

# COMPUTER SYSTEMS NEWSLETTER

*For HP Field Sales Personnel*

REINHARDT, HELMUT  
FRANKFURT  
HPSA

HEWLETT  PACKARD

Vol. 2, No. 17  
July 15, 1977

## DTD Announces . . .



**the 2648A Graphics Terminal**

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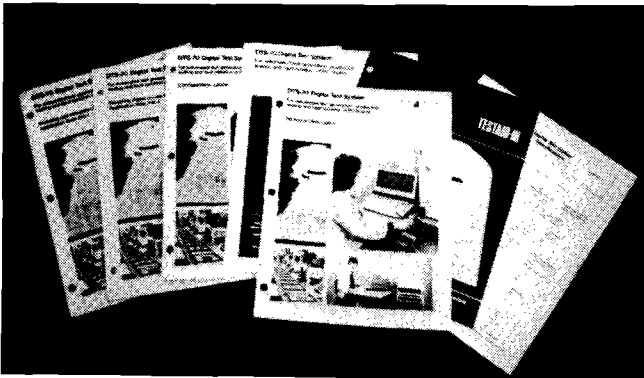
# AMD DIVISION NEWS

## Sales Aids

### DTS-70 Sales Literature

By: Eric Isacson/AMD

Distribution of the DTS-70 Technical Description marks the completion of a new set of sales literature for the DTS-70. It now spans the spectrum from management overview to Application Note. If your customer needs more detailed information, a DTS-70 manual set is available for \$300.00 (HP 91901A) and a two-week TESTAID course can be taken for \$2000.00 (HP 92770A).



### Basic Literature

DTS-70 Digital Test System (5952-8536), February '77, 8 pp., color.

For managers. Introduction to and overview of the DTS-70 with emphasis on its capability to solve manufacturing management problems as well as to test and fault-diagnose PC boards.

DTS-70 Technical Description (5952-8535), June '77, 122 pp.

For engineers. A detailed technical description of the DTS-70 covering the Test Station, TESTAID-III, FASTRACE, system software, controllers, and support. Only a manual set (HP 91901A) provides more specific information.



DTS-70 Configuration Guide (5952-8534D), May '77, 15 pp.

Product numbers, prices, BMMC, SSS, and brief descriptions for quoting and ordering DTS-70's. Includes site planning and preparation information, configuration rules, and a checklist.

### Supplemental Literature

TESTAID-III Software (5952-8504), April '77, 11 pp.

A stand-alone brochure devoted solely to TESTAID-III, a key part of the DTS-70. More sales oriented than the Technical Description. (Also well suited to selling TESTAID-III in 9580 systems.)

9571A Specifications (5952-8508), May '77, 4 pp.

Comprehensive "instrument-like" quantitative specifications. Much more detailed than the competition.

AN210-4 Designing Digital Circuits for Testability (5952-8540), Jan '77, 12 pp.

Application Note with design tips which simplify testing.

AN210-1 Modeling and Simulation for Digital Testing (5952-8537), Jan '77, 42 pp.

Application Note explaining how PC board testing is done using the modeling and simulation approach.

The original DTS-70 brochure (5952-8502), dated March 1977, is now obsolete and should no longer be used. Last year's ad reprints are also out of print.

Let us know how you like the new literature and what else you think is needed.

**SELL HP DIGITAL TEST!**

**HP Computer Museum**  
**[www.hpmuseum.net](http://www.hpmuseum.net)**

**For research and education purposes only.**

## DTS-70 Technical Description

By: Eric Isacson/AMD

The long anticipated DTS-70 Technical Description is now available. Its thoroughness is indicated by its length—122 pages. Separate chapters cover the Test Station, TESTAID-III, FASTRACE, System Software, Controllers, and Support. Appendixes provide more detailed information on IC's in the TESTAID library, TESTAID programs, testing bus logic, using the test adapter, TESTAID-III's capabilities, and Test Station specifications. Now, for the first time, you can give your customer a reference for answering questions like the following:

- How does the DTS-70 test tri-state and bus logic?

- How large a board can TESTAID-III handle?
- System Software:
  - What capabilities do the standard configurations provide and what is required to generate custom configurations?
- Controllers:
  - How much does DTS-70 performance degrade if a 2100 is used in place of a 21MX-E computer?
- How does the automatic pattern generator work?
- How are analog tests intermixed with digital?

Individual copies have been sent to all DTS-70 sales personnel and bulk quantities have been distributed to sales offices.

# COMPUTER SERVICE NEWS

## Division News

### CSD Supplies and Software Organization

By: Fred Sommer/CSD

I would like to take this opportunity to acquaint you with our organization and to introduce some new people to you.

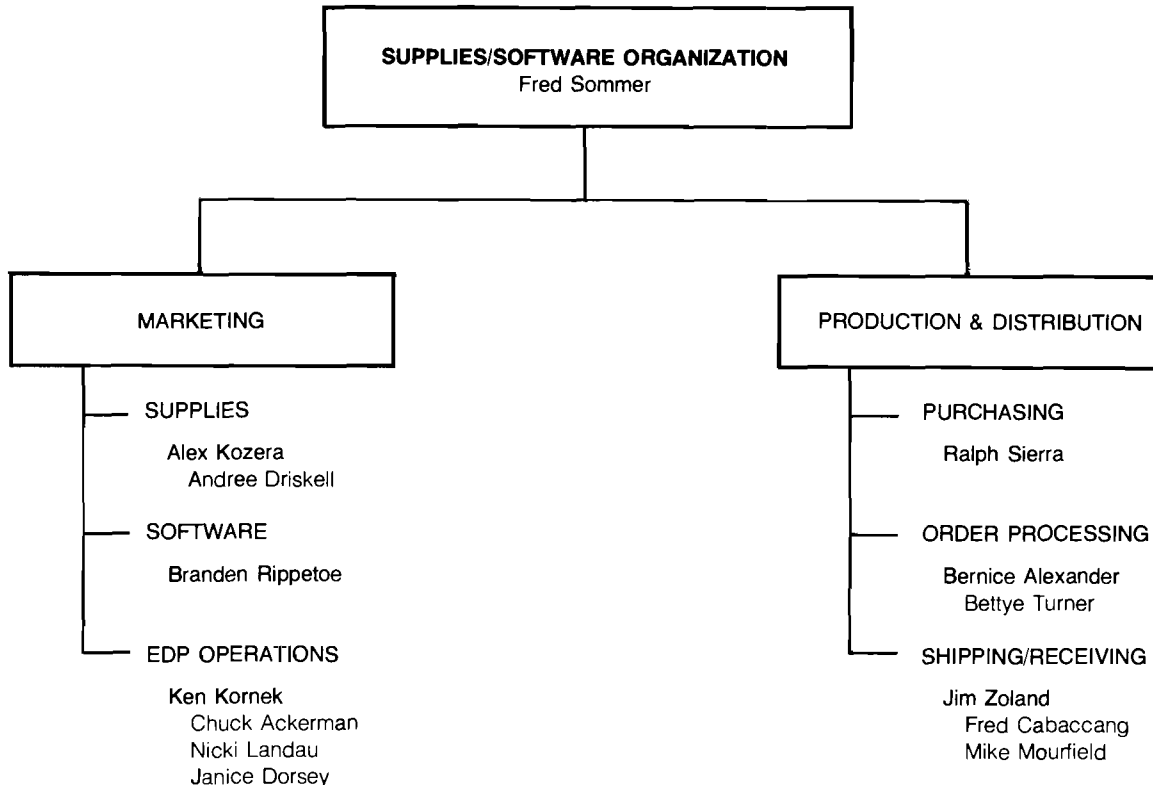
*Alex Kozera* is Product Manager—Supplies. *Alex* is being ably assisted by *Andree Driskell* who recently transferred from MSD. Watch for some new catalog based sales programs to be announced soon!

*Braden Rippetoe* is new to Hewlett-Packard and comes to us with several years experience plus EE and MBA degrees.

His challenge as Product Manager-Software Services is to take SSS/SMA and treat them as products, looking at pricing, how to sell them, data sheets, procedures, policies, etc.

We have strengthened our EDP operations by adding *Ken Kornek* as Systems Analysis and Programming Manager. *Ken* transferred from Corporate Marketing Services. His knowledge of HEART, ROPS and SIS will be an asset. His responsibilities include the Software Support Data Base, the BMMC Price Book Data Base and our pending new Computer Supply efforts.

We have expanded the operational side of the organization to keep pace with the increased order rate, both for supplies (disc cartridges, 1000 User Library catalogs and programs, so far) and Software/Manual Updates. *Ralph Sierra* in Purchasing, *Bernice Alexander* in Order Processing and *Jim Zoland* in Shipping/Receiving are more than able to keep up with the demand.



# Product News

## Know Your RTE

By: Alex Kozera/CSD

This series of articles has appeared regularly in the *Computer Systems Communicator*. Because of its popularity and value as reference material, we are publishing a collection of these articles for those who are involved with the RTE environment.

