utility programs. These functions include editing, status reports, and file utilities. FAMOS also includes a BASIC compiler which generates reentrant code.

Users may initiate several tasks from their terminals. The number of tasks FAMOS can support is limited only by available memory. The system dynamically allocates memory as needed, eliminating the need to repack discs. The vendor emphasizes that existing Data General-supplied system software: there is no need to initialize the target diskette, only proper formatting is required; diagnostic and software release diskettes may be backed up (the COPY commands in DOSINIT/DKINIT and DOS/ADDS won't touch these); and absolute (non-DOS/HDOS) diskettes can be copied. Floppy/Copy is also said to be faster and easier to use than other currently available copy routines. The one-time permanent license fee is $100 for the Nova/Eclipse version or the MicroNova version, or $170 for both. THE TOOLSMITH ORGANIZATION, LTD., Schaumburg, Ill. FOR DATA CIRCLE 270 ON READER CARD

Diskette Copy Utility
For use with all Data General Nova, Eclipse, and MicroNova diskette systems (6030 family). Floppy/Copy does a complete sector-for-sector absolute copy of a diskette. Its vendor cites three advantages over existing Data General-supplied system software: there is no need to initialize the target diskette, only proper formatting is required; diagnostic and software release diskettes may be backed up (the COPY commands in DOSINIT/DKINIT and DOS/ADDS won't touch these); and absolute (non-DOS/HDOS) diskettes can be copied. Floppy/Copy is also said to be faster and easier to use than other currently available copy routines. The one-time permanent license fee is $100 for the Nova/Eclipse version or the MicroNova version, or $170 for both. THE TOOLSMITH ORGANIZATION, LTD., Schaumburg, Ill. FOR DATA CIRCLE 270 ON READER CARD

PL/1 Monitor

PR/T7/VII is a software tool that allows application programmers to time and analyze PL/1 programs and DL/I calls. The package measures and prints the time in microseconds for every individual flow path executed by the program, and also times DL/I calls and reports detailed results on the outcome of each call. Percentage of program execution time and minimum and maximum elapsed times are also reported, allowing the programmer to identify bottlenecks in his programs. The vendor emphasizes that PR/T7 is not a sampling technique, but is rather a direct measurement of every microsecond used by the program. The package is said to use original techniques, including inspection of Sys­tem/370 "system control blocks." Use of the package requires no recompi­lations, additional job steps, temporary work files, or special JCL. To control activity, the flow path monitor is included with the program to be monitored at loading or linkage editing time. PR/T7 will work on any 370 with the IBM optimizing PL/1 compiler under any operating system. The PR/T7/PL/1 monitor is priced at $7,500 and the DL/I monitor is $4,500. Package together, the two monitors sell for $11,000. Prices include installation, documentation, and training. PR/T7 was developed by the Swiss firm of HIS Consultants. PITRONIM INC., Brook­line, Mass. FOR DATA CIRCLE 281 ON READER CARD

An electronic labman equips robots for political trips with circuitous data and layout schemata, and big mouths with falsified lips.

—Gloria Maxson

Even Webster's Knows About QUEST

QUEST (kwést), v. 1. To make a search; to go on a quest.

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Boeing Computer Services, Inc., is seeking an experienced data base systems manager for integrated Computer Aided Design and Computer Aided Manufacturing data base systems.

The selected candidate will organize and direct data base systems to manage aircraft design data storage, retrieval, control and linkage to product design, tool design and manufacturing numerical control programming operations. U.S. citizenship is required.

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Should Software be Copyrighted or Patented?

We've been wrestling with the question of whether software should be copyrighted or patented for some years, and the issues seem far from being resolved. A few cases, however, have occurred which provide a background for answering the questions of software protection, at least for some kinds of programs. For instance, if a program is defined as a set of operating instructions to be used by the computer in solving problems, as the Copyright Office has chosen to define one, then a copyright affords little protection; the courts have viewed these instructions as part of mathematical science, and hence not copyrightable.

The copyright only excludes others from unauthorized copying of documentation anyway, and even this protection is limited by the "fair use" doctrine. Fair use allows libraries and others to make limited numbers of copies for intellectual use. Based on a number of court decisions, this practice allows scholars and others to make copies for individual and private use; it evolved from photocopying being just an advanced way of taking notes. The line between infringement and fair use is subject to interpretation and is a matter of purpose and degree, the purpose dealing with the profit involved and the degree with the number of copies in relation to the market.

There are those who would attempt to apply the concept of fair use to patent protection. This can only come from a basic misunderstanding of copyrights and patents.

A patent excludes others from making, using, or selling an invention. It makes no difference if a profit is involved or only a few copies are made. It is only with respect to the size of the damages claimed that these factors are pertinent.

A patent can be issued for software provided that the software can be regarded as an invention that is novel and has not been shown in the prior art. This is demonstrated by Martin Goetz' patent (No. 3,380,029) for a "Sorting System." (Mr. Goetz' patent was the first ever issued for software, and not very many others have since been granted.)

The expense and time involved in preparing and receiving a patent allowance is considerable compared to that involved for a copyright, further complicating the question of which way to go for software protection. Copyright application requires a $6 fee with a two page registration form and the printing of the copyright notice on the material. The copyright is allowable even without registration, but registration with the Copyright Office facilitates the dating of the notice in any later infringement proceedings.

Patent grants, on the other hand, take about two years. For most software, which is constantly updated and improved, this may be much too long a delay to give any protection. Also, about one-third of patent applications are rejected; the software involved must represent a real breakthrough before this type of protection will be granted.

It is obvious that our present copyright and patent legislation does not consider the requirements or the rapid revolution in data processing. Those with a stake in this area are urged to write their congressmen, expressing their concern and their views on copyright and patent revision.

Mr. Hordeski is the president of Siltran Digital, a digital transducer manufacturing firm located in Silverado, Calif. He is also the holder of a patent on digital encoding.

—Mike Hordeski

August, 1977
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