COMPUTER SYSTEMS NEWSLETTER
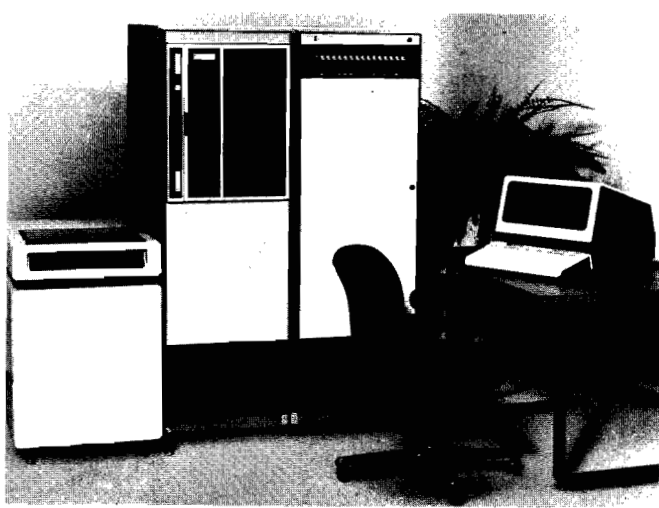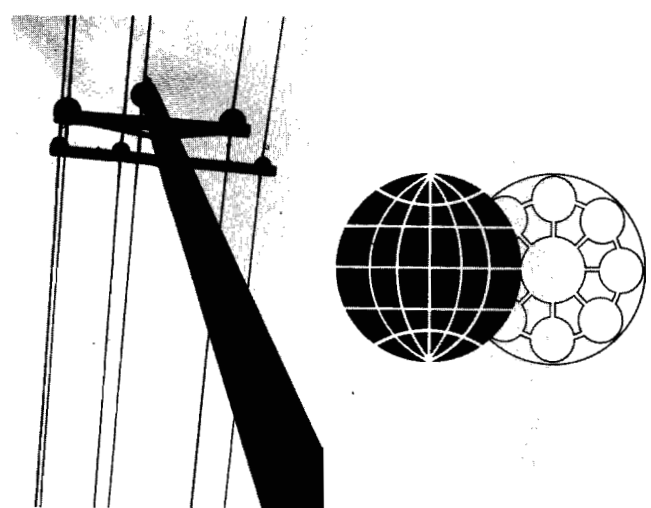
For HP Field Sales Personnel

REINHARDT, HELMUT
FRANKFURT
HPSA

HEWLETT **hp** PACKARD

HP enters Commercial Distributed Data Processing Market

HP competes with U.S. Mail ...
500 characters for less than 7 cents.
GSD introduces HP 2026

HP 3000 reduced to $75K
GSD introduces Series I

In This Issue...

AMD DIVISION NEWS

Division News

Answers to Your Questions

By: Bill Mohr/AMD

Question:
What is our policy on installing large "special" systems in Europe? Does AMD send a Project Engineer for installation?

Answer:
AMD will send a Project Engineer to install large "special" systems not only in Europe, but also domestically. We will include the cost of sending the Project Engineer in the quoted price.

****

Question:
What must be done to get an embargo clearance for DTS-70 into the East Bloc?

Answer:
We do not recommend selling into the East Bloc. We do not have the support capabilities to do so.

****

Question:
What is our training plan for European customers? Who will train? Is the training material in place?

Answer:
All customers in Europe should be told that they must attend AMD for all training courses (except 8542B; two days on-site). If the customer cannot attend at AMD, or if the customer will not buy if he has to attend AMD courses, the customer must be treated as a special case. The following table lists all of our training courses, the length of each, and who in Europe, in those "special cases", could present the course. Also, for certain courses there is no capability

Course	Days	Tony Chambers	Theo Papatheodorou	Tony Strahl	John Taylor	Marc Chovet
ATS (TODS)	5			✓★		
OPT 1 TODS				✓★		
OPT 2 DTU	1 Day each					
OPT 4 9510						
Advanced TODS-C Prog.	4	---------- ONLY AT AMD ----------				
ATLAS (TODS) Prog.	5		✓			
8580 Cust.	5	---------- ONLY AT AMD ----------				
COS APO	4	✓				
ADV. TODS-II Prog.	5	---------- ONLY AT AMD ----------				
8580 Maintenance	10	---------- ONLY AT AMD★★ ----------				
Digital Test Prog. (70)	10	✓★	✓			
8542 Maintenance	10	---------- ONLY AT AMD ----------				
ATS 80 Course	5	---------- NOT DETERMINABLE THIS DATE ----------				
ATLAS (RTE)	5	✓★	✓★			
9571A Maintenance	5			✓	✓	✓
8542B Cust. On-Site		---------- DETERMINED BY SELLING OFFICE ----------				

✓ Indicates capability to present the course.
★ No material (will be supplied when available/needed).
★★ Product Specialists are capable of providing this training if required but, because of course length, courses should be put on at AMD.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

in Europe and these are indicated ONLY AT AMD. However, SE or Product Specialist *agreement to present a training course must* be made *before* any commitment can be made to the customer.

By: *Dick Lovlien*/AMD

****

Question:
How does AMD get software updates to the field SE/CE's?

Answer:
Our plan is to distribute one complete up-to-date set of software ASAP, then send an update once per quarter, to each of the addressees listed below. The update will only consist of those software modules which have been changed, unless we deem it easier to distribute a complete set for a particular update. As a minimum, a complete set will be distributed once per year.

System-related software for the DTS-70, ATS-80, TODS-C, TODS-II, COS and drivers will include both relocatable and source files; TESTAID and ATLAS will be distributed in relocatable form only.

By: *Al Jefferis*/AMD

AMD Software Distribution List

Eastern Sales Region
Manny Perry, Lexington
Don Schildt, King of Prussia
Natalie Russell, Rockville

Midwest Sales Region
Mike Porras, Kansas City
Bob Bertram, Rolling Meadows

Southern Sales Region
Joel Rubenstein, Richardson
Del Kittendorf, Orlando
Alec Creagh, Atlanta

Neely Sales Region
Bob Myers, Fullerton
Dick Deonigi, Bellevue
Stan Drayus, Santa Clara
Larry Smith, Los Angeles (Airport)

Canada
Gerry Cornish, Ottawa

France
Marc Chovet, Orsay

Germany
Tony Strahl, Boeblingen

UK
John Taylor, Manchester

South Africa
Lore Holtzhausen, Johannesburg

Product News

Significant Price Reduction!
By: *Ron Carelli/AMD*

To reduce our inventory of Teledyne AC and DC signal conditioning modules, prices on these modules are being reduced. The modules can be used for digital signal conditioning either in an HP 9611R or a customer-designed module which requires interface to or from T^2L logic. The product number, description, and prices from the May 1st CPL are shown below.

Product Number	9611R Option	Description	Old Price	New Price
91210A	027	95-135 VAC RMS Input Signal Conditioning (Single Channel)	$20	$12
91211A	032	10-55 VDC Input Signal Conditioning (Single Channel)	$20	$12
91212A	039	20-250 VAC RMS Solid State Relay Module (Single Channel)	$30	$15
91213A	042	4-55 VDC Solid State Module (Single Channel)	$30	$15

Please contact me at AMD extension X2516 if you have any technical questions and/or a large quantity with tight delivery requirements.

OSHA and the Master Switch
By: *Ernie Harper/AMD*

When is the primary power switch of an electronic system not enough? Recently there have been encounters with customers who state unequivocally that the power switch on an HP system does not fully comply with Occupational Safety and Health Act (OSHA) requirements. The systems referred to in these cases have been those with two or more, separately enclosed units.

Interestingly enough, the customer may be correct. Therefore, it is important that the FE encountering this situation knows what the facts are and how to deal with them.

The pertinent points are listed below in approximate order of importance.

1. *Point One:* The responsibility to assure compliance with any OSHA requirement fundamentally rests with the customer (as with any other employer). The OSHA requirement dealing with "electrical disconnecting means" for Data Processing Equipment is no exception. In this situation the task of compliance is typically left to the electrical installer.

2. *Point Two:* The requirement for a disconnecting means is "in addition to" any integral power switches of the product, as described in (a) and (b) below.

a. Data Processing Rooms. The code requires "the disconnecting means" to be placed at designated exit doors and accessible to the operator. This "Master" disconnect must not only secure power to all equipment in the room other than lighting, but must also shut down the ventilation system serving the room.

b. General Building Area. The "disconnecting means" must shut down all interconnected Data Processing Equipment in the area from a location readily accessible to the operator.

3. **Point Three:** The disconnecting means requirement is imposed wherever article 645 of the National Electrical Code (or NFPA No. 75) has been adopted by Federal, State or local authority. For the Computer Systems Group, only (1) Data Processing Systems, (2) equipment interconnected to Data Processing equipment or (3) equipment placed in designated Data Processing Rooms are affected.

Summation and Comment:

Each HP system product is designed to meet applicable safety standards including a single mains disconnect switch on each unit (e.g., System 1000, 9571A, 9640A, and the HP 9580A).

Since compliance with OSHA is facility dependent, there is nothing more HP can do to further simplify our customers' task of complying with those requirements.

HP systems require customer electrical hook-up prior to initial operation. One of the reasons for this is to assure compliance with local electrical codes.

You may always contact the appropriate Divisional Product Safety Engineer for this or any matter relating to product safety. This should be done whenever there is reasonable doubt in your mind on any aspect of product compliance or user safety.

TESTAID License
By: Dick Landes/AMD

Development of TESTAID software was an expensive proposition and to protect that investment, we require customers to sign a License Agreement. The U.S. Government customers may incorporate special restrictive wording in the body of the Purchase Order instead, if they prefer. The License form and the restrictive wording were distributed to all AMD Field Engineers and Sales Offices several months ago, but will be redistributed immediately.

A properly signed License is as much a part of the Purchase Order as the price. Without it, you haven't made a sale! In the past, we have been lenient in enforcing the requirement that a copy of the signed License Agreement be forwarded to AMD at the time of order transmittal. However, we now have orders almost ready to ship with no License, or changed wording, or incorrect or missing restrictive wording in a Government Purchase Order. AMD will not ship the soft-

ware until we receive the proper License. However, if you accepted the order, you may have put HP in the position of breaching the contract.

An order for TESTAID III, HP 91075B, is not acceptable and is not transmittable without a signed License or the appropriate restrictive rights wording. We will assume a copy of the License or restrictive rights special provision is in the mail to us if we receive a transmittal. But, if a copy doesn't turn up in a week, we'll contact you to find out where it is. If it doesn't exist, we will have to reacknowledge the order with indefinite delivery while awaiting Field action. So, get the License with the order and you'll save us all a lot of effort!

TESTAID/FASTRACE III Training
By: Al Jefferis and Hal Brook/AMD

We began offering the Digital Test Programming Course (HP 92770A) in June 1976, and have now presented nine 2-week classes to our DTS-70 customers. Most of them were very pleased with the course, based on their course evaluation sheets. More importantly, they learned how to develop digital test programs using TESTAID III, and how to implement tests on the DTS-70. But, we have a couple of problems you can help us with.

1. Most of our students have had considerable experience with the problems associated with digital testing and have had little trouble with the course. A few students have had insufficient background in these areas and have had considerable difficulty learning the course material.

2. Some students have brought PC boards to the class for which they intended to develop test programs. If the student spends time during the class on his own PC boards, he does not spend adequate time learning all the concepts of test program generation.

To eliminate these problems, please make it clear to your customers that students attending the class must have an understanding of digital logic circuits such as gates, flip flops, registers, counters, ROM's, RAM's, etc., and understand the fundamentals of digital testing. Also, please specify that the student cannot bring PC boards to the class with the expectation of preparing test programs for those boards.

If you have any feedback from your customers regarding the course we would like to know about it. With your help we will keep improving the course to better meet the needs of your customers.

DTS-70 Configuration Rules
By: Eric Isacson/AMD

Several recent DTS-70 orders have included more cards for the DTU than there are slots available. Others have failed to specify the software media desired. The following are the

rules which must be followed in order to avoid delivery delays. Note that extra DTU cards must be ordered using 91XXX or 94XXX numbers.