This group of articles consists of "Know Your RTE" parts one through six which were published in issues seven through twelve. They cover the following subjects:

Know Your RTE:

- Part 1 — The List Processor, \$LIST
- Part 2 — System Start-Up or "Bootstrap"

- Part 3 — Operator Requests through System Console
- Part 4 — Operator Requests Continued (\$MESS)
- Part 5 — I/O Requests
- Part 6 — Time Keeping

The collection of all six articles is available in Xerox form (part number 5955-3205) for internal sales in multiples of 25. The price is \$15.00 for the package of 25 copies.

To order, send a TWX message or address an inter-office memo to,

Attention: *Bernice Alexander*

Hewlett-Packard  
Computer Service Division  
974 E. Arques Ave.  
Sunnyvale, CA. 94086

Be sure to indicate the part number, number of copies requested (in multiples of 25) and reference your account and location code for billing purposes.

# DISC MEMORY NEWS

## Division News

### DMD Order Processing People

By: Jerry Worth/DMD

Having moved the DMD Order Processing Department to Boise, we have also hired three new order coordinators—*Margie Goslin, Regina Shepard, and Debbie Spoviero.*

*Margie* is a native Idahonian who has just earned an AA degree in Business from Boise State University.

*Regina* comes to us with 8 years experience in banking in Boise and Kansas.

*Debbie* returns to HP after a 3-year stint as a homemaker. Her previous HP experience was in the Mountain View Division production area.

Although all three of these people are new to their jobs, we are confident that they will come up to speed rapidly and give you the level of service you expect from DMD.



### Cables Unraveled

By: Dick Byhre/DMD

In the case of the fabulous, rock solid, definitely desirable 7920 disc drive, here is the cable line up.

#### 7920M — You Get:

13013A-001 (daisy chain) 5 ft.  
13213A (data) 10 ft.  
and (21MX I/F cable) 18 ft.

#### 7920S — You Get:

13013A-003 (daisy chain) 8 ft.  
13213A-002 (data) 50 ft.

#### 7920S-001 — You Get:

13013A-002 (daisy chained for 3000) 18 ft.  
13213A-001 (data) 25 ft.

#### 13395-001 — You Get:

13013A-003 (daisy chain) 8 ft.  
13213A-002 (data) 50 ft.  
13013A-002 (daisy chain) 18 ft.  
13213A-001 (data) 25 ft.

YOU MAY HAVE NOTICED there is no 12 foot daisy chain cable in the line up. Consider the following saga resolving the mystery of the 12 footer.

Remember in our last episode when Clarence Customer asked Peter Persuasive, salesman at large, "Hey, Pete, I need one of them 12 foot daisy chain cables (13013A) so I can stuff'em under the floor boards of my data center so this joint don't look so messy." Pete, whipping out his pocket microfiche, discovers there's no way to buy a 12 footer on the 7920S or 13395 without getting the 8 footer thrown in for \$250. Yikes! Well gang, its true, but for good reason.

Meanwhile, back at the factory great minds have been wrestling with the problem. . . Over the din of klinking coffee cups we hear Marvin Manager, while munching on his fourth doughnut, proclaim. . . To create a special option for one percent of our 7920 orders doesn't make a lot of sense. "Hear-Hear, Hear-Hear" is heard echoing through the hallowed halls.

But have heart groupies, there is a way!

Through the miracle of Sales Development, the 12 footer can be had. Just call old friendly DMD Sales Development and ask for the 12 footer and Zingo! This fabulous cable will be exchanged for the standard, at no cost to your customer, and rushed out with the order.

Leapin' Lizards! Who are those guys?

### COMGRAM To Bob Hoke/DMD From Tom Winker/NSR Bellevue

By: Bob Hoke/DMD

#### NEWS BULLETIN FROM THE GREAT NORTHWEST

A 7920 RECENTLY UNDERWENT A 10 FT. DROP FROM A TRUCK. A GREAT DEAL OF DAMAGE OCCURRED TO MECHANICAL PARTS, MOSTLY CABINET COMPONENTS, CARD CAGES & POWER SUPPLY (THE FRONT PANEL COMPLETELY POPPED OFF & LANDED SEVERAL FEET AWAY). WE STRAIGHTENED THE CARD CAGES & POWER SUPPLIES & FIXED HER UP. SHE CAME ON LIKE A REAL LADY & HAS BEEN OPERATING ON A 3000 SYSTEM FOR OVER A WEEK WITH NO FAILURES. A REAL CREDIT TO HP'S "ROCK SOLID" 7920A.

JUST THOUGHT YOU WOULD LIKE TO KNOW.



# DATA SYSTEMS NEWS

## Product News

### Console Logging on 2645

By: Grant Hallman/CSR

Did you know that — the HP 1000 has "Console Logging"? This feature is sometimes required by customers who must have a hard copy or tape record of all input and output activity at the system console. Traditionally, it has been difficult on RTE because messages may connect the console from many different sources within the system. The only solution has been a (slow, expensive) hard copy terminal as system console.

Now, thanks to a feature of the 2645, console logging is possible without any special software at all. Simply use the following sequence on the 2645 keyboard:

GOLD KEY — TO: R TAPE (or TO: L.TAPE, or  
TO: PRINTER)

GREEN KEY — EDIT

Putting the 2645 in "EDIT" mode while REMOTE is pressed causes the green "EDIT" light to flash. This is the "LOGGING" mode for the 2645. Any text appearing on the screen from keyboard or CPU will roll up as usual. However, when the 2645 memory is filled, text will roll off top-of-memory onto the designated "TO" device—left or right mini-cartridge, or printer. If the printer is slower than the CPU (e.g. 3000 baud vs 9600 baud), the 2645 will "hold off" the CPU without losing data until the printer catches up (using the 12966 handshake feature). The only possibility of data loss is a power failure—2645 local memory would be lost.

Thanks to *Rich Ferguson* at DTD for this tip!

### How to Order Tektronix Graphics Software "Plot-10" for the 2648A Graphics Terminal

By: Van Diehl/DSD

The 2648A Graphics Terminal can be used with Tektronix Plot-10 software because the 2648A is graphics communication code compatible with the Tek 4010 or 4012 terminals. This software allows the user to draw points and solid or

dashed lines. Several sets of graphs and data can be displayed on-screen at one time by using the windowing functions or graphs can be superimposed in the same screen area. Clipping, rotating, or zooming-in on selected data are all effected by simple commands.

This software has to be specially modified to operate in the HP 1000. This modification is available from our Special Engineering Group.

Here are the steps you have to follow to get operational Plot-10 software on the HP 1000 driving the 2648A Graphics Terminal.

1. Order an additional 2648A to your HP 1000. The 2648A used as system console of the HP 1000 cannot be used to emulate the Tek terminal because it uses driver DVR05. The special Plot-10 software uses driver DVR00.
2. Your customer must order the Plot-10 package from Tektronix. He orders a 4010A01 (\$650) Plot-10 Terminal Control System. He must specify delivery to Hewlett-Packard, Data Systems Division.
3. Order the special product 93596B, special modification for Plot-10 software and manual (\$1200).

**REMEMBER STEP 2.  
THIS IS A MUST!**

### Error on HP 1000 Sales Training Manual August '77 Supplement — File Access Capability for RTE-M BASIC/1000M

By: Van Diehl/DSD

There is an error in Section VII—File Access Capability for RTE-M BASIC/1000M. It was stated that

"... with the new file access capabilities you can SAVE/LOAD programs and READ/PRINT data ...".

This is in error. You can only LOAD, SAVE, MERGE, RUN or LIST on files, but YOU CANNOT READ OR PRINT!

Note: No READ or PRINT.

## Sales Aids

### Effective Date of the New HP 1000 Configuration Guide

By: Ted Proske/DSD

The new HP 1000 Configuration Guide, which you'll soon be receiving, carries an effective date of August 1, because that is the date when the new jumbo memory and fault control memory products will first appear on the corporate price list. All other information in the guide is effective July 1.

### Use of New HP 1000 and 21MX Data Book Supplements

By: Ted Proske/DSD

To cover the new HP 1000 system options and memory products, we have published supplements to the HP 1000 and 21MX data books. This has enabled us to react quickly in supporting the sales of these new products, but may leave you wondering how best to use the new supplements. Here are some suggestions:

- Wherever complete product coverage is required for a new customer, provide both the data book and supplement.
- To update existing customers who already have the data book, provide only the supplement.
- To give an overview only of the HP 1000, the HP 1000 data book supplement is a good tool; you can follow up later with the full data book if the customer wants more information on software and peripherals.
- The 21MX data book supplement is an easy way to provide information on only the newest products.

Both of these supplements will be incorporated in the parent data books within the next few months; but, in the meantime, they can give you added selling flexibility.

### DSD Launches HP 1000 Advertisement Campaign!

By: Van Diehl/DSD

The long awaited HP 1000 ad campaign is underway. You will soon see within several technical journals and newspapers a family of ads that invite the reader to compare the HP 1000 features with the competition's. There will be ads related to computer performance, operating systems, data base management, etc.

The first ad of the series will be related to HP 1000 CPU performance.

The lead-in text of the ad will be:

**"CAN YOUR COMPUTER SYSTEM PASS THIS TEST? Recent independent studies show that the HP 1000 real-time computer system, with its new 21MX E-Series . . ."**

The lead-in material will be followed by a table headed:

Feature	The HP 1000	Your Old Favorite
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Since the last column will be left blank for the reader to complete, we have filled the "Your Old Favorite" column with DEC's, DG's, and IBM's features to help you answer questions related to this ad. I'll be including operating system and data base comparisons in the following issues of *Newsletter*.



Feature	HP 1000	DEC 11/34 & 11/60	DG NOVA 3D S/130 S/200 Eclipse S/230	IBM Series 1
CPU	608K bytes memory capacity. Standard I/O rates of 2M bytes per second, burst rates up to 11.4M bytes per second.	248K bytes max. 56K supported by RT-11. I/O rates: 11/34 833KHz max. 11/60 2M bytes/sec max.	S/130-64K bytes max. NOVA 3-128K bytes S/200-256K bytes max. S/230-512K bytes max. I/O rates: 1.8M bytes/sec Eclipse	128K bytes max. 64K supported by Op. Sys. I/O rates: Model 3 1.2M bytes max. Model 5 1.6M bytes max.
Microprogramming	Full software for developing and running 8.5K 24-bit words. 175nS instruction execution time.	1K 48 bit WCS No microprogramming development utilities	256 words WCS No microprogramming development utilities	Not supported.
Memory Speed	Cache speed 350nS cycle time for all 608K bytes; just \$2100 per 32K bytes. 595nS cycle time; \$1600 per 32K bytes (just 5 cents per byte).	11/34 775nS 11/60 532nS effective speed w/200 nS cache 11/34 32K MOS \$2550 (8 cents per byte)	S/230 500nS Nova3D 750nS S/130 700nS 32K MOS ECC\$10,400 65K MOS ECC\$20,800 128K MOS ECC\$41,600 S/130 single bit ECC Only one DMA map (8 cents per byte)	Model 3 800nS Model 5 660nS Model 3 32K MOS \$3600 Model 5 32K MOS \$4080 (11 cents per byte)
Operating Systems	One upward compatible family of Real-Time Executives: RTE-M memory-based up to 608K bytes; RTE-II disc based up to 64K bytes; RTE-III disc based up to 608K bytes. This lets you pick the right one for the job. BASIC, FORTRAN and Assembly Languages.	.CAPS-11 Cassette O.S.-max 48K bytes .RT-11 Floppy and disc O.S.-max 248K bytes .CAPS-11, RT-11 and RSX-11 no upward compatible  RT-11: BASIC, FORTRAN RSX-11M: FORTRAN	RTOS-Execute only RTOS-Max.64K bytes S/100, S/200, S/230 RDOS-max 192K bytes -S/200 or S/230 AOS-max 512K bytes <sup>4</sup> RDOS and AOS not upward compatible.  BASIC, FORTRAN COBOL (AOS)	Real time programming system. FORTRAN, PL/1

Feature	HP 1000	DEC 11/34 & 11/60	DG NOVA 3D S/130 S/200 Eclipse S/230	IBM Series 1
Data Base Management	IMAGE, HP's complete DBM capability, includes QUERY language for easy access to related data.	DBMS-11 (PDP-11/70) No QUERY \$15,000 RSX-11M does not support DBMS-11	INFOS Not a data base management. Only runs on Eclipse, no QUERY	Not supported
Networking	Distributed Systems with RTE Network Centrals. Modems or high speed hardwired communications. Over 150 networks installed and running. Also RJE/1000 2780 emulator at 9600 baud.	DECNET Low installed base. Requires RSX-11M for RSX-11S program development.	Not supported as standard product.	Not supported as standard product.
HP-IB IEEE-488	HP-Interface Bus (HP-IB), HP's implementation of IEEE-488, allows simple link to instruments. Complete software support.	??	Not supported.	Not supported.
Cost				
Model 20 \$25,500	Model 20 64K byte memory-based system. Series from \$21,000. 500K byte flexible disc optional.	DEC DS534A \$26,040 incl. 512K byte dual flexible disc but no dual mini cartridge.	??	Not supported.
Model 31 \$43,400 <sup>1</sup>	Model 31 64K byte disc-based system: Series from \$31,500 with 5M byte disc; 15M and 50M byte available.	11/34 \$47,630 11/60 \$66,200	\$46,250 <sup>6</sup>	\$41,825
Model 80 \$69,070 <sup>2</sup>	Model 80 128K byte data base management systems with IMAGE, mag tape, and line printer: Series from \$61,700 with 15M byte disc storage; 50M byte available.	11/34 \$88,910 <sup>3</sup> 11/60 \$104,480 <sup>3</sup>	\$108,650 <sup>5</sup>	DBMS not supported.

<sup>1</sup>Model 31 with 128K bytes, 10M bytes disc.

<sup>2</sup>Model 80 with 128K bytes of fault control memory, 50M bytes disc, 800 bpi mag tape, 2001lpm line printer.

<sup>3</sup>Incl. 11S34 or 11S60 with 128K bytes ECC memory, LA36, 30M bytes disc, 800 bpi mag tape, 240lpm printer and DBMS-11.

<sup>4</sup>MRDOS memory management is similar to RTE-II (2 partitions) and AOS to RTE-III (multiple partitions).

<sup>5</sup>S/230 with 128K bytes ECC, 40M bytes disc, 240lpm printer, 800 bpi mag tape and CRT display and 2-bay cabinet.

<sup>6</sup>S/200 with 128K bytes, 10M bytes disc, and CRT display and cabinet.

# DTD Announces . . .



## the 2648A Graphics Terminal

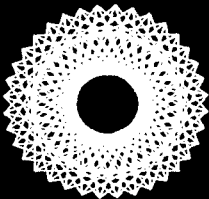
# DATA TERMINALS NEWS

## Hewlett-Packard Introduces First Graphics CRT Terminal

By: Jim Elliott/DTD

Selective Erase, Zoom and Pan, Scaling, Clipping, Display Processor, Vector Generator; what do they all mean? Until now, these were "buzzwords" associated primarily with the world of display graphics. Typically, they were used to describe a CRT display terminal or similar product offered for sale by a non-HP manufacturer. True, HP is recognized for its high-quality plotters, exceptional display tubes and reliable computers, but these are only parts of a complete graphic display system. A complete system is typically comprised of a computer (where the graphics software resides), a hardcopy output device (oftentimes a plotter), and a user interface or graphics display terminal. The most important part to the user is the terminal, since it produces not only alphanumeric characters, but also actual pictures. These pictures are important since they represent a two or three dimensional representation of the user's concepts and/or ideas. UNTIL NOW, the \$100 million-plus market for picture-producing terminals was not addressed by HP; however, this issue of the *Newsletter* introduces you to a product that will thrust HP into new challenging market areas.

**BRIGHT-EASY TO READ**




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## Announcing the New HP 2648A Graphics Terminal

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The 2648A Graphics Terminal combines the latest in micro-processor and raster scan technology to provide a high-performance, low-cost, bright, easy-to-read tool that aids the user in areas such as schematic diagramming, computer aided design, architecture and more. It is a feature-oriented graphics terminal that's flexible, friendly, and easy to use. It offers users the opportunity to explore new areas of interest, and to try out new ideas in graphics.

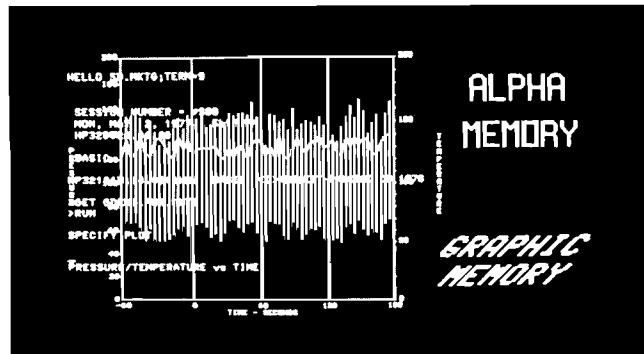
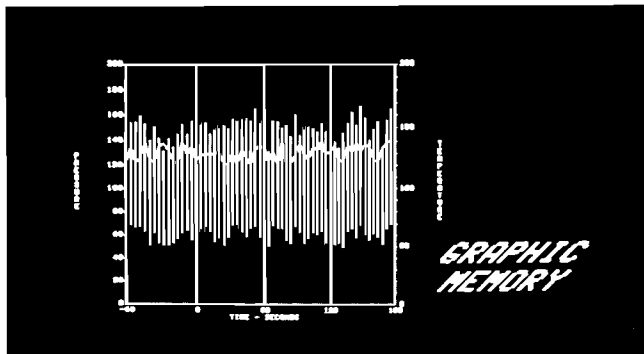
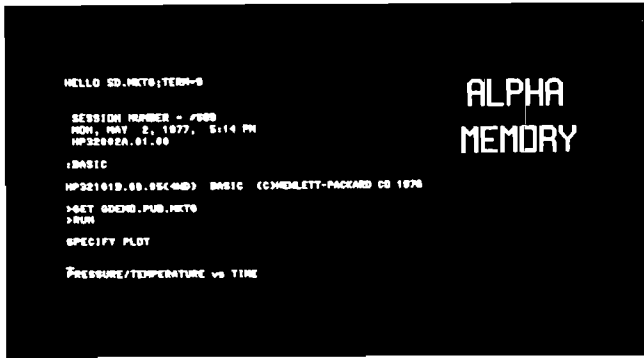
The 2648A is the first graphics terminal in the fast-growing 2640 family of CRT terminals. With it are a constellation of bright ideas.