1. Microinstruction Storage:

    For HP 1000 Systems & HP 2113A Computer:
    HP 91073A PROM Set
    For HP 9640 Systems & HP 2112A Computer:
    HP 12978A WCS
    For HP 2100 Computers:
    HP 12908A WCS

2. Software Media:

    For HP 2170A & HP 9640A Systems & HP 7900A
    Disc Memories: Option 003
    For HP 2171A, HP 2172A & HP 7905A Disc Memories:
    Option 004

3. Driver/Comparator Slots: Slots used may not exceed slots available. Spare cards or cards not to be installed in the station at the factory must be ordered as 91XXX or 94XXX "customer installed add-on kits" as listed in the DTS-70 Ordering Information.

4. Programmable Driver/Comparator Cards:
    Require at least one Logic Level Ref. Card

5. Logic Level Reference Cards:
    One maximum unless DTU Extender is ordered.
    Then two max.

6. Prog. Rate Gen: One Maximum

7. Orders for TESTAID-III must be accompanied by a license agreement.

Sales Aids

Any 2402A's Around?
By: Tom Freed/AMD

A French customer needs four 2402A's for spares and maintenance purposes. If you know of any units at your sales office or customer facilities that might want a trip to Europe, please TWX directly to D. Georges at the HP Orsay, France sales office. Apparently the customer is willing to buy used units. No input power conversion is required, so don't worry that your unit is being used on 60Hz, 120VAC.

BOISE DIVISION NEWS

Product News

Drum Printer Enhancements
By: John Freeman/BOISE

In an effort to enhance HP Drum Printers and to improve their performance in the commercial marketplace, HP Boise is working closely with Dataproducts Corporation (our OEM vendor) to improve the reliability level of these printers. Along with a revamping of our Preventive Maintenance Policies to catch problems before they happen, there are many improvements DpC is working on:

2613 and 2617:
Paper Puller Exit Assembly
QA testing of Static Eliminators
Redesign of VFU board for better life
Hood Hinge improvements
New Tractor Face Plates
Hammer Driver Board Capacitor
Ribbon Deskew Retrofit Kit

2618:
Paper Puller Exit Retrofit Kit
Hammer Driver Board Capacitor update
Paper Tape Tensioner

As availability and U.L. approval take place on these enhancements, we will notify you immediately to get these changes to the customer as fast as possible.

Division News

HP-Boise's HP 3000 EDP Environment
By: John Freeman/BOISE

The photo used for the "Multiple Printer Environment of the HP 3000" brochure is of HP Boise's own Data Center. Boise has two HP 3000 Series II systems servicing Boise data processing needs. We perform all of our Accounting and Manufacturing requirements on these systems. This includes Cost Accounting, Accounts Payable and Receivable, General Accounting, Inventory Control functions of MRP,

THE MULTIPLE PRINTER ENVIRONMENT OF THE HP3000

★ IMPROVED OPERATOR
★ NO BOTTLENECKS — SHORT REPORTS
★ NO DOWN-TIME WITH PRINTER BACKUP
★ SPOOLED & UNSPOOLED PRINTOUT SIMULTANEOUSLY
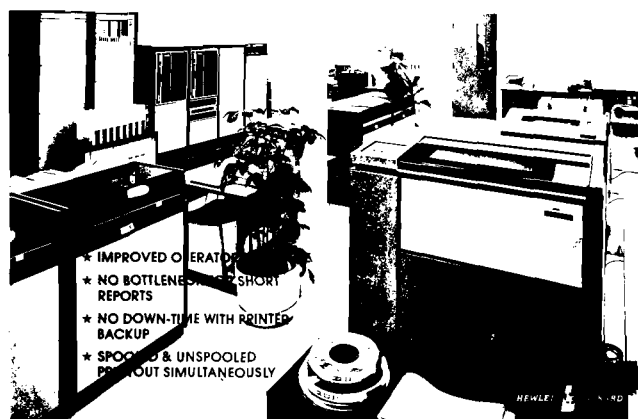
on-line inventory tracking, shop loading, and automatic parts allocation. The two HP 3000 Series II's have 42 terminals doing source data collection, error correction, and order entry using the 264X family of CRT's, 7260 OMR readers for source data collection, 2762A's for interactive forms handling, as well as an assortment of terminals for on-line development. On-line Order Processing functions will be added this year, and a third HP 3000 will be added to handle all the EDP functions.

HP Boise printers use the new option 002, 64 character OCR-B/OMR slug drum to print mark-sense cards (see sample printout). By printing cards instead of punching cards, the manufacturing departments can update the data by mark-sense and input the data for immediate editing and collection right at the source via mark-sense reader and 2640 interaction. The CRT and OMR reader transmit transactions via modem/telephone lines from Boise's Stores department 7 miles away. By performing all the functions required by a manufacturing company through common IMAGE data bases, all departments are able to interact by

COMPUTER SYSTEMS NEWSLETTER

using the same information. The information is collected through on-line applications and automatically moved to other processing requirements without having to go through any keypunching or centralized data collection process. Only three data entry operators service both Divisions' central data entry needs, doing both keypunching and COMSYS data entry.

The combination of batch processing in the off-hours, creating interactive turn around documents by printer to be used by 7260 terminals during the day, allows HP Boise to expand its system requirements as the Division grows and minimize its operations staff requirements. The cost of the 7260 terminals can easily be justified by the savings in keypunching requirements and the elimination of any need for a card punch.

OMR PRINTING AND ON-LINE PROCESSING CLOSE THE LOOP OF BATCH AND INTERACTIVE DEVICES

Sales Aids

Pre-Printing OMR Forms
By: John Whitesell/BOISE

Remember to order Option 002 (64 character drum) or Option 003 (96 character drum) to the drum line printers (2613A, 2617A, or 2618A) if your customer wants the ability to conveniently pre-print Optical Mark Reader forms.

These are no-charge options and will help you sell more 7260A OMR's, either right away or as a future system enhancement.

GOOD SELLING!!

DISC MEMORY NEWS

Competition

A Look at the Independents
By: Dick Byhre/DMD

As you are aware, our installed peripheral base is receiving new competition from several vendors for add-on disc drives. This article is focused on two of the more visible ones in order to bring you up to date with their offerings.

Telefile

Telefile specializes in the add-on disc business with annual sales estimated at $7 million this year. Their value added is a disc controller which supports most of the name brand OEM discs. Telefile's market is the major minicomputers, installed, for which they offer add-on drives. HP does *not* endorse any Telefile drives on HP systems.

Their Hardware

The drive proposed by Telefile for use on the HP 3000 is the AMPEX DM 9300 (311Mb unformatted). After formatting the drive, Telefile offers it at 225MS. The Telefile controller is the DC-16-C which supports up to 4 drives.

Their Software

As we understand it, the software driver was written by sources outside Telefile. The driver is appended to the 3000 MPE.

Their Service

Service and support for the controller will be the responsibility of Telefile while the disc service is handled by Ampex. Software support will be handled by Telefile.

Their Prices

Telefile (Master Drive) 225MB	$29,000
Add-On Drive	18,000

Deliveries will start as soon as their Bay Area test site is up and running, which is estimated to be June.

How We Compare

PRICE COMPARISON
HP vs TELEFILE

VENDOR	TRACK TO TRACK	DATA TRANSFER	AVG DATA ACCESS
HP	5 ms	937 KB	33.3 ms
TELEFILE	10 ms	1200 KB	36.3 ms

CAPACITY M BYTES *we're 9% Faster*
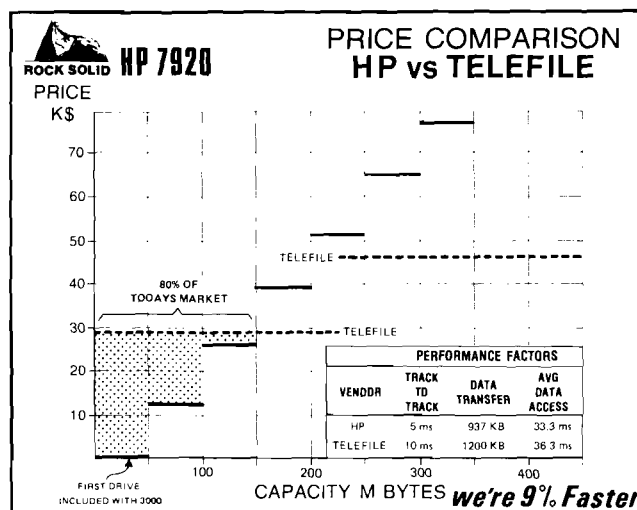
Microcomputer Systems Corporation

MSC specializes in microprocessor related products with annual sales estimated at $2 Million this year. The value-added on their disc subsystem, like Telefile, is the controller. MSC's market, like Telefile, is the installed major minicomputer systems. Again HP does not endorse any MSC drives on HP systems.

Their Hardware

The subsystem, MSC-3677, proposed for application on the HP 3000 consists of the MEMOREX 677 (208Mb unformatted) drive. MSC formatted the drive to look like three 7920's (150Mb). The controller is their MSC-1000 which supports 8 drives.

Their Software

According to recent trade articles, the driver was written by MSC using their own HP 3000 as a test site. The driver is appended to the HP 3000 MPE.

Their Service

MSC will support their controller and software driver, and the disc drive will be supported by Memorex.

Their Prices

MSC-3677 (Master 150Mb)	$31,500
Add-On Drive	16,500

How We Compare

PRICE COMPARISON
HP vs Microcomputer Systems, Inc.
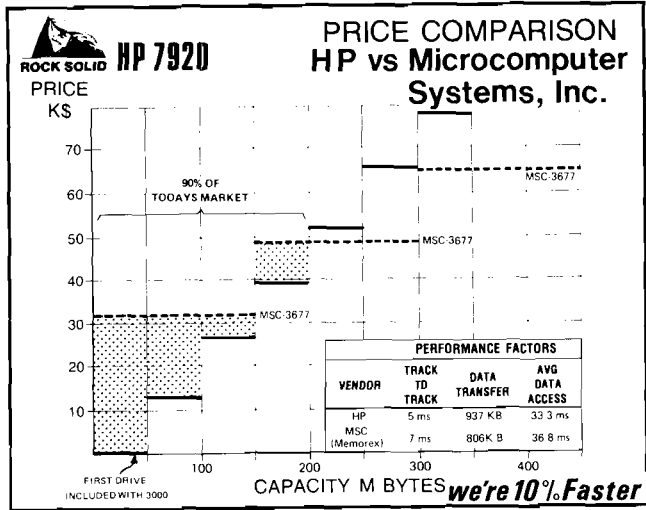
Summary

A few points for your customer to keep in mind.

1. Full service and support will require the controller and disc manufacturers' involvement as well as HP's.

2. HP discs are faster.

3. High-speed disc/system interfaces are complex and require many hours of vigorous system testing to eliminate subtle software, hardware, and timing incompatibilities. Your customer should make sure the vendor of a non-HP disc subsystem has allowed for this.

4. Remember, HP has an entire Division devoted to providing disc memory peripherals on our HP systems.

7905 vs. DG 6045
By: Dick Byhre/DMD

The April 15th Edition of the *Newsletter* was dedicated to the 7900 & 7905, and since that time I have received information regarding Data General's new cartridge disc offering.

DG is getting more serious about building their own disc peripherals. Recently they announced the DG 6045 (10Mb) which is the third drive they are manufacturing themselves. In the past they have relied on Diablo for their smaller capacity disc requirements.