Here are some of them:

### Raster Scan Technology

The 2648A can be used in bright ambient light environments since raster scan provides a bright, easy-to-read display. The bright display also helps to minimize eye fatigue during extended sessions at the terminal.

With refreshed raster scan technology, the ability to modify selected portions of a picture is a natural feature. Portions of the picture can be modified without completely erasing and redrawing the entire display. This minimizes the system software overhead, user wait-time, and communication costs.

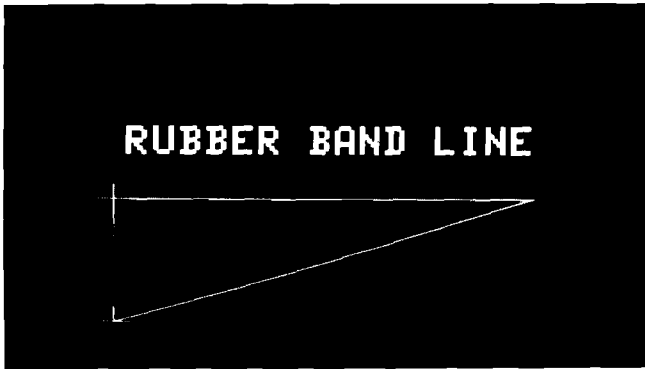


### Independent Graphic and Alphanumeric Display Memories

The Graphic and Alphanumeric display each have their own independent random access memory (RAM). The alphanumeric display memory can typically contain up to one and one half pages of text (37 lines each containing 80 characters or over 200 short lines). The independent graphics memory, consisting of sixteen 16K RAMs, has 720 by 360 displayable points. Because these two separate memories are independent, computer transactions do not have to obscure the graphics picture. Either the graphics or alphanumeric memory display can be suppressed without disturbing the other, improving the readability of the display. Also, the graphic and alphanumeric displays each have their own separate cursor control keypad.

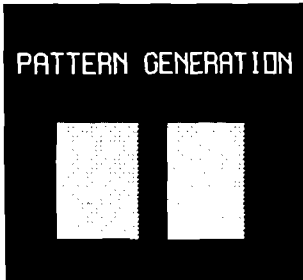
### Hardware Zoom and Pan

The graphics display can be magnified incrementally from one to sixteen times (16X). This feature allows the user to make full use of the 720 by 360 dot resolution. This allows investigation and/or modification of dense display areas such as parallel lines separated by only a single dot spacing. Panning can then be used to view any area of the magnified display not in the viewing window. The complete display can be panned through without affecting the graphics display memory.



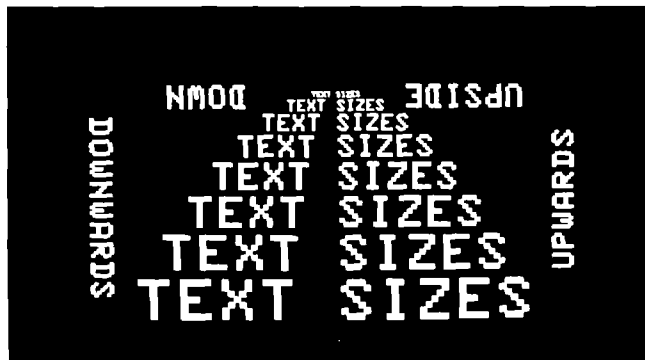
### Rubber Band Line

Trial graphics can be performed with or without computer support using the Rubber Band Line. This provides quick, user initiated picture generation or modification. This feature allows the user to draw a line segment between a predetermined position and the graphics cursor. Through a simple set of keystrokes, one end of a line segment is fixed into position while the other is automatically drawn to the graphics cursor. As the graphics cursor moves to a desired position, the line segment automatically stretches with directional changes of the cursor. After the graphics cursor reaches its final position, a fixed line segment is drawn with two keystrokes.



### Rectangular Area Shading

Several patterns for rectangular area shading can be selected. The user can also specify unique patterns within an eight bit by eight bit cell for special effects. This feature adds a new visual dimension to graphics by enhancing the shading of parts and assemblies, and facilitates differentiation of bar graphs.



### Graphics Text Composition

Characters entered into the graphics display memory can be varied in shape, size, and orientation. This feature allows the user to select an incremental character size, orientation (90-degree multiples), and slant (italic). In addition, it lets the user left/right justify or center graphics text automatically. This feature helps the user label axes and makes it easy to add notes or comments to his graph.

### Compatibility Mode

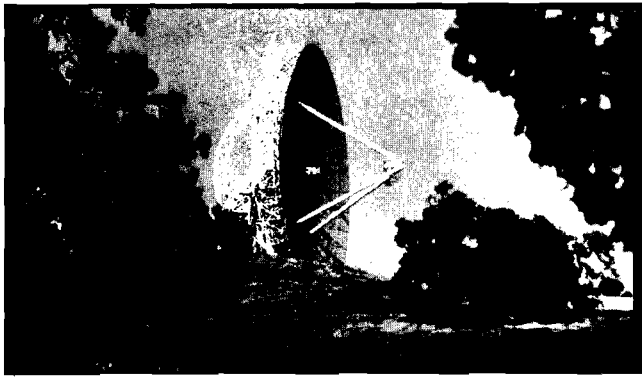
When in compatibility mode, the 2648A can accept data formatted for some terminals with 1024 by 780 displayable points. The 2648A can either display a 720 by 360 dot segment of the picture for viewing or the entire 1024 by 780 formatted picture can be scaled automatically to fit in the 2648A's display.



### Business Decision Making

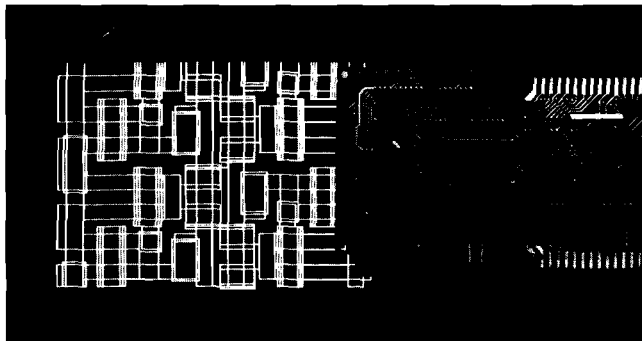
Try the 2648A's Automatic Plotting—"Auto-Plot" feature on your business application. You will find it an easy way to plot tabular data without the need to develop expensive system software. This feature allows you to quickly see market trends and explore your own market problems. For example, simply enter tabular data from the keyboard, cartridge tape, or remote computer; and with a few simple keystrokes it quickly plots the data.





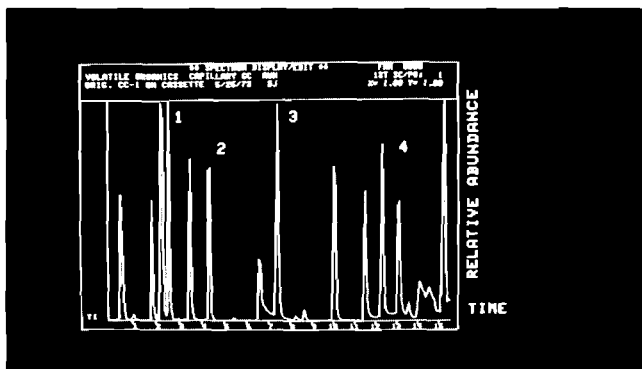
### Antenna Design

If you are doing computer aided antenna design and you need a quick look at the radiation field pattern, you can use the 2648A. The terminal coupled with your system, can plot contour maps quickly. Immediately the effect of varying design parameters is available for analysis. The alphanumeric display allows you to interact with your computer system and save computer transactions in the independent alphanumeric memory without disturbing the graphics picture.



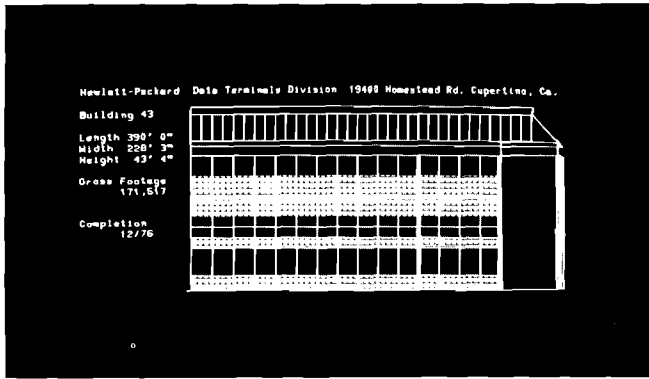
### Computer Aided Design

If you use a computer aided design system for electrical circuits, mechanical parts, or Integrated Circuit mask design, the 2648A can help. The zoom and pan features let you use the full resolution of the 720 by 360 displayable points. The zoom feature allows you to get a closer look at dense areas of the graphics display. You can also pan to any portion of the graphics memory display not in the viewing window. These features can help you see your design before you commit it to hardcopy thus saving you computer connect time and money.