How We Compare

7905 vs DG6045

DG6045
SINGLE DRIVE $9950
TWO PACK $17950
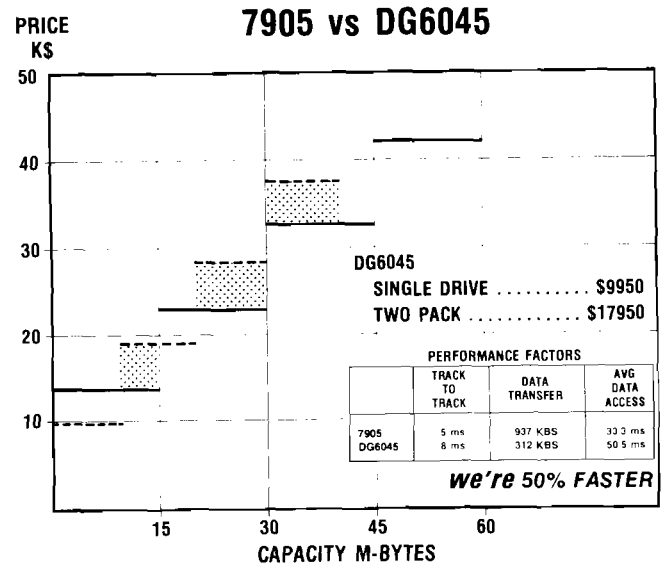
DATA SYSTEMS NEWS

Competition

Competitors Announce Two New Computers Aimed Directly at E-Series
By: David Carver/DSD

Two recent announcements by DEC and Data General appear to be in direct response to the success you've had selling 21MX E-Series computers.

Both the PDP-11/60 and the Eclipse S/130 are strikingly similar to the E-Series. Essentially, the two new computers feature firmware floating point instructions, user microprogramming, and lower memory prices ... all of which have been offered to 21MX Family users for years!

Details of these new offerings are given in the following articles. As you'll see, the E-Series still has significant advantages, particularly in price and in user microprogramming. The E-Series is still the leader, so push'em while they're hot!

Data General Eclipse S/130 Analysis
By: David Carver/DSD

The new Eclipse S/130 is a price-reduced version of the older S/230. Significant new features include lower memory prices, firmware floating point instructions, and user microprogramming. Sounds a lot like the E-Series, doesn't it?

Like DEC, Data General appears to be seriously offering microprogrammabiity for the first time. Although earlier Eclipse models have been "microprogrammable", no software support has been available until the introduction of the S/130. Even now, the support includes only a micro-assembler and loader. E-Series support is much more sophisticated, as it includes an interactive debug editor, dynamic microprogramming capability with the WCS loader, and the activity profile generator.

HP is simply six years ahead of DG in terms of user microprogramming support, so that microprogram development and use is far more efficient with the E-Series computer.

The E-Series 24-bit word width also contributes to ease of use, compared to the 56-bit word of the Eclipse. Developing

Eclipse microprograms is harder simply because each instruction must deal with more operations than is the case with the E-Series.

Data General has reduced memory prices in an attempt to compete with the E-Series. The price for 32KB of error correction MOS memory has been reduced from $3750 to $2500, a 33% difference. E-Series parity memory is available at $1600, still substantially under the S/130 price.

Two firmware based products are available with the S/130. One is a floating point instruction set, a combination of hardware and firmware that sells for $2,000. The set has 64-bit capability, and uses hardware accumulators along with firmware instructions. Largely because of the hardware registers, the S/130 floating point instructions will execute faster than the E-Series counterparts. Exact performance data will be distributed to you when known. A second firmware option is the character instruction set previously available only on the commercially oriented Eclipse C/330. The instructions are implemented in firmware.

An important limitation of the S/130 is that it cannot be upgraded to a larger Eclipse model (S/230 and C/330). The larger Eclipse hardware floating point processor, for example, is not available on the S/130.

E-Series vs. S/130 Pricing

S/130 Description	Price	E-Series Equivalent	%Δ
CPU, 32KB core memory, power fail/restart, ROM leader, signed MPU/DIV	$11,000	$8050	−27
with 64KB core	$14,000	$9650	−31
with 64KB core and DMS	$16,000	$10,750	−33
CPU with 64KB error correction MOS memory, battery backup	$14,000	$10,250	−27
with 64KB MOS and DMS	$16,000	$11,350	− 29
with 128KB MOS and DMS	$21,000	$14,250	−32
with 192KB MOS and DMS	$26,000	$17,450	−33
with 256KB MOS and DMS	$31,000	$20,650	−34
with 320KB MOS and DMS	No Answer!	$23,850	∞
Field Add-on 64KB MOS/ECC memory module	$8,000	$3200	−60

Summary

Although the Eclipse has taken a step closer to the E-Series in terms of price and user microprogramming, they aren't there yet. Deliveries will not start until the summer of 1977, while you can get an E-Series in six weeks! Sell E-Series to OEM's while we have the lead!

DEC PDP-11/60 Analysis

By: David Carver/DSD

The new DEC 11/60 was introduced to fill the large gap in price/performance between the 11/34 and the 11/70. Its performance appears to be in the same range as the 11/45 at a lower price, and thus will eventually replace the older computer. DEC characterizes 11/60 performance as within 85 to 90% of the 11/70.

The 11/60 uses the same instruction set as the 11/34, plus integral 32-bit floating point. It is a UNIBUS computer, unlike the multi-bus 11/45 and 11/70; this should make system throughput more limited in the 11/60. For example, the dual-ported memories of the 11/45 are not available. As another example, the high performance mass storage devices available with the 11/70 will not run on the 11/60 UNIBUS.

User microprogramming is a brand new field for DEC, and their introduction should lend credibility to our efforts in selling microprogramming. The 11/60 has less software support than E-Series/RTE systems, as only an assembler and loader are available. The RTE microprogramming package is much more extensive, with loader, editor, assembler, and the WCS driver that enables dynamic allocation of random-access control storage. The 11/60 micro-word is 48 bits wide and has more fields, or sub-instructions, per word than the 24 bit E-Series word. 48 bits allows the microprogrammer to do more operations in parallel, but makes program development far more difficult. The E-Series was designed from the ground up to be easily microprogrammable by the user; it appears to be an afterthought in the 11/60.

DEC has made a diagnostic tool available with the 11/60, called "Diagnostic Control Store", priced at $3800. It is apparently a set of firmware diagnostics that DEC claims will allow fault isolation to the module level. This product is an extension of the idea of microprogrammed diagnostics that are standard in the E-Series computer.

Highlights of the 11/60 along with E-Series comparisons are given below:

11/60 Feature	E-Series Answer
Floating Point Firmware instructions standard. Speed/precision details unknown at this time. Optional hardware floating point processor $5600.	E-Series floating point has 32-bit precision standard, 48-bit optional with FFP.
Cache memory is standard. Cache cycle time of 240 nSec yields effective *system* cycle time of 532 nSec (per Datapro Research).	E-Series high performance *main* memory yields system cycle time of 350 nSec! It's nice not to have to charge the customer for a cache system.
Error correction memory is standard for semiconductor memory versions. Parity is standard for core systems.	Parity is standard. Main memory is less expensive than either core or semiconductor memory for 11/60.
User microprogramming. 1K 48-bit WCS $5000, 1.5K VCS $1200, micro-assembler, loader.	E-Series microprogrammers use a 24-bit word that makes program development easier, faster. Software support is superior with assembler, loader, interactive editor, and a WCS driver for on-line, dynamic allocation of micro-programs.
Packaged in a double width, 36" high cabinet with space for mounting two 14 MByte RK06 Disc Drives *above* the CPU cabinet. Requires 3-phase power input.	E-Series is available in a compact 8-¾" high box with no special power requirements. Lo-boy cabinets for CPU and Disc Drives are optionally available.

11/60 PRICE LIST

Product Number	Description	List	Monthly Maintenance
11X60-BA	11/60 CPU with 64K Bytes core, 2K Byte cache, memory management, 46 floating point instructions, power fail/restart, ROM loader, TTY interface, line frequency clock, double width cabinet	$31,700	184
11X60-CA	Same as 11X60-BA with 64KB error correcting MOS memory and battery backup	25,700	174
11T60-BA	11X60-BA with RK11J disc controller, one RK05J 5MB non-removable cartridge disc drive, and one RK05F 2.5 MB removable disc drive, LA35 DEC writer	50,700	338
11T60-CA	Same as 11T60-BA with 64KB ECC/MOS Memory and battery	44,700	328
11S60-BA	11X60-BA with 128KB core memory, RK611 controller, 2 14MByte RK06 disc drives, LA36	67,300	419
11S60-CA	MOS version of 11S60-BA	62,700	409
MS11-WP	64KB core add-on memory with parity	6,600	?
MS11-KA	64KB MOS/ECC memory	5,000	15
FP11-E	Hardware Floating Point with 46 instructions, 32 and 64-bit precision	5,600	42
KU116-AA	1K 48-bit WCS	5,000	?
KU116-BB	Diagnostic control store to allow failure isolation to module level	3,800	

Summary

The 11/60 appears to be a step forward in packaging for DEC, and brings price/performance and microprogramming capability a little closer to the E-Series. We still have a considerable edge in price. Our equivalent to the 11X60-CA shown above is $14,700* or 43% less!

11/60 deliveries don't begin until summer, 1977 . . . and only small quantities at that time. We should have better deliveries with the E-Series for a long time.

Sell our price and user microprogramming advantages!

```
           *2113A . . . $6,850
      2102B ... $600      12766A ... $3,500
    13304A ... $300          12531C ... $350
   12892B ... $500             12991A ... $600
  12539C ... $350                29421A ... $1650
```

$14,700
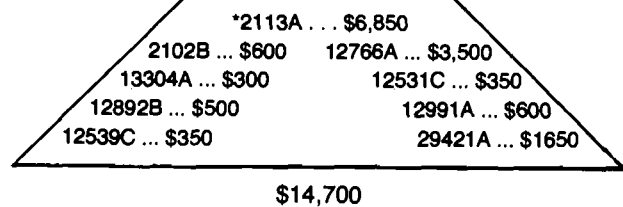
21MX E-Series Compatibility Upgrade Kit for HP 12979A I/O Extender
By: Phil Williams/DSD

The careful reader may have noted a slight discrepancy in the HP 12979A I/O Extender E-Compatibility upgrade kit part number referenced by two articles in the April 1, 1977 Computer Systems Newsletter. To eliminate confusion, the part number is 12979-91001. The list price is $1100 and

installation may be purchased from the local sales office on a time and materials basis.

Additionally, it should be pointed out that I/O Extenders with serial prefixes of 1712 and up are not necessarily directly compatible with all 21MX E-Series computers. Some earlier versions of 2109A and 2113A Computers (serial prefix before 1712) may require a simple modification to the upper power supply board.

A complete description of this modification is included in service note 12979A-13A. To determine whether a particular 21MXE Computer is I/O Extender compatible, the date code of the upper power supply should be checked. If it is 1709

or greater, the computer is compatible. Otherwise it is not and the previously mentioned modification will have to be performed.

Also, the Dual Channel Port Controller Assembly, located in the CPU, HP number 12897-60004 (Exchange number 12897-69004) will have to be checked to insure that it is a "Rev C" assembly, date code 1649 or greater. If it is not, a new assembly will have to be ordered through Blue Stripe and installed before attempting to run DMA devices in the I/O Extender. Time and materials charges are billable to customer.

35 Inch and 70 Inch Cabinets

By: Jim McCabe/DSD

As I mentioned in the April 1 *Newsletter*, 35", 70" and Multi Bay 56" Cabinets are no longer being offered as standard products. They can now be ordered on a special handling basis at the following new prices:

29401B	35"	1 Bay	$1400
29404B	56"	2 Bay	2575
29406B	56"	3 Bay	3800
29408B	56"	4 Bay	4485
29403B	70"	1 Bay	1725
29405B	70"	2 Bay	2700
29407B	70"	3 Bay	4025

The following guidelines apply when ordering the above cabinet models.

1. Above prices are good for just 90 days—after that contact DSD Sales Development for a new price quote.

2. For new prices on 35" and 70" cabinet options contact DSD Sales Development for quotation.

3. Delivery will be approximately 12 to 14 weeks.

4. Purchase agreement discounts no longer apply on these model cabinets. However, we may quote lower prices for large quantity orders to reflect our cost savings in handling these orders. Contact DSD Sales Development for quotations.