### Spectral Analysis

If you have a computer-controlled gas chromatograph/mass spectrometer system and need spectral plots, the 2648A's bright display and graphics text composition can help. For example, during extended computer sessions where spectral plots might be analyzed, the 2648A's bright display will help reduce operator eye fatigue and stress. After analysis, your spectral plots can be readily labeled. Various points of interest can be annotated quickly and clearly.



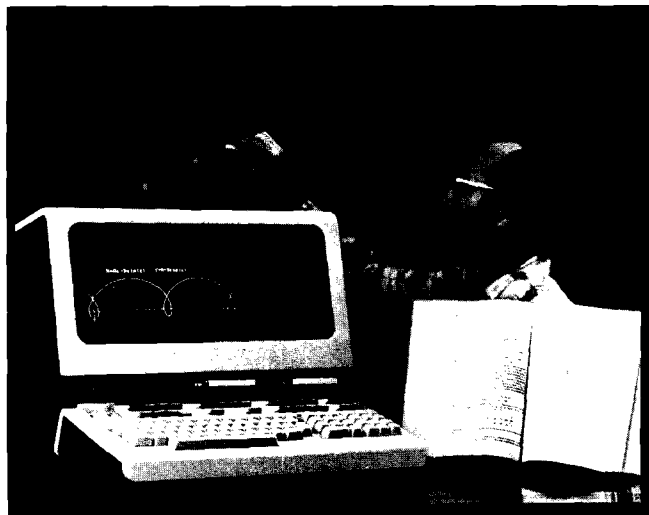
**Architectural Design**

Computer aided architectural designs can be enhanced and improved using the 2648A. Various parts of a building can be easily distinguished from each other by using a variety of rectangular area shading patterns available in the 2648A. Rubber Band Line aids architectural design by offering quick user initiated picture modification. This will help reduce design and computer time.



**Education**

Help your students visualize scientific, mathematical or engineering problems with the aid of graphics. With computer aided instruction systems, students learn to develop a "feel" for abstract mathematical and physical concepts. The 2648A as an integral part of your system can be used in brightly lit classrooms, making it ideal for lecture demonstrations and small group discussions. Also, the 2648A's bright, easy-to-read display, helps to minimize eye fatigue during extended lab sessions.



Additionally, the 2648A has all the capabilities of the highly successful 2645A Display Station, including the dual-cartridge tape option, user-definable "soft" keys that can be programmed to speed repetitive jobs, and self-test at the push of a single key.

What to order one? Here's what you need to know:

**Ordering Example**

This is an example of ordering a 2648A Graphics Terminal with cartridge tape, extra cartridges, video hardcopy interface and cable, to be used with a modem.

Note: With this configuration there are no available option slots.

- |                                           |                                           |
|-------------------------------------------|-------------------------------------------|
| 2648A Graphics Terminal                   | 13232N 103/202 Modem Cable                |
| -007 Adds cartridge tape units            | 13260B Extended Async Data Communications |
| -013 Adds five cartridges                 | 13254A Video Interface                    |
| -030 Deletes standard data communications | 13232K Cable, Compatible video hardcopy   |

**Ordering Information**

PRODUCT NUMBER	DESCRIPTION
2648A	GRAPHICS TERMINAL 720 X 360 dot graphics image memory and random access alphanumeric memory (expandable by 4K bytes), 128 character Roman, inverse video, editing, 9 user-defined soft keys, RS232C, 3 option slots. <i>Note: No interface cable included.</i>
-007	Integrated Dual Cartridge Tape – Mini Data Station Adds two built-in cartridge tape transports and electronics to provide Mini Data Station capabilities (requires 2 option slots). Includes device support firmware.
-013	5 Mini Cartridges
-015	50 Hertz, 220V
-016	50 Hertz, 110V
-030	Delete Standard Asynchronous Communications <i>Note: One of the 13260 data communications accessories must be ordered when option 030 is ordered.</i>
ACCESSORIES	
13231A	DISPLAY ENHANCEMENTS Adds blinking, half-bright and underline; and provides for addition of three 128 character sets (requires 1 option slot).
-201	64 Character Mathematic Symbol Set. Adds display of integral signs, Greek letters, etc.
-202	64 Character Line Drawing Set Adds display of continuous horizontal and vertical line segments for forms, histograms, etc.
-203	Large Character Set
13234A	TERMINAL MEMORY MODULE (+4K) Adds 4096 bytes of user RAM memory (requires 1 option slot).
13236B	INTEGRATED DUAL CARTRIDGE TAPE UPGRADE KIT Field upgrade for adding two built-in cartridge tape transports and electronics to provide Mini Data Station capabilities (requires 2 option slots). Includes installation. <i>Note: 13261A-003 also required.</i>
13250B	SERIAL PRINTER INTERFACE Adds interface for connecting RS232C serial printing devices (requires 1 option slot). No interface cable included. <i>Note: 13261A-003 also required on tapeless 2648A's.</i>
13254A	VIDEO OUTPUT INTERFACE Provides video signal for a compatible monitor or hardcopy unit (requires one option slot).
13260A	STANDARD ASYNCHRONOUS COMMUNICATIONS Upgrade which provides standard RS232C communications interface for the 2648A. <i>Note: This is identical to the capability deleted by 2648A-030.</i>
13260B	EXTENDED ASYNCHRONOUS COMMUNICATIONS Provides either an RS232C or 20mA current loop communication interface for the 2648A. Has split speed and custom baud rates. <i>Note: 2648A-030 must be ordered to delete the Standard Asynchronous interface.</i>
13261A	DEVICE SUPPORT FIRMWARE
-003	Required by tapeless 2648A's to support printers, tape upgrade or other I/O devices.
9162-0061	MINI CARTRIDGE (purchased from Corporate Parts Center)
CABLES	
13232C	RS232C Cable. 2648A/female RS232C, 5 ft.
13232F	Current Loop Connector Kit. 2648A/four wire, 5 ft.
13232K	Video Cable. For connection to compatible video hardcopy.
13232L	Video Cable. For connection to compatible video monitor.
13232N	Modem Cable. 2648A/male RS232C, 15 ft.

# GENERAL SYSTEMS NEWS

## Division News

### ISS Disc Drive "Fire Sale"

By: Pat McGrath/GSD

Take advantage of the "fire sale" on 47 Mb add-on ISS Disc Drives (30102A) while they last!! The price is only \$8,000 (U.S.).



#### How To Order:

To order use the following prices and product numbers:

30102A	47 Mb ISS Disc and Controller	\$9,000.00
010	Delete Controller (2nd, 3rd, 4th, 5th, 6th & 8th Drive on 60Hz Systems; 2nd, 4th, 6th & 8th Drive on 50 Hz Systems)	-1,000.00
015	230V, 50 Hz	0
020	Delete Controller (7th Drive on 60 Hz Systems; 3rd, 5th & 7th Drive on 50 Hz Systems)	-1,000.00

When ordering, treat the ISS Disc Drive as a non-product file item and use a HEART override.

Note that all ISS's in inventory are subject to prior sale. So customers should be advised that their order is not a commitment until they receive an acknowledgement from GSD of the Ship Date. Also note that the few remaining 60 Hz Disc Drives are "used equipment".

This should be an excellent opportunity for pre-Model 6 and 8 3000 customers to add additional low cost disc space (ISS Disc Drives are not supported on the 3000 Series II Model 6 and 8).

### GSD to Announce New Software Support Services and Prices on August 1

By: Rich Edwards/GSD

Since its creation in November 1975, GSD's number one goal has been customer satisfaction:

**IMPLEMENT PROGRAMS TO BRING OUR CUSTOMERS TO A LEVEL OF SATISFACTION SECOND TO NONE IN THE COMPUTER BUSINESS.**

Your own experience in the marketplace selling 3000 systems has shown that our current and prospective customers desire well defined and extensive hardware and software support.

On August 1, 1977, GSD will define a new set of software support services that are:

- Included with the purchase of HP 3000 software
- Performed primarily by field SE's via:
  - mail
  - telephone
  - on-site assistance
- To solve the problems of:
  - misinterpretation of HP documentation
  - application program bugs
  - HP software design errors/enhancements

In order to purchase HP 3000 software, including these services, customers will pay an initial payment and agree to pay four years of monthly fees—after the 90-day HP warranty. Customers whose business practices prevent them from purchasing software and support over the four year period will be given an alternative option to purchase the software with one year's prepaid support included.

With the introduction of DS/3000 and other communications products, many of our customers will be purchasing multiple 3000 systems. In order to make the overall 3000 system attractive to them, as well as to our OEM's, a new discount schedule for software will become effective on August 1. This one schedule will be effective for both VEU's and OEM's, with discounts ranging up to 70% after 25 HP 3000 systems have been purchased. Note that OEM's in the future will

have to purchase software for each system ordered, not just the first as in the past.