5. Above cabinets will be available from DSD for at least one more year. However, we should strongly urge our customers to change to standard 56" cabinets.

RJE/1000 Compatibility

By: Bill Stevens/DSD

RJE/1000 emulates an IBM 2780 Data Transmission Terminal. Unfortunately, this does NOT imply that RJE/1000 is compatible with any IBM system which supports 2780 terminals. This reminder is here because a problem has

recently arisen wherein a customer has committed himself to an IBM system which is not compatible with an existing HP system with RJE/1000. RJE/1000 is compatible and factory supported only with IBM systems which meet the criteria below:

- 2780 communications must be supported by the IBM 360/370 host.

- The operating system must be OS, OS/360, OS/MFT, OS/MVT, OSVS1, OSVS2 and DOS.

- The communications access method must be HASP, BTAM or TCAM.

- The control unit must be a 2701, 2703, 3704, or 3705.

If the above criteria are not met the factory cannot support the RJE/1000 installation. The factory will try to assist to the extent of referring you to other customers who might have interfaced RJE/1000 to other IBM operating systems and access methods. However, if the customer does purchase RJE/1000 for communication with an IBM system which does not meet the above criteria, support of the product is entirely the customer's responsibility.

Communication between RJE/1000 subsystems continues to be supported.

Significant Price Reduction!

By: Ron Carelli/AMD

To reduce our inventory of Teledyne AC and DC signal conditioning modules, prices on these modules are being reduced. The modules can be used for digital signal conditioning either in an HP 9611R or a customer-designed module which requires interface to or from T²L logic. The product number, description, and prices from the May 1st CPL are shown below.

Product Number	9611R Option	Description	Old Price	New Price
91210A	027	95-135 VAC RMS Input Signal Conditioning (Single Channel)	$20	$12
91211A	032	10-55 VDC Input Signal Conditioning (Single Channel)	$20	$12
91212A	039	20-250 VAC RMS Solid State Relay Module (Single Channel)	$30	$15
91213A	042	4-55 VDC Solid State Module (Single Channel)	$30	$15

Please contact me at AMD extension X2516 if you have any technical questions and/or a large quantity with tight delivery requirements.

Sales Aids

Data Systems LOCUS
By: Melanie Van Vliet/DSD

Our new name is Data Systems LOCUS. LOCUS is an acronym for Library Of Contributed User Software, and all you mathematicians will no doubt get the point. We were formerly called the 2100/21MX Contributed Library. Our name has changed but not our objectives.

LOCUS is a sales tool and a service to our computer users. As a service, LOCUS provides a facility for users to share their programming efforts. Contributed programs in the LOCUS apply to a wide range of systems from a CPU and teleprinter, to a large disc-based configuration with a variety of computer peripherals and digital input/output instrumentation. The large variety of programs can be used without modification or as a starting point for developing special purpose software. LOCUS software is written in Assembly, Microprocessor Assembly, FORTRAN, ALGOL and BASIC for the 2100 and 21MX series computers.

Data Systems LOCUS program catalog for 1977 is available through the Computer Service Division. The part number is 22000-90099 and the price is $15.00. The catalog is designed as a reference to over 640 programs, routines, drivers, compilers, and cross-assemblers currently available. The catalog of over 300 pages is organized in five sections: Indices, Software Abstracts, Ordering Information, The Contributors' Guide and a DOS-III to RTE-III Conversion Guide.

New contributed programs are welcome for consideration as entries to Data Systems LOCUS. A new contributor of an accepted program receives the traditional plaque engraved with the person's name, and a choice of any other contributed program. For further information on LOCUS contributing see the Contributors' Guide in the catalog, or contact the LOCUS Librarian at Data Systems.

Questions/Answers from NPT Tour
By: Roger Ueltzen/DSD

The following are some questions/suggestions, which were raised during the March NPT Tour, which we have addressed and would like to share with you.

- Should communicate literature update/revision plans to the field so they don't overstock literature which will soon be replaced.

  Completed & sent to field. Will be updated on a regular basis

- HP-IB manual inadequate—needs to be revised.

  We agree! It is a go task and probably will be done in about 4 months.

- Hire summer student to document internal users/ applications of 21XX/1000.

  George Fernandez in Joe Schoendorf's group is doing this.

- Pocket price guide needs to be updated—when?

  To be distributed to field on April 22.

- Long lead times on measurement and control products (i.e., 26 weeks on 9603R/11R) hurting orders.

  Current availability for 9603R/11R is 14 weeks

- MSR-E never received IMAGE application note—why?

  Only a few were printed to make a show (APICS). It has to be reworked.

- Suggestion that we have color monitor displaying memory map in Computer Caravan.

  Done.

- 7905 availability going out.

  Special agreement will keep 1000 Systems at 12 weeks.

- Clarify SSS and BMMC—who, what, why, etc.

  Van Diehl reviewing. Article will be forth-coming.

- Have factory personnel participate in some field installations—review what is shipped; ease of installation; etc.

  Manufacturing & Marketing personnel will do this.

- Pocket price guide needs to be updated—when?

  To be mailed this week.

- Would like application oriented management brochures.

  Coming, as we gain application knowledge at the factory.

- Re: RTE 1000—2780 capability is not adequate—need 3780 capability.

  No current plans to do this.

- Would like to have 1000 seminar package like that available for HP-IB.

  Joe Schoendorf to supply.

- Would like copies of DEC's OEM customer list.

  Available from Stu Kagan.

Data Systems Division Current Sales Literature List April 1977

By: Ted Proske/DSD

Literature Stock No.	Pub. Date	Description

HP 1000 Computer Systems Literature

5953-0805	3/77	HP 1000 Computer Systems brochure, color, 16 pp, covers Models 20 through 81 (REVISED)
5953-0815	9/76(A)	HP 1000 Computer Systems tech summary brochure, 16 pp, covers Models 30 through 81
5953-0809	3/77	HP 1000 Computer Systems Technical Data book, 108 pp, covers Models 20 through 81 (REVISED)
5953-0810	4/77	HP 1000 Computer Systems Configuration Guide, 30 pp, covers Models 20 through 81 (REVISED)
5953-0819	9/76	HP 1000 Computer Systems Support Services brochure, 8 pp
5952-5531	1/77(A)	The Mini's Impact on Data Base Management Systems, 8 pp, reprint of magazine articles on HP 1000 Computer Systems and IMAGE/1000 in Nov. 1976 Mini Micro Systems

Other Systems Literature

5952-4657	6/76(A)	9640A Interactive Data Systems brochure, 12 pp
5952-1652	7/76(A)	9600 Technical Data Book, 124 pp

Software Literature

5953-0812	2/77	Real-Time Executive Software brochure, 20 pp, covers RTE-M/II/III (NEW)
5953-0804	2/77	21MX Computers, Software Data book, 68 pp, covers RTE-M/II/III, RTE-B/C, and BCS (NEW)
5952-1687	4/76	Real-Time BASIC brochure, 16 pp
5952-1689	2/76(A)	RTE-III brochure, 20 pp
5952-9939	5/76	92063A IMAGE/1000 brochure, 8 pp
5952-9950	9/76	IMAGE/1000 Performance Brief, 8 pp
5952-1645	8/75	Distributed Systems brochure, 16 pp
5952-9929	4/76(A)	HP Journal article reprints book, 64 pp
5952-1514	6/74(A)	Teach Yourself Real-Time BASIC, 148 pp
5952-5531	1/77(A)	The Mini's Impact on Data Base Management Systems, 8 pp, reprint of magazine articles on HP 1000 Computer Systems and IMAGE/1000 in Nov. 1976 Mini Micro Systems
5952-1615	3/76(A)	Process Control Software Review, 8 pp, reprint of magazine article by Van Diehl
5952-9949	9/76(A)	Network Techniques for Multiple Minicomputers, 4 pp, reprint of article by Dave Borton

Computers, Computer Accessories, Interfaces, and Subsystems Literature

5953-0842	1/77	21MX Computers brochure, color, 20 pp (REVISED)
5952-5533	2/77	21MX Computers, Technical Data, 128 pp, covers computers, accessories, and interfaces (NEW)
5952-5532	2/77	21MX Computers, Price Information, 16 pp (REVISED)
5952-9929	4/76(A)	HP Journal article reprints book, 64 pp
5952-4396	7/73(A)	2100A Computer data sheet, 2 pp
5952-4523	2/74(A)	12908A (2100A/S) Writable Control Store data sheet, 2 pp
5952-4524	12/73(A)	12907A (2100A/S) Fast Fortran Processor data sheet, 2 pp
5952-4537	2/74(A)	12901A (2100A) Floating Point Hardware data sheet, 2 pp
5952-5514	3/75(A)	2100S Microprogrammable Systems Computer data sheet, 4 pp
5952-9934	5/76	21MX K-Series Miniprocessor Components brochure, 8 pp
5952-4617	8/74	12926A Tape Punch Subsystem data sheet, 2 pp
5953-0803	7/76	12996A Page Printer Subsystem data sheet, 2 pp
5953-0835	9/76	21MX E-Series Microprogrammable Processor Port application note, 16 pp
5953-0836	9/76	21MX E-Series Microprogramming application note, 8 pp

HP-IB Minicomputer Literature

5952-1584	5/76	The Real-Time HP-IB Minicomputer brochure, color, 8 pp
5952-1585	4/76	59310B HP-IB Interface data sheet, 6 pp
5952-1688	3/77	HP-IB General Information brochure (adapted and updated from 1977 HP Catalog), 12 pp
5952-1578	5/76	AN201-1 Automatic Q-A Evaluation of Precision Resistors, 4 pp, HP-IB Minicomputer application
5952-9932	5/76	AN201-2 Measuring Differential Non-Linearity of VCO, 4 pp, HP-IB Minicomputer application
5952-1686	10/76	AN201-3 Multiple Station Electronic Test System, 4 pp, HP-IB Minicomputer application

Other Literature

5952-1626	11/75	29400B Series Cabinets data sheet, 6 pp

(A) Until further notice, this item can be used until it runs out of stock, but it will not be reprinted.

DEC and the BUS
By: Neal Kuhn/DSD

Recently, some of the trade press have been carrying articles about a new interface card for the LSI-II. The card, called 1BV-11, is an IEEE-488 interface. It is understood that the card will be priced at $750 and released in June, 1977. Further, we believe that programming must be done at the assembly language level and that driver software (for FORTRAN or BASIC) won't be available until September. As more information becomes known, it will be announced.

There is no better time than now to demonstrate and sell HP-IB with an HP 1000. Let's all get onboard the BUS!

Used Equipment at Super Savings
By: Judy Coleman/DSD

The following used equipment is available at great savings and all units carry a full 90-day warranty.

Qty	Product	Description	Price
4	12551B-888	Output Resistor	$ 334.00
6	12676B-888	Fixed Shelf 1-3/4" x 15" x 41" Double Bay HP Cabinet	$ 156.00
4	12880A-888	I/F Terminal	$ 227.00
3	12880A-001-888	I/F Terminal Add 2640 Delete EIA	$ 227.00
10	12884A-888	8K Memory Expansion Kit for 2100A: From 4K to 8K; or 21K to 16K	$ 500.00
12	12884A-002-888	8K Memory Expansion Kit for 2100A: 8K to 12K	$ 500.00
4	12889A-888	High-Speed I/F	$ 487.00
11	12944A-888	Power Fail Recovery for 2109A, 2105A, 2108A	$ 390.00
2	12936A-888	Priv. Int. Fence	$ 162.00
2	2100A-008-888	Computer 8K Memory	$ 8100.00
2	2100A-016-888	Computer 16K Memory	$ 9600.00
1	2100A-024-888	Computer 24K Memory	$11100.00
2	2100A-032-888	Computer 32K Memory	$12600.00
7	2108A-888	21MX Computer	$ 3180.00
1	2155A-888	I/O Extender 2100A	$ 4712.00
1	91700A-888	System Kit for RTE-II-III Prereq. RTE-II and Batch	$ 2275.00
2	91703A-888	Dist. Sys. Kit for BCS Satellite Prereq. BCS Software	$ 2600.00
1	2617A-888	600 LPM Printer	$10000.00
3	12960A-888	7900 Disc Sub.	$ 6750.00

DATA TERMINALS NEWS

Division News

In-Service Training Course
By: Rich Ferguson/DTD

O.K., you terminal tigers — here's what you've been waiting for! For those of you who missed the Terminal Specialists Training Class held in February in Cupertino, we have just the thing — the training materials and lab sessions used in that class have now been put into an In-Service Training Course. Here you can learn the terminal and its operation in the convenience of your own office.

This In-Service training course is designed for those who wish to become expert in terminal operations and who do not have an opportunity to come to Cupertino. To go through the course, you will need two 2645A's with display enhancements, and line drawing set, minimum. Also, two 13232A cables, one 13232H cable and a 13232U modem bypass cable.

So, now you can learn at your own pace and become a terminal expert in your own office!

To get a copy of this In-Service Training Course. fill out the form below and send it to DTD.

TO: **Data Terminal Division**
Sales Development
Bldg. 43, Cupertino
Attn: Carl Flock

Please send me my personal copy of the DTD In-Service Training Course for 2645A terminals.

NAME _____

OFFICE _____

SIGNATURE _____

(Reprint from Volume 2, Number 9, March 15, 1977.)

Corrected Restatement of DTD Discount Policy*
By: Carl Flock/DTD

Discounts Without Agreements

An 8% discount is available if 5–9 terminals are ordered at one time without an agreement, as described in Volume Discounts below. All Volume Discounts are available, without an agreement, if all terminals are ordered at one time; (i.e., 10 terminal–11%, etc.) Delivery must be at one time also.

HP Agreement Discounts

Discounts with signed agreements are available in three ways:

1. Volume Discount–All DTD products and accessories identified as "purchase agreement discountable" on the CPL are discounted according to Schedule E. That's everything but the 13248A Service Kit, 13294A Class and "Specials."

2. HP CPU OEM Discount–A 15% discount is available to HP CPU OEM's (must buy CPU) for all discountable DTD products and accessories. That's everything but the 13294 Class and "Specials." This discount is not based on the number of terminals–flat 15% for all quantities. Above 50, the CPU OEM should use the volume discount to his advantage.

3. HP 2649 OEM Discount–The 2649A (and only the 2649A terminal) and all discountable accessories (except the 13246A/B and 13349A) are discounted according to Schedule F for OEM's. The 13246A/B, 13349A are discounted according to Schedule E (Volume Discount). Remember, the 13294A and "Specials" are not discountable. For example, a 2649 OEM who signs an agreement to buy fifty 2649A's is entitled to a 31% discount on all DTD products except the 13294A and specials which are not discounted; and the 13246A/B and 13349A which are discounted at 18%.

*The discount is determined by the number of 264X numbered items, in all cases except the HP CPU OEM discount.

Product News

What's What on the 2649A/#1
Inside the Terminal—(An Informal Tour)
By: Steve Berman/DTD

NOTE:

This is the first in a series of articles describing DTD's OEM effort ... watch for more!

So, your customer wants to add enough bells and whistles to the terminal that it competes with the 4:17 freight train for decibel output, eh? You say our specials group won't do the modifications (even with a bribe?) Well, do we have a deal for you! Have the *customer* do the work.

This is, perhaps, an oversimplified version of the way things are. To really understand the whys and wherefores of qualifying and selling an OEM our 2649A/13290A, one should first understand the "insides" of the 2645A. That's what this article will start to cover.

The 2645A is, essentially, a microcomputer system. It has a microprocessor, memory, and I/O devices. DTD has implemented the function of a computer terminal on this microcomputer system via a program for the microcomputer. This program is stored in Read-Only-Memory (ROM), and is also known as the *firmware* of the terminal. The firmware controls (in one way or another) *all* of the terminal's operations. (Examples of what the firmware controls includes interpreting keyhits, commanding the CTU's to move, moving the cursor, and getting data to/from the datacomm.)

How is this implemented physically? Well, the best way to view it is as a combination of a number of hardware modules and two different types of data paths. The modularity is evident; microprocessor on the processor board, firmware on the control memory board, a module for the keyboard, several modules for the display, a module for data communications. But data paths? Where? Why?

The data paths are needed to allow the modules to communicate data and control information among themselves. One of these data paths is called the bottom plane or backplane; physically it is the circuit board and connectors that all of the 2645A circuit cards plug into. In order to avoid "confusion" amongst the various modules, there is a protocol to be followed if one module wishes to "talk" to another. Various modules can thus "request" this data path (bus) for their use.

In some cases, however, it is desirable to avoid the protocol (for timing reasons, for example). The top plane provides this type of path; physically it is implemented with the 2, 3, 4 and 5-wide top plane connectors (e.g., to connect the processor and control memory boards). In this configuration only one module can ever be the top plane "master" (i.e., dictate what the other modules on that data path do); thus, no protocol is required.

So, we've got all this hardware connected together *and* the control program is stored in ROM. What happens when power is turned on? More on that next time....

The 'Secret' For Success
By: Steve Stark/DTD

Do you want to be successful? If not, skip to Section B. If you do, read on!

Section A.

People become successful because they discover some secret which gives them some unique leverage or advantage over their competitors. This leverage or advantage is, of course, extremely critical in the computer systems business which is undoubtedly one of the most competitive. With this in mind, DTD would like to let you in on one of our secrets which has allowed a number of HP Sales Representatives to be very successful. (Before we tell you, though, you have to promise to tell EVERYONE!!)

The secret is the HP-2649 MICRO-PROGRAMMABLE CONTROLLER/TERMINAL.

The 2649A is so effective that, although we have never formally promoted it, we have sold a substantial number of them. The reason for this is that the product literally sells itself. About all that you have to do to sell it is to show your OEM or end-user what a 2649A is and explain what it can do. If they are anything like the people that we have been dealing with, they will immediately recognize the capability of the 2649A and the benefits that it has to offer.

Since you may not know where to begin your rise to the top, we thought it appropriate to describe some of the applications where the 2649A has proven to be a winner:

1. **POINT-OF-SALE SYSTEM**—In this application, the 2649A functions as the central controller and has been interfaced, by the OEM, to a 5 Megabyte moving head disc drive. The 2649A controls a number of point-of-sale terminals and updates inventory data on the disc. The OEM developed the entire firmware package from scratch for the application.

2. **CLINICAL LINEAR ACCELERATOR**—In this application, the 2649A has been interfaced to a clinical linear accelerator used for treating cancer patients. Data relating to the type of treatment that the patient is scheduled to receive as well as a history of past treatment is maintained on individual cartridges for each patient. The 2649 then monitors the operating parameters of the accelerator set by the radiologist and will turn the accelerator off if it determines that the parameters are inconsistent with the treatment specified on the cartridge.

3. **SPECIALIZED INDUSTRIAL TERMINAL**—In this application, the 2649A will be interfaced to a specialized keyboard which will allow operators in a steel mill to enter complex commands to a control

system by simply pressing a single key. They will use the special character set capability in the terminal for displaying diagrams which provide status information about various aspects of mill operation. Future implementation of the terminals might include interfacing scales and other devices to the 2649A.

4. WORD PROCESSING TERMINAL— In this application, the OEM will modify and enhance the 2645 firmware package in order to add more text editing capability. This modified firmware package will then be installed in the 2649A, which will be part of a word processing system. By taking advantage of the intelligence in the 2649A, the processing capability of the computer in the system was substantially reduced.

5. DATA LOGGING SYSTEM— In this application, the 2649A will be mounted in an airplane. It will acquire data about the airplane's position as well as data about magnetic fields around the airplane and log the data on a cartridge. After the airplane lands, data will be transferred to an RTE system for further analysis. The system clock in the terminal will be used to initiate execution of the data logging program at specified intervals.

Obviously, these five applications represent only a small segment of 2649A applications spectrum. However, they should provide you with a perspective of the versatility and appeal of the 2649A, which should help you to identify accounts which are trying to solve similar problems. Should you encounter a situation where you are not sure that an application is within the spectrum of the 2649A, call DTD and we'll help you make that determination.

Another aspect of the 2649A which will contribute to your success is the large quantities of controller/terminals which are typically required in the 2649A applications. This means that you will be well rewarded for any efforts expended to capture the business or, in other words, you can make big bucks with the 2649A!

Section B

Call your Mother—and tell her that your career at Hewlett-Packard is seriously in doubt!

GENERAL SYSTEMS NEWS

Product News

Introducing the New HP 2026:
The Dedicated System for Data Entry and Data Communication
By: Nev Griffin/GSD

Have you been involved in sales situations where your customer was only looking for a remote source data entry system and had less than $50,000/per system to spend? He didn't want to program. He didn't want to process data. He just wanted a simple, easy-to-use data entry system ... a system which would keep his communication costs at a minimum.

We just had to walk away in those days, *but*, those days are gone!! We have the solution now ... with the HP 2026. The HP 2026 is a powerful new system for those companies that require information processed at corporate head-quarters to be entered in widely dispersed geographic locations. Originally developed to meet Hewlett-Packard's demands for data entry and worldwide communications, it has been enhanced so that today it provides a unique combination of features complementary to our data processing product line and an ideal system for those accounts embarking on a plan for distributed processing.

This proven system offers capabilities which your competitors will find hard to beat—such as:

★ Extremely efficient data communications with three line protocols and data compression/expansion to give maximum throughput,
★ Flexible data communication capabilities like multiple transmission speeds and code independence to name a few,
★ Data Entry utilizing 1 to 16 multidropped 2645's operating in page mode at speeds up to 9600 baud,
★ The powerful Data Entry Application Language or DEAL as we call it, to develop screen formats, edits, file specifications, and output reports,
★ Multiple storage modes and fast information retrieval techniques, and
★ Remote job entry utilizing either 2780 emulation to small IBM systems and our 3000, or full HASP multileaving to large IBM systems.

These are just the highlights—you'll find lots more in the field training manual.

Remember—a network of HP 2026 systems offers these major benefits to your prospects:

★ Consistent and accurate source data entry at remote locations
★ Prompt entry of remote data for central processing
★ Easy operation by present office personnel
★ Significant cost reduction for information transmission
★ Elimination of the data entry burden on the central computer, thus allowing it to perform more complex tasks

Since service and support are key elements in selling to commercial accounts, GSD has put together a support team to provide comprehensive systems engineering and product specialist training for the HP 2026. The first SE training was given during the week of March 28 and will be followed by courses scheduled for June and August. Besides training on the system, this course will enable the SE to give on-site training for customers. The product specialists will receive their initial instruction commencing May 16 and subsequent programs are scheduled for September and December. The first customer training course is scheduled for June 20 at General Systems Division.

To assist your selling effort, four new pieces of literature have been provided:

★ *Introduction Brochure*—directed at top management focusing on the system features and the payback HP has received from its installation. (5953-0504)
★ *Databook*—providing a system summary, price/configuration, support service and data sheets on individual components. (5953-0508)
★ *Reference Manual*—a comprehensive manual providing all details on the subsystems in addition to operational instructions. (22704-90001)
★ *Site Preparation and Installation Manual*—provides the necessary information and direction for you and the customer engineer to assist your customer. This will be especially valuable since most systems will be installed in an office environment and might require

special wiring and/or additional floor space. (19702-90002)

★ *Guidebook to Data Communications*—an introduction to telecommunications components, modems, line protocols and common carriers. (5955-1715)

In addition to the sales literature, the system will be further promoted as a feature article in the June issue of *Computer Advances* and by articles in issues of *DataComm User* and *Industry Week* magazines. Also, product information has been submitted to Datapro and Auerbach.