#### Benefits to HP 3000 Customers:

- HP is committing itself to provide a completely defined, full set of software support services for four years. The customer will know in advance what services to expect.
- A lower capital investment is required at the time of system purchase because the customer pays for support as he receives it.
- Volume customers will have the flexibility to tailor the support they need at remote sites—with associated cost savings to them.
- The customer's large investment in his application software (typically as costly as the hardware) is protected through these features:
  - Published typical response times for telephone and on-site resolution of customer problems with software documentation, applications, or HP software.
  - Installation by HP of updated software modules to maintain the software plus enhancements to the software to improve its features/performance.
  - Automatic delivery by HP of new documentation.
  - Automatic delivery by HP of technical information pertaining to the status of currently used software and resolution of known problems.
- The performance of the customer's programmers (a large ongoing expense) will also be improved by the features listed above.

#### Details:

Full details of the program are being presented to domestic U.S. sales regions on the current NPT tour. Complete information on the support services, prices (US list), discount schedules, and ordering details is being distributed to worldwide sales regions through the Sales Manual—look for your copy in the next few weeks. A summary of the details will appear in this Newsletter's next issue—August 1.

With your help we'll be taking a giant step forward towards the number one goal of customer satisfaction—defined software support services with pricing to match.

## Sales Aids

### Educational Users' Group Newsletter — Already to You

By: Carol Budkowski/GSD

The May/June 1977 issue of the *Hewlett-Packard Educational Users' Group Newsletter* is out; it focuses on a very popular subject amongst educators around the world — that is Computer Aided Instruction (CAI). The Telcatch system (CAI for the handicapped) is presented along with how a New Jersey school met its "T & E" (thorough and efficient) education state requirements with HP's equipment.

If you haven't seen a copy of the *Hewlett-Packard Educational Users' Group Newsletter*, ask you DM about it. From now on, he'll be receiving five copies for your office. If you need extra copies (there is a minimal charge per copy of \$1.00) contact HP Corporate Literature Distribution in Palo Alto.

If you have customers who would like to either join the HP Educational Users' Group or who would just like to receive the HP Educational Users' Group Brochure, tell them to write:

*Carol Budkowski*  
Coordinator

Hewlett-Packard Educational Users' Group  
5303 Stevens Creek Blvd.  
Santa Clara, CA 95050

### Oil Distributor Replaces IBM 3, Increases Processing Sixfold

By: Rich Edwards/GSD

That's the story on the front page of the "MINIWORLD" section of the June 13, 1977 issue of *Computerworld*. The article details the success of *Dennis Lamb*, DP Manager, at Universal Motor Oils in Wichita, Kansas, who installed an HP 3000 last year.

Have you wondered how *Computerworld* and other publications get leads to write stories? Computer trade journals are frequently sent 'news feature' stories by HP. These are based on leads from YOU to GSD Sales Development who, in turn, forward the customer's name, address and applications to *Bob Ingols*, CS Group Public Relations Manager. *Bob* works with a group who writes application stories based on telephone and on-site interviews. To give you an idea of what is submitted to the trade journals from HP, here's the original Universal Motor Oil Story:

## SMALL OIL COMPANY GETS BIG INCREASE IN DP THROUGHPUT WITH TIME TO SHARE USING HEWLETT-PACKARD COMPUTER

**WICHITA, KANSAS, MAY 00** — Universal Motor Oils, Inc. an independent oil compounder here, has gained a sixfold increase in data processing throughput since replacing its mainframe computer with a multi-programmable Hewlett-Packard computer with virtual memory.

Despite the increase in throughput, Universal's HP 3000 Series II computer cost about the same as the company's previous system and has enabled the company to earn additional revenues by operating a time sharing service bureau.

Universal switched over to the HP system some eight months ago when Hewlett-Packard introduced the Series II. Prior to that Universal and its affiliate companies, Universal Motor Fuels, Inc., Universal Service Stations, Inc. and Lo-Ball Service Stations, Inc., were batch processing payroll, accounts receivable, accounts payable, financial statements, general ledger accounting, and results of its oil analysis program for customers on the mainframe computer.

Although Universal has not yet programmed the HP computer for on-line data entry, all of the batch programs have been transferred to it from the mainframe. And now, according to Dennis Lamb, data processing manager at Universal, five to seven jobs can be run at once where previously only one could be run.

Universal is a family-owned company which buys bulk oil, blends it and sells it under its own label, generally to large oil users such as farmers, contractors and service stations. The company is also distributor for a wide range of major brand oils. Universal and its affiliate companies employ some 125 persons.

The computer system at Universal consists of the HP 3000 with 192 KB memory, two 47 megabyte disc drives, a 15 megabyte system disc, a 600-line-per-minute printer and four HP 2640 terminals.

The fully interactive nature of the HP system was one of the key factors in Universal's decision to buy it, according to Lamb.

"We wanted to get more widespread participation of our employees in data processing," he says. "For one thing, we expect to speed up our operations immensely by going on-line. We can bypass keypunching and do all the input and editing at the terminal. For another thing, we feel our employees will be more receptive to data processing if they have a greater hand in it themselves."

An on-line order entry system is currently being programmed for the HP system. Lamb expects it to be operating early this winter.

"Currently," he says, "we don't send out an invoice until anywhere from a week to 12 days after we receive the order. When this system is operating, we are going to have an invoice in the mail on the day the order is shipped or the next day at the latest.

"And," Lamb adds, "the IMAGE data base management system will enable the company to draw information from the order entry system which will aid in inventory control and in determining production requirements.

"We should be able to retrieve information showing how many orders we need to fill and determine how many barrels or cases of a particular kind of oil we need to fill the orders and determine exactly what we have on hand in the warehouse.

"At present," Lamb says, "Universal's inventory lists run at least three days behind actual conditions.

"We believe real-time inventory control will enable us to reduce our inventory overhead by letting us see more clearly what our stock requirements are," he adds.

Lamb says that the HP system is also expected to provide the company with a truck routing schedule to permit more efficient delivery of goods.

Universal's switch to the HP 3000 has also enabled the company to operate a time sharing service bureau.

"We went to the Hewlett-Packard system because we felt it would do everything we wanted it to do," says Lamb. "However, we also felt that it was more than we needed, so we wanted to sell time on it, too."

The HP computer is running a billing system for an oil exploration firm and for a radio communications company.

The joint interest billing system for the oil exploration firm provides each investor in an oil well with his individual tax information as well as his share of accounts payable and revenues.

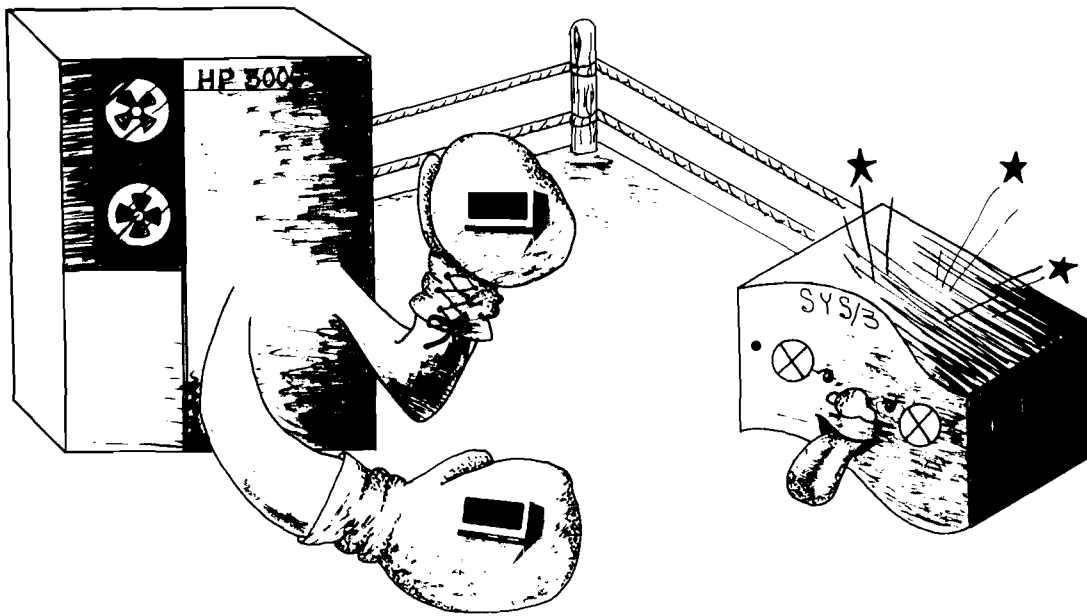
The billing system for a radio communications company, which sells and leases pagers, car telephones and other communications equipment, produces a sales journal, invoice register and all necessary Federal Communications Commission reports. The system also keeps track of the locations of all leased equipment.

If you have any installed HP 3000 Systems whose story would be of interest to readers of *Computerworld*, *MiniComputer News*, *Small Systems World*, etc. — please let your GSD Regional Sales Engineer know about them.

# Competition

## HP 3000 Series II Beats System/3-15D in Benchmark

By: Rich Edwards/GSD



Many of you have been asking about the performance of the Series II against the top of the line System/3—Model 15D. Our thanks to *Rich D'Angelo*, S.E., Lexington, for a superb job in documenting a winner!