For $38,500.00 the HP 2026 is a quota beater!! Remember the market for data entry systems is forecast to grow at more than *40% per year* for the next five years to $1.2 billion!!! Take advantage of this expanding market and sell 2026 systems!!
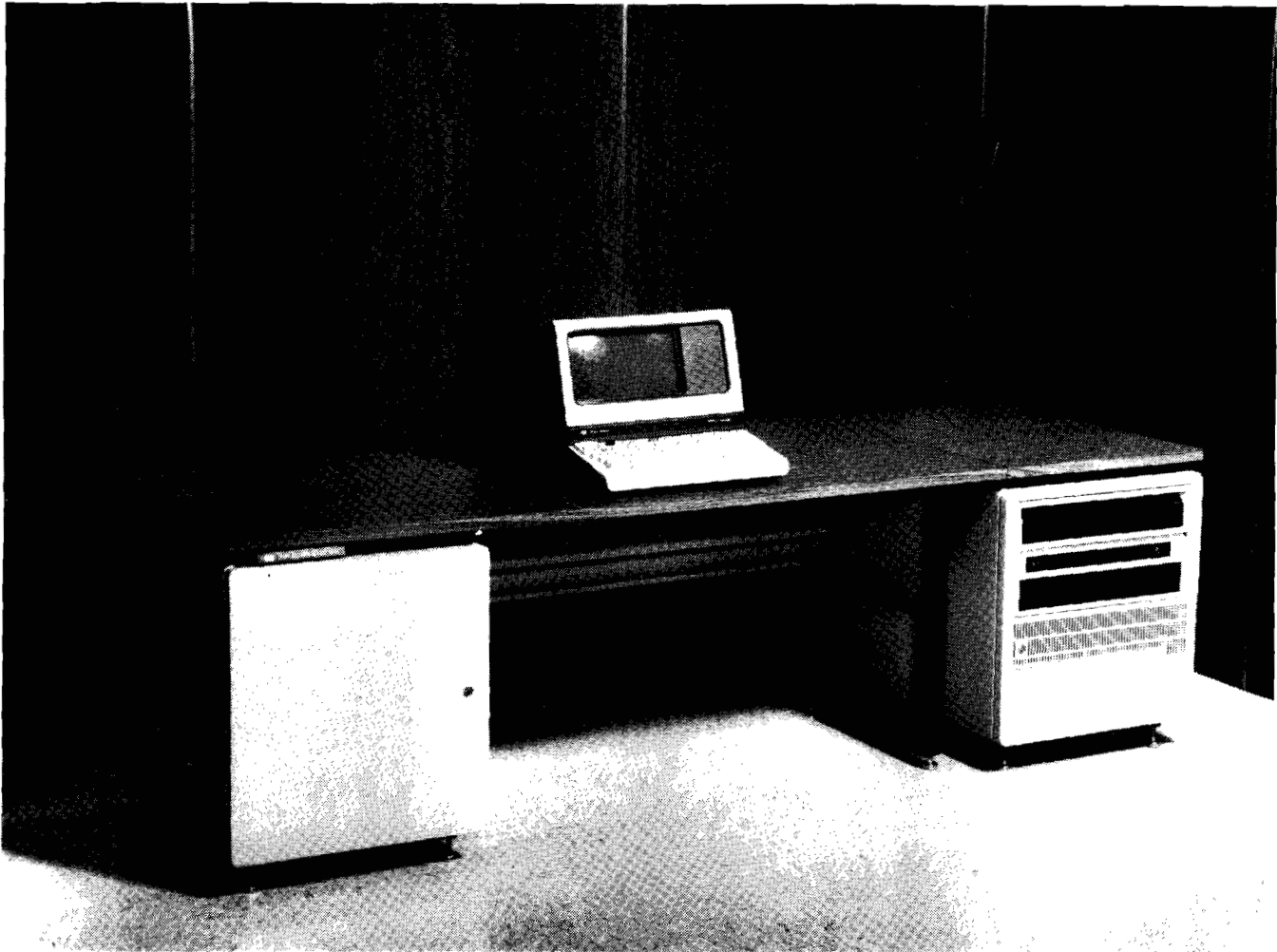
The HP 2026 system comes in the attractive desk cabinet ideally suited for the business environment.

The HP 2026 system may be expanded with peripherals to meet specific customer environments. This configuration would be typical of a central 2026 location and/or an application development system.

DS/3000 — A Significant Advance in Computing
By: Larry Hartge/GSD

Distributed processing in the business world has been little more than a buzzword. Now, with the Hewlett-Packard introduction of Distributed Systems/3000, distributed processing becomes a reality!! In addition, DS/3000 gives powerful credibility to CSG's large company marketing strategy.

DS/3000 consists of the software enhancements to MPE II and interface cards that permit interactive communications between HP 3000 Series II computers via hardwired coaxial cables or via modem links over phone lines. With this HP contribution, the user is not required to have a knowledge of telecommunications concepts—that means "transparent" distributed processing power with DS/3000!

Why All the Excitement?

The distributed processing marketplace is growing very rapidly. The projected number of CPUs sold for use in distributed systems by 1980 is 4 times that of 1976! In terms of dollars, it is estimated that 37% of the money spent on computer hardware in 1980 will be spent for distributed processing hardware! This amount is a whopping 5.6 Billion Dollars!! DS/3000 affords us the opportunity to get the lion's share of this money.

Why is the Marketplace Expanding so Rapidly?

Prior to the advent of systems which could be used to implement distributed processing, companies seemed to be designing their organization around the computer instead of mapping the structure of its data processing to the organizational structure. But, with a super product like DS/3000, distributed processing now affords the capability of reinstating true responsibility, authority and control for decision making at the departmental level, while at the same time providing **corporate-wide decision support** to top-level executives. *Remember, this is the most important point for distributed processing!!!*

A Powerful, Capable Product

The three major functional capabilities of DS/3000 are:

★ **Remote Command Processing** giving the user the ability to execute any and all MPE commands through an interactive remote session.

★ **Remote File Access** permitting the user to automatically access remote files, simply by expanding his file statement to identify the remote system.

★ **Program-to-Program Communication** affording the programmer the ability to write application programs which run simultaneously in separate computers and communicate directly and efficiently with each other.

The use of these three capabilities results in many benefits and features, such as:
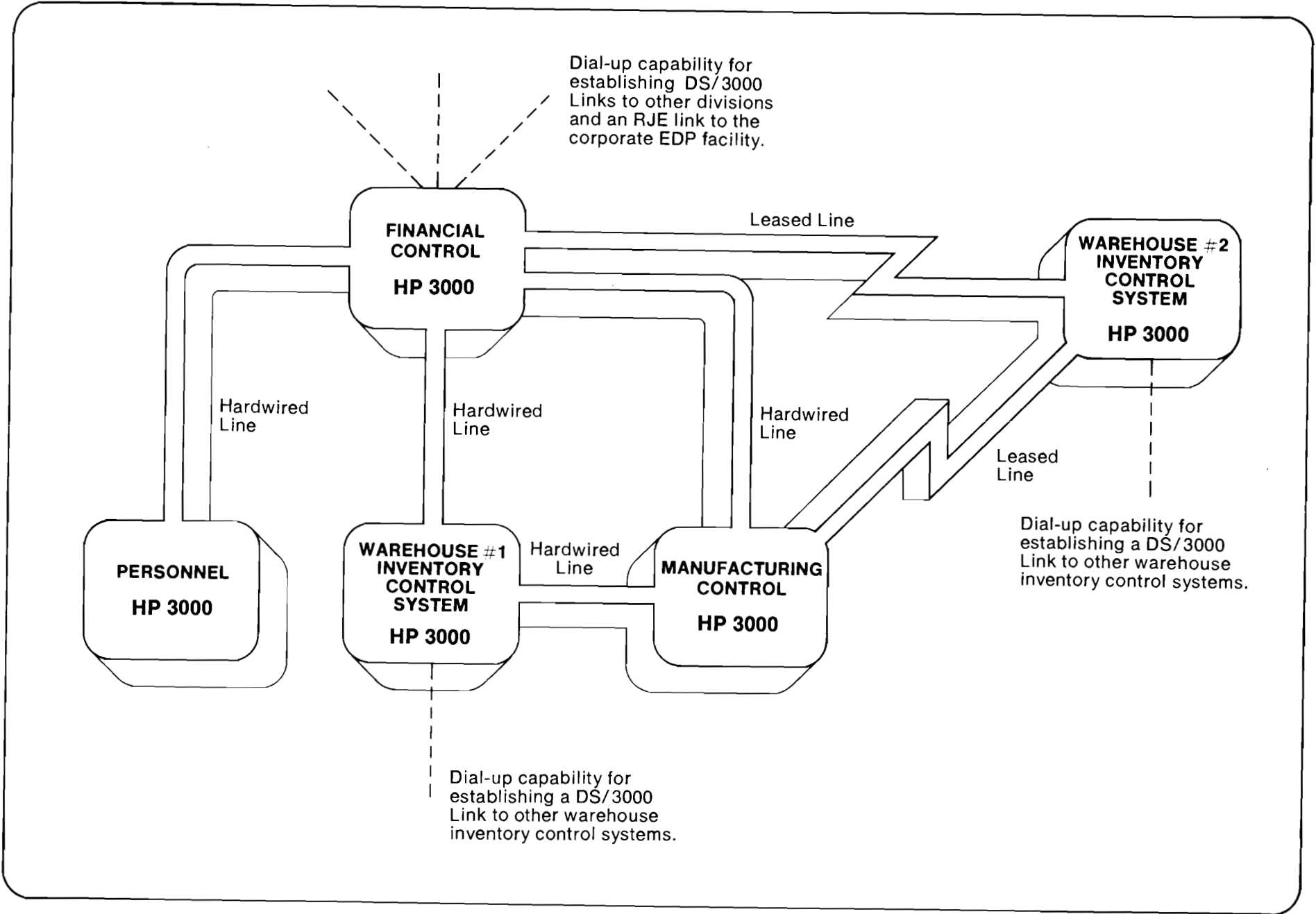
★ *Virtual Terminal Capability*—the ability of a terminal user to attain full use of another remote processor just as if it were his local processor.

★ *Peripheral Sharing*—overall cost reduction by minimizing duplication of expensive, specialized peripherals (such as an upper/lower case line printer) is achieved automatically via the remote file access capabilities.

★ *Data Base and Data File Sharing*—elimination of complete duplication of data bases or files is afforded through the use of program-to-program communication and remote file access.

★ *Application Transparency*—the application programmers need not be concerned with the details of network communication, but can now concern themselves with the application problem.

★ *Efficient Communications*—all communications take place in a bidirectional, interleaved fashion for efficiency. In addition, these communications may take place over switched, leased, or hardwired lines.

★ *Network Control*—a computer network can be implemented that distributes computer power to locations where it is needed—at the same time maintaining control at a central location, if desired.

★ *Network Security*—full network security is assured through the password and lockword provisions of the MPE accounting system.

DS/3000 represents a quantum jump on the competition —again! First, we developed the state of the art hardware, our stack architecture. Our operating system, MPE, made terminal handling transparent to the programmer—he simply did input and output regardless of the physical type of terminal (or for that matter any device) or its physical location. We then developed a full complement of high level commercial languages that conformed to industry standards thereby assuring that the actual hardware behind the compiler was transparent to the programmer. At the same time, we made the user's data management problems transparent by being the first to develop true data base management on a mini. In fact, HP was the only computer vendor that had a data base management package (IMAGE) awarded a place on the Datapro Software Honor Roll. In addition, with the introduction of KSAM, all of the user's data management problems are solved.

Since we had our act together as a fully capable standalone system, it was only natural that we took the next logical step—connecting them together in "transparent" distributed systems. HP is already an established leader in industrial distributed systems. By drawing upon this experience and our fantastic success with the commercially-oriented HP 3000, we are now stepping forth as the *leader* in commercial distributed processing with DS/3000.

In summary, DS/3000 represents a *major contribution* to the industry from Hewlett-Packard. For more information, the whole story appears in the DS/3000 Field Training Manual, the Data Sheets, the DS/3000 *Reference Manual,*

Dial-up capability for
establishing DS/3000
Links to other divisions
and an RJE link to the
corporate EDP facility.