The benchmark was requested by a New England division of a Fortune 100 manufacturer who "has been looking into the possibility of replacing their IBM System/3 Model 10 with an HP 3000 Series II or upgrading the present hardware to a Model 15D with CCP (Communications Control Program for Terminals)."

The results were conclusive. HP showed lower wall times in 6 of the 8 tests that IBM ran; more important we were able to perform two runs the System/3 couldn't. First, the System/3 "could not compile the COBOL program at all because the object module was greater than 64 Kb." Secondly, we were able to run four jobs concurrently (the System/3 is hardware limited to three partitions, maximum). The bottom line: the company "has requested to Corporate EDP for purchase of an HP 3000 for their operation." In addition, corporate EDP people would like to evaluate these results in order to determine what part Hewlett-Packard mini-computers will play in their total EDP requirements.

*Rich* added one footnote: "the conversion from ISAM (IBM) to KSAM was very easy and the programs required NO changes in order to process the KSAM file. RPG and KSAM ran like a champ — my congratulations to GSD labs."

Those of you interested in the details of the benchmark should review the following:

**Table 1. Company Supplied Data**

A	RPG (program 1)	1411 Source Statements
B	RPG (program 2)	1596 Source Statements
C	COBOL	2303 Source Records
D	Production Job Stream:	6 RPG programs 4 Sorts 1 file copy
(The master file is a 1633 record ISAM file)		

**Table 2. Configurations**

IBM System 3 Model 15D	192Kb Main Memory	2 - 3340 Disc Drives (82Mb)	Note: CCP was <i>NOT</i> running during benchmark
HP 3000 Series II Model 6	256Kb Main Memory	1 - 7920 Disc Drive (50Mb)	

**Table 3. Results** (all times are wall clock minutes)

	A		B		C		D	
	HP	IBM	HP	IBM	HP	IBM	HP	IBM
RUN 1 (stand alone execution)	4:17	7:43	3:09	8:57	7:15	COULD NOT RUN	7:00	7:36
RUN 2 (A,B,D simultaneously)	18:07	20:14	15:50*	13:40	N/A	N/A	17:00*	8:44
RUN 3 (A,B,D simultaneously)	14:00	19:31			N/A	N/A	13:00	24:36
RUN 4 (A,B,C,D simultaneously) OPTIONAL	38:00	DID NOT RUN	33:00	DID NOT RUN	38:40	DID NOT RUN	37:00	DID NOT RUN

\*NOTE: On this run IBM placed job D in partition 1 with highest priority (run to completion). The HP 3000 ran under the normal "round-robin" timeslice (time quantum = 500 mS. It is critical to note that the HP 3000 completed the run in less time than IBM (start to completion = 18:07 min. HP versus 20:14 min. IBM). The CPU times for the benchmark didn't vary much.





# HP GRENOBLE NEWS

## Division News

### Computer Chess in Switzerland

By: Jacques Fritsch/HP Zurich

Ever heard about LUCERNE? Well, it is one of the loveliest towns in the heart of Switzerland.

This April, Lucerne was in the center of an extraordinary attraction: *Henrique Mecking* (Brazil) and *Lew Polugajewski* (Russia) were competing to determine who was going to enter the quarter final of the World Chess Championship. While they were working very hard on their problems, someone else was playing chess as well, but without nervous breakdowns, just keeping his cool and demonstrating his consistently high skill: it was an HP 2112 computer. The program had been developed by *Mr. Johann*

*Joss*, a Swiss mathematician. Its name—what else could it be—was "Tell". Chess champions needed up to 48 moves to beat the little machine. On former occasions the same computer program was competing with big computers in computer chess tournaments and had won most of these games.

Our participation in the Lucerne tournament, which was supported by an HP 2112 borrowed from our Grenoble factory, was mentioned in numerous newspaper articles in the local and professional press. The chess tournament attracted hundreds of visitors to the Congresshall of Lucerne. Most of them found it very amusing and interesting to play against the HP computer or to watch how it came up with surprising solutions.

88 official games were played. The machine won 31 times and 5 games ended in a draw, and it must be said that the majority of the players were well qualified tournament chess players.



# Sales Aids

## A Simple, Easy-To-Set-Up HP-IB Demo Available From Grenoble

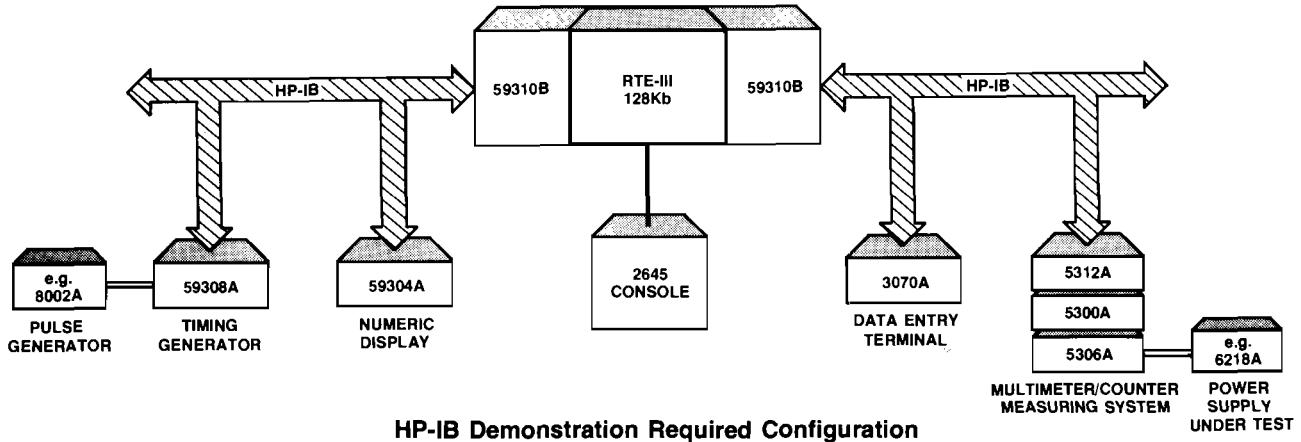
By: Henri Ajenstat/HPG

To help you demonstrate the various capabilities of the HP 1000 system as an HP-IB controller, an easy-to-set-up demonstration package has been put together in Grenoble. It will run on an HP 1000 system Model 30 matching the March NPT Tour configuration. It is centered around two HP-IB applications (power supply and time interval control) that you can execute concurrently with file handling and program development tasks.

The two HP-IB programs are written in FORTRAN IV and require a limited number of simple instruments to be present:

- For the power supply test a 5312A/5300A/5306A measurement system and a 3070A terminal are needed. The measured data is reduced and stored on-line into a simple IMAGE data-base and may be retrieved with QUERY.
- For time-interval measurement, a 59308A timing generator, a 59304A display and any pulse generator are sufficient. Time intervals are controlled and displayed on the numeric display.

A dump of the system can be obtained along with comprehensive documentation by sending a magnetic tape to my attention in Grenoble.



## Let The 2645 Demo The 7260 For You!

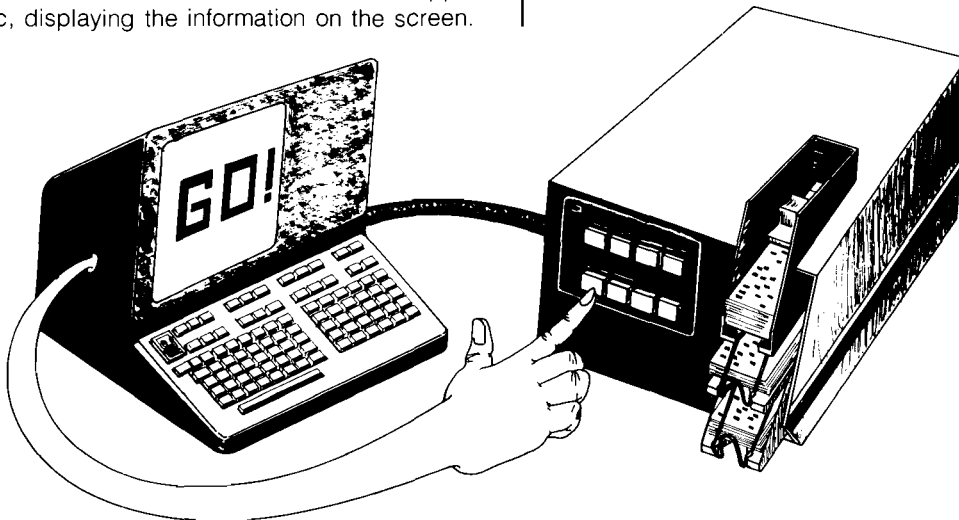
By: Richard Franklin/HPG

We have a neat demo for you, using the 2645 and 7260 OMR stand-alone; i.e., you do not need a computer to show off the capability of the optical mark reader.

The 2645 displays the features of the 7260 and the special function keys will read cards, sort them to the select hopper, retransmit, etc, displaying the information on the screen.

Your prospect can mark cards for himself and see how easy it is, and how well the 7260 reads what he has written!

If you would like a copy of the minicartridge, contact me in Grenoble or *Alic Rakhmanoff* in Boise.