**FINANCIAL
CONTROL**

HP 3000

Leased Line

**WAREHOUSE #2
INVENTORY
CONTROL
SYSTEM**

HP 3000

Hardwired
Line

Hardwired
Line

Hardwired
Line

Leased
Line

Dial-up capability for
establishing a DS/3000
Link to other warehouse
inventory control systems.

PERSONNEL

HP 3000

**WAREHOUSE #1
INVENTORY
CONTROL
SYSTEM**

HP 3000

Hardwired
Line

**MANUFACTURING
CONTROL**

HP 3000

Dial-up capability for
establishing a DS/3000
Link to other warehouse
inventory control systems.

the write-up in the "large company" brochure, and the Guidebook to Data Communications.

When Can You Order?

Now! Check with you RSM as to availability within your region. The press release announcing DS/3000 goes out on May 16. The first ad, as you have seen at NPT, appears on May 16 in the *Wall Street Journal* with follow-on ads in *Business Week, Datamation* and *Computerworld*.

The following table lists the DS/3000 products that appear on the May 1 Corporate Price List.

	U.S. Price	BMMC
For each customer, you must sell:		
36900E DS/3000 On-Site Training	$3,000	—
For each computer (node) in the network you must sell:		
32190A DS/3000 Software	$9,000	$75
One of the following Interface Cards:		
30055A—Synchronous Single Line Controller for modem links (cable to modem included)	$2,000	$18
or		
30360A—Hardwired Serial Interface (for coaxial links). You must buy a 30220A cable for each pair of HSI interfaces.	$2,300	$19
30220A—Coaxial cable for HSI	25' =	$175
Option 001	100' =	+$200
Option 002	250' =	+$225
Option 003	500' =	+$430
Option 004	1000' =	+$825
Option 005	2000' =	+$1600

The above prices are subject to existing VEU and OEM Agreements with the exception of 36900E Customer Training.

KSAM Locks 'em Up— Now in COBOL, Too!
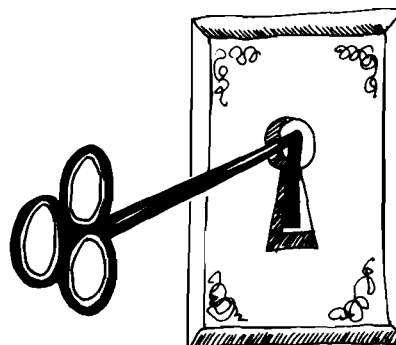*By: John Yu and Rich Edwards/GSD*

Beginning with version A.00.04 of KSAM/3000 (on MIT 1709, on its way now), KSAM/3000 files may be dynamically locked and unlocked from COBOL programs. This now means that KSAM files can be locked and unlocked from ALL five of the languages interfacing to it: COBOL, RPG, FORTRAN, BASIC, and SPL! Thus, today, from any language KSAM is another 3000 subsystem that will help you LOCK UP those transaction processing applications your prospects are trying to bring on-line.

Full details of how to use locking/unlocking are found in an update Number One to the KSAM Reference Manual (now available) or on the NOON file of the 1709 MIT.

A few brief details: Before locking a KSAM file, it must be opened with dynamic locking and share access enabled

by the new COBOL open procedure CKOPENSHR. The actual locking and unlocking must be done, after calling CKOPENSHR, by calling the new procedures CKLOCK and CKUNLOCK.

Don't keep KSAM locked up any longer when discussing data management with a COBOL prospect—use it to help you win the sale.

Speed Up Duplicate Keys in KSAM/3000 Files
*By: John Yu and Rich Edwards/GSD*

Here's a tip you should pass on to any of your customers using the DUPLICATE KEY feature of KSAM/3000:

Let's imagine you have many records with the same key value (duplicates) — transactions associated with the name of a patient in a hospital, for instance. Rather than define each key to be the patient's last name, use the following scheme: append to the key value (last name, in this case) a "time stamp" which might be of the format YYMMDD (year/month/day).

Regular Key Definition	(Time Stamp & Name) Key Definition
JONES	JONES770429
JONES	JONES770430
JONES	JONES770503
JONES	JONES770505
.	.
.	.
.	.

This will drastically speed up processing, and actually give the user greater flexibility in examining the records. He will now be able to look at all of JONES' records for a given date (or range of dates) through just ONE key.
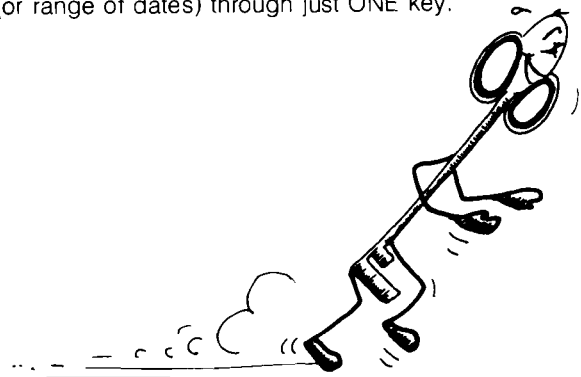
Self Test*: Do You Know the HP 3000 Better Than an IBM Salesman?
(or)
HP 3000 Series II — IBM System/3 Update
By: Rich Edwards and John Yu/GSD

How well do you know the HP 3000? Could you successfully rebuff questions written by a competitor's salesman? The following questions were given to an HP 3000 prospect by an IBM salesman. The questions reveal a large degree of misunderstanding of the 3000's capabilities by our competitor's salesmen. We would like to share with you the issues raised by IBM with the HP prospect and give you the REAL ANSWERS to these questions.

(Thanks to *Dan Kearns* for forwarding us this information from Tualatin, Oregon.)

Product Related Questions (prefaced by: "Is It True?")

1. **The disks are 2316 type disks with (given speeds).**
   The 47 Mb ISS disk is a double density equivalent to the IBM 2314 disk. At the time of the questions the new Disc Memory Division's 7920 50 Mb disc was not announced. Today the following are the appropriate comparisons:

	Transfer rate	Access speed	(=Seek time + Delay)	
IBM 3340	885 Kb/sec	35.1 mS	25 mS	10.1 mS
HP 7905/20	937.5 Kb/sec	33.3 mS	25 mS	8.3 mS

   Note that IBM had compared their 3340 seek time of 25 mS to the ISS (HP 2888A) disc's average access time (seek time + delay) of 41 mS to make their Winchester look even better. Today there is no question but that the HP 7920 is faster (average access speed) than the IBM 3340.

2. **The system console is an ASR 33 teletype instead of a video screen (3277).**
   This is totally incorrect. It's also interesting that IBM made this point since only the Model 15 and the new Model 4 have a system console at all! That is one of the big selling features in upgrading a model 10 or 12 to a Model 15: getting a VIDEO CONSOLE! (Note: their console is very limited in size as well as capability vis-a-vis the 3000's.)

3. a. Communications only support asynchronous terminals at speeds up to 2400 baud.
   b. Terminals cannot be multidropped on a single line.
   c. Screen formats are loaded by operator from cassette instead of directly with application requested by operator.
   Points a) and b) are correct. Point c) is incorrect; DEL/3000 allows the user to load the screen formats

from a user program. Note that all HP 264X features are programmable, giving programs written in any HP 3000 language control of the terminal.

4. **SORT does not support—reformatting output, record selection, ADDROUT and summary sorts.**
   SORT/3000 will process KSAM/3000 files whose first record is defined to start at 0 (zero) and deliver an output file consisting of relative record numbers (equivalent to an ADDROUT sort on the System/3). This SORT output file is fully compatible with RPG/3000.

5. **File management allows adding records to sequential files only without the use of IMAGE.**
   Not true. While with both MPE and either KSAM or INDEX, the 3000 user can add records sequentially, he can also add them sequentially to an IMAGE detail data set.

6. **INDEX files are supported only with IMAGE.**
   While true at the time of the letter, NO longer true. KSAM/3000 and INDEX/3000 support both indexed and indexed-sequential files.

7. **The cost of IMAGE is $10,000 plus $30 per month and takes 40Kb system overhead. With supervisor of 40Kb that is a total of 80Kb.**
   Another question that is dated (partially). IMAGE and QUERY have been bundled together into DBM/3000 for $11,000 and $40/month. (The price mentioned by IBM was correct.) Note that the overhead figures are incorrect, though! IMAGE/3000 requires only 20K bytes of memory; MPE takes about 40 to 60K bytes depending upon the configuration (table sizes).

8. **The original blocking factor must be used by every program using the file.**
   This question is raised because many users have a large number of programs accessing the same file, but the programs have different blocking factors specified WITHIN the program; users are CONCERNED they may have to REWRITE THEIR PROGRAMS if they CONVERT to an HP 3000. Here's another case where the 3000 offers them flexibility but in this case system "defaults" will handle everything properly. Recall that there are three places where a file's blocking factor may be specified: 1) in the disc file label, 2) in the :FILE command, and 3) in an FOPEN intrinsic within a program. Also recall that on the HP 3000 the disc label overrides the parameters specified in the file command which, in turn, overrides parameters specified in a program (FOPEN). Thus, the actual disc label blocking factor takes precedence over the blocking factor in one or all programs accessing a file. The net result is—a customer doesn't need to reprogram. In short, the blocking factor is transparent to the user after the file is created.

9. **File system does not support the following types of file processing:**
   Sequential: By KEY no ADD no UPDATE, by KEY with ADD no UPDATE, by KEY with ADD and UPDATE, by LIMITS no UPDATE, by LIMITS with UPDATE;
   Random: By CHAIN no ADD no UPDATE, by CHAIN

*In the Next Two Issues, GSD's Section Will Feature Additional Self-Test Questions. It May Be a Good Idea to Keep the Entire Series in a Separate File for Future Reference.

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with ADD no UPDATE, by CHAIN with ADD and UPDATE, by ADDROUT no UPDATE, by ADDROUT with UPDATE:
Consecutive:
Loading Order Unordered:
Adding Records Only.

RPG/3000 with KSAM/3000 or INDEX/3000 can support all the file processing techniques listed above including ADDROUT.

Division News

GSD Sales Support—Europe
By: Bill Krause/GSD

With the increasing importance of the sales potential for Business Data Processing (BDP) in Europe, GSD Marketing announces the creation of a GSD Sales Support—Europe group to be located in Geneva, Switzerland.

The group's primary objective is to help our European sales force increase their sales of GSD products in the BDP market. This will be accomplished by staffing the group with marketing engineers experienced in the use of HP 3000's in BDP, thereby serving as educators and con-sultants to the European sales force in their pre-sales activities.

Bob Lewin has accepted the job of Manager, GSD Sales Support—Europe and will report to *Bill Krause* on a func-tional basis and to *Heiner Blaesser* on an operational basis.

Bob Lewin will be communicating directly to you regarding more details on his specific activities and the people in his organization.

I am sure all of you join me in wishing *Bob* and his team much success in their challenging new assignment.

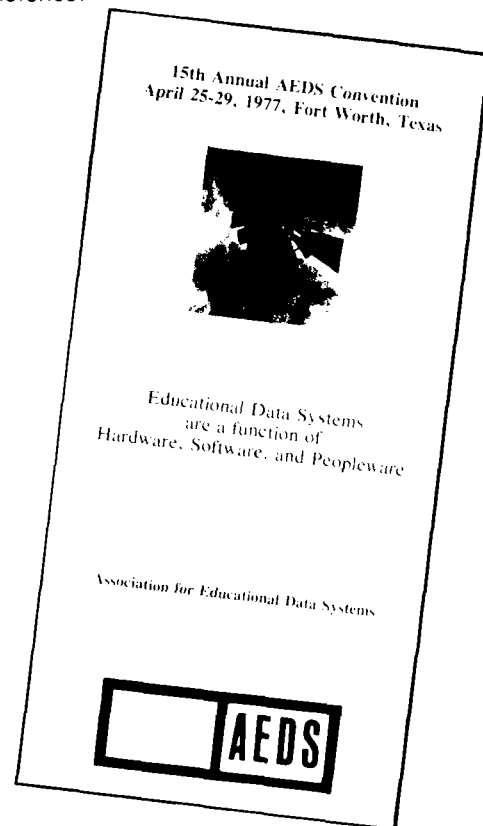### Lone Star State Hosts AEDS Convention
By: Carol Budkowski/GSD
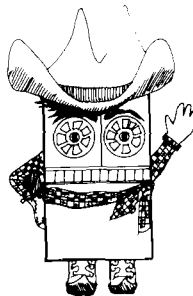
The Fifteenth Annual Association of Educational Data Systems (AEDS) convention was held this year (April 25-29) in Fort Worth, Texas . . . and HP was there. Heading up a variety of conference activities was an HP Users Group meeting, Texas-style. With the help of our local sales representative, *Bill Burls* (Dallas), we were able to corral

many users into a very informative discussion about their new software developments and answered questions about HP marketing directions.