## Product News

### Customer's Site Demo is Very Effective

By: Alic Rakhmanoff/Boise

Here is what we did for Hughes Aircraft Company at their Los Angeles plant when they expressed the desire to have a 3070A presentation with a demo on an RTE system: We took one of their 21MX computers used for maintenance, brought a disc pack configured with RTE system and two 3070A terminals with cable and interface card, and put on a live 3070 demonstration inside their plant.

By having the presentation in their plant, many more Hughes managers were able to attend the demonstration. We had two sessions with around 40 people including the Computer Manager, Manufacturing Manager, Production Engineering Manager, Purchasing and Q.A. Managers. They were very much impressed by the different possibilities of the 3070A with the HP 1000 System, and are considering purchasing a large quantity of 3070A's with HP 1000 Systems for different applications.

If you feel that you have customers with a good potential needing a similar presentation, let me know, and we will be glad to help you out.

### Optical Mark Reader: Background Color of Card

By: Alic Rakhmanoff/Boise

You have probably noticed that the OMR Card Form Specifications brochure (5952-5546) mentions clock mark and background printing ink specifications. But nothing is said about background color of the card itself.

We recommend that you use for background color of the card, the ink specified for background printing in the OMR Card Forms Specifications. You can also add to this list the following Sinclair and Valentine inks:

Violet	J20530
Orange	J30269
Light Blue	J27973
Light Blue	J31858
Red	J30495
Light Green	J24649
Light Green	J27975
Yellow Green	J28974

The Optical forms read by the HP 7260A bring to your customer a wide variety of applications at a very low cost price. It brings to you new

Optical  
Readers  
Draw  
Easy  
Rewarding  
Sales.

### RTE Users Mailing on 3070A

By: Alic Rakhmanoff/Boise

Don't be surprised if you receive a lot of inquiries about the HP 3070A from your RTE customers. In addition to the direct-mail packages that we mailed to each North American DM for distribution to his district's RTE Customers, we have also mailed directly to RTE users in the Eastern Sales Region (at ESR request) a package on the 3070A, focusing on the capability of remotely controlling a cluster of HP-IB devices.

We would like to thank those of you who have helped us to accomplish this mailing.

Selling 3070A's with new applications using HP-IB capability can many times lead to receiving orders for additional RTE systems with 3070A's for similar applications by other divisions of the same customer.

**SELL 3070A's!**

### Having Trouble Connecting The 3071A to a 3000 or 2000 System?

By: Peter Stuart/HPG

It seems that we have hidden in the 3071A Operating and Service Manual one of the most important pieces of information.

When setting up the rocker switch which selects the baud rate, etc. (Table 4-1, page 4-3), please note that a "1" means "OFF" and a "0" means "ON".

Incidentally, do not forget to declare the terminal type as a "Teletype".

### How Are "Turnaround" Documents Used in Manufacturing?

By: Peter Stuart/HPG

Boise line printers are available with an optional drum which contains a slug (■) character to permit them to be used to print marks on forms which may be subsequently read by an HP Optical Mark Reader.

So what!?

This article explains a typical application of a turnaround document with the help of an information flow chart for a typical manufacturing company.

Believe it or not, most companies manufacture to a plan. In HP we call it the "master schedule". For example, the "master schedule" helps us plan when to order raw materials to meet production requirements at some time in the future.

Any factory which produces a range of discrete products or options would use some sort of master plan (the "master schedule") to derive instructions to the production lines. These instructions may detail the work should be done that day, week or month.

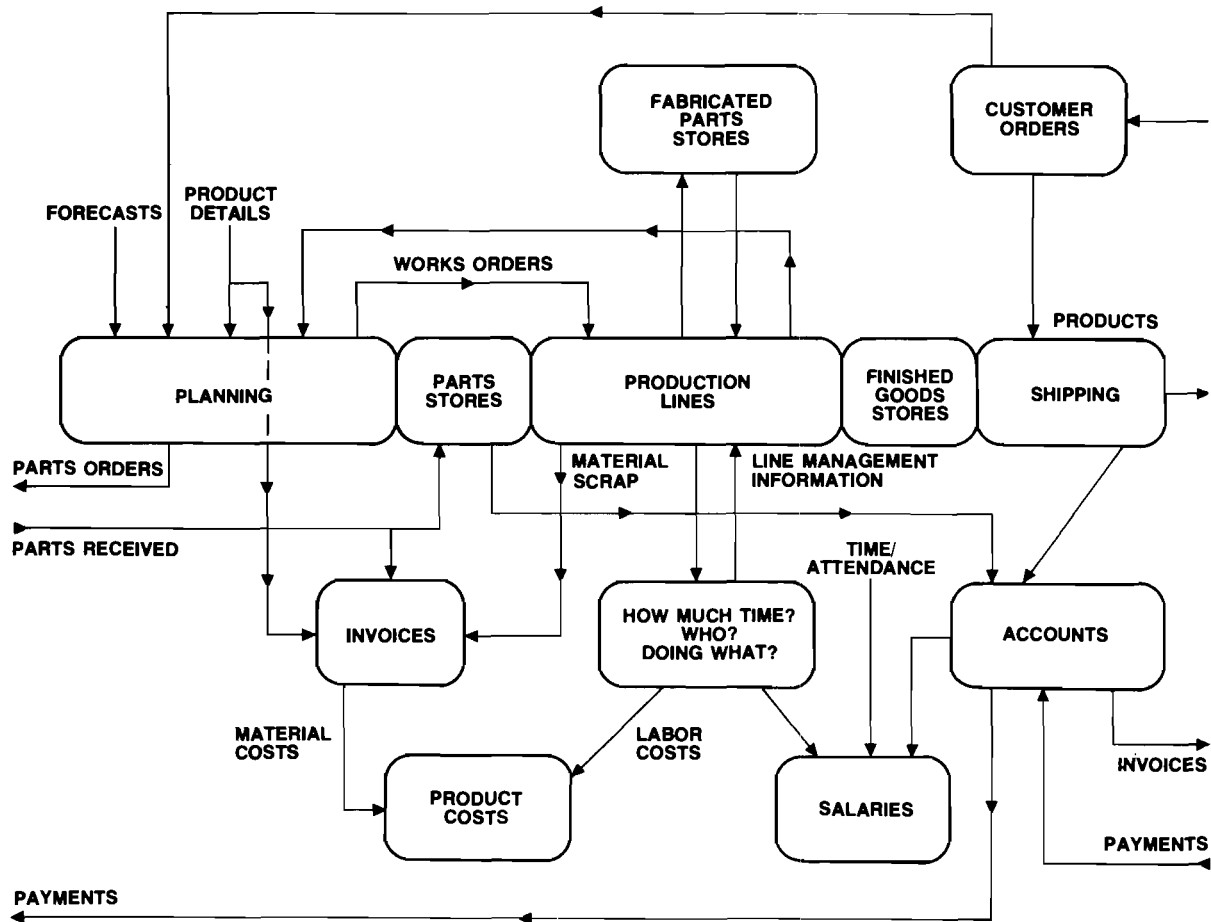
But it is no good for the planning group to be issuing new instructions without keeping track of where production has got to in executing the previous ones. For example, if there has been a delay in the completion of some vital sub-assembly, it may be desirable to have other production lines, which needed the assembly, start work on a different product. In other words, there is a need for the production to report back successful completion of instructions. *HP has a nice low-cost solution to satisfy this need.*

The instructions may be printed on an OMR sized form using a Boise line printer, with the slug character used to print a series of identifying marks which can be read by an OMR. The instruction itself then becomes a "turnaround docu-

ment" since it came from the computer and eventually the data on it is effectively sent back to the computer.

In this application HP Optical Mark Reader terminals located at the entrance to the Fabricated Parts Stores and Finished Goods Stores would be ideal for reporting completed instructions (typically the completion/movement/test of a subassembly or product) by simply reading the form and transmitting the identifier number to the computer. This "turnaround document" ensures there is less chance of entering a wrong number and gives the planning group more accurate data to work upon, while simplifying the task of Factory Data Collection.

In future issues, we will give you some more examples of how HPG products fit in Manufacturing using the same information flow chart. For example, there is already a nice application running in Boise Division. In the meantime, we would be glad to hear about the applications you have found.



# COMPUTER SYSTEMS NEWSLETTER

**HEWLETT-PACKARD COMPUTER SYSTEMS GROUP**  
11000 Wolfe Road; Cupertino, California 95014 USA

**Bob Lindsay/CS Group - Editor**

Address content inquiries to:

PAT LEMMON/AMD — Editor  
LILLIAN BLANKINSHIP/BOISE — Editor  
BARBARA BAXTER/DMD — Editor  
DELIE BARTLETT/DSD — Editor  
SONI HOGAN/DTD — Editor  
APRIL KILPATRICK/GSD — Editor  
CATHERINE CLAY/HPG — Editor

TOM FREED/AMD — Technical Editor  
JOHN WHITESELL/BOISE — Technical Editor  
DICK BYHRE/DMD — Technical Editor  
JOE SCHOENDORF/DSD — Technical Editor  
CARL FLOCK/DTD — Technical Editor  
CAROLYN MORRIS/GSD — Technical Editor  
GUNTER KLOEPPER/HPG — Technical Editor