More than just our users attended this conference; educators and educational administrators from all over North America joined in this full week of activities in the field of educational computing. Throughout the week, over 100 papers were presented covering a myriad of subjects from instructional innovations to administrative techniques.

In addition to these individual sessions, a room was set aside for vendor displays. Rather than going this route, HP decided to produce a nifty brochure which attendees carried about and used during the entire conference week. Printed in this pocket-size booklet were day-to-day events and a map of the convention center's layout for quick and easy reference.

15th Annual AEDS Convention
April 25-29, 1977, Fort Worth, Texas

Educational Data Systems
are a function of
Hardware, Software, and Peopleware

Association for Educational Data Systems

AEDS

We're hoping next year's show in Atlanta (May 15-19, 1978) will be even more exciting! See you next year, pardner!

Sales Aids

APL/3000 Seminars—Standing Room Only!
By: Pat McGrath/GSD

APL/3000 customer seminars, entitled "State-of-the-Art Features of APL/3000", are being presented in conjunction with Computer Caravan (a travelling computer trade show). The early seminars have already proven to be major

success! In Los Angeles, for example, the seminars attracted standing room only crowds that exceeded the capacity of the available room.

Because APL users are widely dispersed, the key to this successful APL Seminar Series was an effective promotional campaign advertising the seminar. The following activities supported this APL Seminar Series:

1. APL Direct Mailings (6,500) to:
   ACM/APL special groups
   Key industries/large manufacturing companies, insurance, and financial institutions
   APL leads from Computer Advances
   University computer center directors
2. Computer Caravan Mailing (8,000)
3. Local Mailings—sales offices' prospect lists
4. Computerworld—spot ads and press releases
5. Field Sales Prospecting.

Covered in these stimulating APL Seminars were all the unique features of APL/3000:

★ APLGOL
　★ Virtual Workspaces
　　★ Extended Control Functions
　　　★ APL/3000 Editor
　　　　★ Subscript Calculus, and
　　　　　★ Dynamic Incremental Compiling.

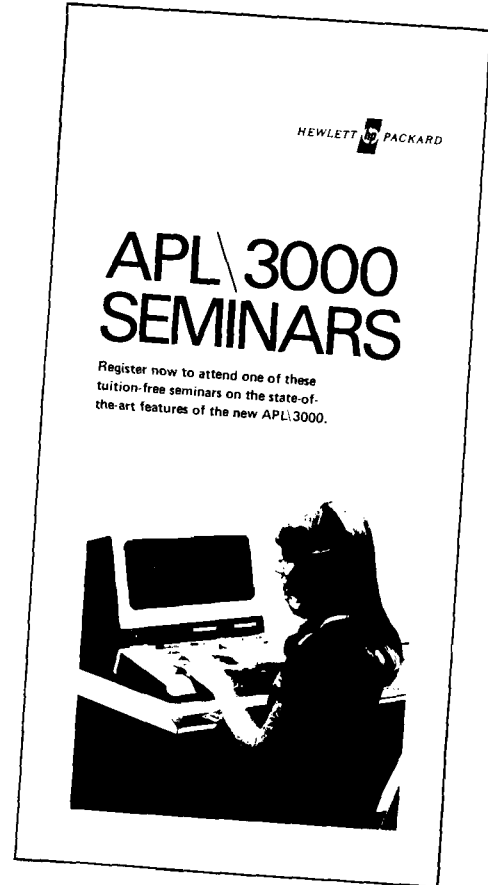We'd like to congratulate the following people for making the APL Seminar Program such a great success:

City	Field Manager	APL Seminar Coordinator (SE)	Attendance 1st Day	2nd Day
San Francisco	Al Nonnenberg	Lane Nonnenberg	40	35
Los Angeles	Dwayne Neely	Fred Waters	100	50
Cleveland	Dar Weir	Wayne Lukacsko	30	25
Minneapolis	Tom Rappath	Owen Benson	20	18
Chicago	Phil Conway	Paul Wittman	May 4, 5	
New York	Ange Colucci	Bob Ahrend	May 11, 12	
Philadelphia	Al Schallop	Don Kavulic	May 25, 26	
Wash., D.C.	Will Workman	Mike Baker	June 1, 2	
Boston	Ted McCarthy	Rich D'Angelo	June 8, 9	

This very successful APL Seminar Program is now being extended to the sales offices which were not associated with Computer Caravan. All the necessary materials to make your seminar successful and easy-to-implement are available from GSD in an APL seminar kit:

1. APL Seminar Slides
2. APL Seminar Script
3. Demo Software
4. Demo Script
5. Sample Invitations
6. Sample confirmation letter
7. Literature list for seminar handout notebooks
8. Seminar evaluation and follow-up form
9. Prospect qualification guideline

To order your seminar kit, send an I.O.S. to Bob Hall at GSD; use product number 47-770421. The price is $45.00.

HEWLETT PACKARD

APL\3000 SEMINARS

Register now to attend one of these tuition-free seminars on the state-of-the-art features of the new APL\3000.

Several of these APL Seminars have already been scheduled.

City	District Manager	APL Seminar Coordinator (SE)
Dallas	Ken Ferguson	Paul Edwards
Santa Rosa	Al Nonnenberg	Lane Nonnenberg
Montreal	Sherif Alally	Serge Daoust

If I can help you arrange a seminar in your sales office, please let me know.

GOOD SELLING WITH APL/3000!!

HP GRENOBLE NEWS

Sales Aids

Programming the HP 3070A on the HP 1000 is not for Specialists Anymore!

By: Georges Ouin/HPG

We have developed some contributed utilities to make the HP 3070A transparent to the standard BASIC Read/Print statements enabling you to easily control HP-IB instruments.

Key benefits of the HP 3070A/HP-IB are:

- Easy addition of HP-IB instruments to a system at any time without disturbing the other users.

- Control of these HP-IB instruments at distances up to 1.24 miles (2 Km) from the system.

- Easy program development using friendly BASIC.

Look at this sample of a program listing. Programming cannot be more friendly!

These 3070A utilities are available from Boise/Grenoble to anyone who needs them. Ask your friendly factory sales support engineer who will be happy to send you a copy of them.

```
200   REM
210   REM ===== DEFINE THE 3070'S LU NUMBER =====
220   REM
230   LET L=36
240   REM
250   REM ===== CLEAR THE CLUSTER =====
260   REM
270   LET C=CLR(L)
280   REM
290   REM ===== SET THE CLUSTER IN REMOTE ENABLE MODE =====
300   REM
310   LET F=REN(L,1)
320   REM
330   REM ===== PROGRAM THE DVM TO MAKE ONE DC VOLTAGE MEASUREMENT =====   The DVM is the HP 3455A
340   REM
350   REM == FRONT PANEL CONTROL    : SELECTED      ----> (HP-IB) ==
360   REM
370   REM == FUNCTION              : VDC           ----> (F1)    ==
380   REM == RANGE                 : 10V           ----> (R5)    ==
390   REM == MATH                  : OFF           ----> (M3)    ==
400   REM == TRIGGER               : INTERNAL      ----> (T1)    ==
410   REM == HIGH RESOLUTION       : ON            ----> (H1)    ==
420   REM == AUTO CAL              : ON            ----> (A1)    ==
430   REM == ENTER Y OR Z AND Z    : NO            ---->         ==
440   REM == STORE Y OR Z AND Z    : NO            ---->         ==
450   REM == DATA NOT RQS.         : OFF           ----> (D0)    ==
460   REM == BINARY PROGRAM        : NO            ---->         ==
470   REM
480   REM == CREATE THE PROGRAMMING STRING ==
490   REM
500   LET P$="F1R5M3T1H1A1D0"
510   REM
520   REM == SEND THE PROGRAMMING STRING TO THE DVM (HP-IB ADDRESS= 1)
530   REM
540   CALL TWRIT(L,1) ⎫ To direct the next PRINT statement to the DVM with HP-IB
550   PRINT #L;P$       ⎬ address = 1
560   REM             ⎭
570   REM == GET DATA FROM THE DVM ==
580   REM
590   CALL TREAD(L,1) ⎫ To select the DVM as next input device and read data into V$
600   READ #L;V$       ⎭
```

Joint HP-IB Show with Calculators and Instruments!!
By Henri Ajenstat/HPG

Would you believe it?

It actually happened on April 15 at an exhibition organized by the HP-LYON's sales office in a fashionable hotel in Grenoble.

The show aimed at the local scientific community was centered around HP-IB capabilities available with HP computing controllers.

The numerous visitors were introduced to the wide family of HP computing controllers ranging from desktop calculators (9815, 9 825) to a complete system (HP 1000 Model 30).

The HP 1000 system configured with two HP-IB clusters was used to demonstrate a few of its unique features like: control of multiple bus clusters, online access to a central data base through IMAGE/1000, concurrent program development . . .

We are sure that this first step will be followed by others, and we are ready to help you make it happen again.

Before the show, a dry run for *Alain Carron* (Instrument FE), *Jacques Fuchs* (Calculator RSM) and *Christian Hebert* (Computer SE).

Order Processing

Choose the Right 13232 Option When Ordering an RS 232 Male Cable
By: Francis Marc/HPG

Statistics show that you still order the 13232A cable mainly in Europe.

Though it costs only $50, that cable is a simplified one which we no longer promote (removed from data sheets). *Many timing and control lines are missing in the 13232A,* particularly the CH line recently added in the new "ex-

tended data communications" board. Your customer could be in trouble with PTT or when modifying this installation.

Only the 13232 M ($75) is fully RS 232C/CCITT V24 compatible and strongly recommended. If your customers use some American modems which are RS 232A compatible (SCA at pin 11 instead of 19) you may order instead the 13232 N ($75).
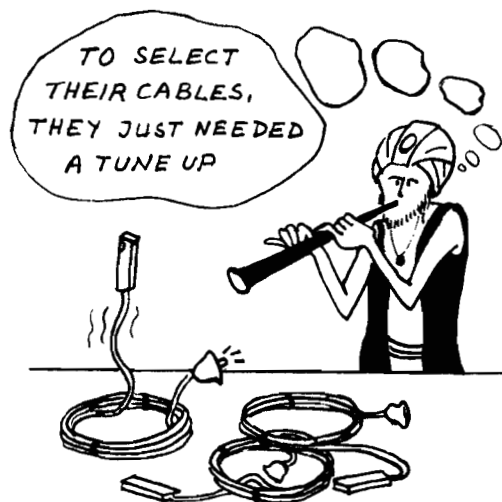

Having Trouble Identifying Your 264X Cables?
By: Francis Marc/HPG

Cables are ordered as products (13232X), but actually they are marked as assemblies* (02640-60XXX or 5061-XXXX). To recognize them, use the following cross-reference list:

13232 A = 02640-60043	13232 M = 5061-2409
13232 C = 02640-60059	13232 N = 02640-60131
13232 F = 5061-2408	13232 P = 02640-60132
13232 G = 02640-60098	13232 Q = 02640-60133
13232 H = 02640-60099	13232 R = 02640-60134
13232 J = 02640-60116	13232 S = 02640-60135
13232 K = 02640-60120	13232 T = 02640-60151
13232 L = 02640-60121	13232 U = 5061-2403

*Only "Parts Center Europe" delivers cables ordered using their assembly number.