

# **Communicator**

# 250

**Notice**

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8010 Foothills Boulevard, Roseville, California 95678, Telephone 916-786-8000

Dear HP250 Customer,

Hewlett-Packard makes every effort to assure that the products you receive are of the highest quality. Prior to the distribution of our newest HP250 Operating System revision, we found several small "bugs". We have removed the "bugs" and we now call our release B.06.01.

Your new HP250 Manual Updates and the Communicator #8 may refer to Operating System B.06.00 while your software states B.06.01. Our fixes do not affect the material in these manuals so please consider B.06.00 to read B.06.01.

We hope you will be pleased with the features and quality of the B.06.01 revision of the HP250 Operating System.

Best regards,

A handwritten signature in black ink that reads 'Tom Black'.

Tom Black  
Marketing Manager  
Computer Systems, Roseville



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# Introduction

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## From the Editor's Desk

This Communicator is dedicated to an exciting new release: Operating System B.06.00, or simply OS 6. The features of OS 6 are described throughout this issue. New peripherals, new system software, and a new data communications package all contribute to making the HP 250 a more versatile and reliable product. As a brief overview, a partial list of the enhancements is included below, along with a list of software corrections incorporated in this release.

### New Features and Enhancements:

**PERFORM DROM:** The Perform DROM (PERFM) can be used to set up procedures or jobs to be executed. These jobs are executed from a previously established Perform file.

**TASK-II additions to TASK DROM:** The TASK DROM has been enhanced to provide intertask communications capabilities, and to allow a primary task to control the activities of a secondary task.

**TOOLS DROM:** This DROM incorporates all commands previously available only through binary programs. This means that binaries will no longer need to be loaded with each program.

**NEW PERIPHERALS:** Several new high quality peripherals are now supported on the HP250 with OS 6: HP 3081A Data Capture Terminals

- HP 39800A Programmable Bar Code Reader
- 14.7 Mb Integrated Winchester Disc Drive
- HP 2687A 12 PPM Laser Printer
- HP 2563A 300 LPM Printer
- HP 2932A 200 CPS Printer
- HP 2933A/2934A 100/200 CPS Printer

**NEW COMMANDS:** Four new commands/functions have been added with OS 6:

1. SYSID\$ will return the HP 250 system identifier for a particular system. This identifier is set in the CONFIG utility.
2. The SHOWTASK command will allow a user to see what task activity is present on the system.
3. Two new commands, SD and SI, are available as abbreviations of SPACE DEPENDENT and SPACE INDEPENDENT, respectively.

**IMAGE/250 Performance enhancement:** IMAGE/250 has a new key search algorithm (HASHing algorithm) which provides a significant performance improvement for alphanumeric keys.

**SERVICE REQUESTS RESOLVED:** As part of our on-going support, more than 55 Service Requests have been resolved, including solutions for 38 bugs and the implementation of 17 requested enhancements.



## Upgrading Programs to a New Operating System

What does the OS revision number indicate?

Each version of an HP software product is given a revision number, e.g. B.06.00. This number actually has three parts.

1. The revision letter indicates a supportable line of software. The HP 250 currently supports two operating systems: the 'A' Operating System (A.03.06) and the 'B' Operating System (B.06.00). This letter is changed only when there is a major product change that may require new hardware or additional memory in order to upgrade software to the new release.

2. The number after the first period is the revision level. This changes whenever the operating system is restructured. Some enhancements and bug fixes require extensive changes to the OS code and thus require various modules of the OS to increase or decrease in size. Since binary programs are written in assembly level code and contain direct references to the operating system, binary programs of one revision will not necessarily be compatible with an OS of a different revision. This means that any programs that utilize binaries must be reloaded with the appropriate revision of binary programs before they can be run on a new OS revision.

3. The last number is the fix level. This number is incremented whenever a new version of software is released that is of the same revision (the internal structure did not change), but contains only bug fixes and minor enhancements. Binary programs from a given revision are compatible with any fix level of that revision.

What does this mean for customers upgrading to OS 6?

In the past, whenever a new OS revision was released, programs containing binaries had to be updated with the new binaries before they could be run on the new OS version. With the release of OS 6, there are two alternative ways to upgrade programs with binaries. One can either attach the OS 6 version of the binaries to the program, or re-interpret the programs under OS 6 with the new TOOLS DROM loaded into memory. The TOOLS DROM contains all of the commands that are in the binary programs, making these commands available to all users without requiring the individual binary programs to be loaded. We recommend using the new TOOLS DROM for two reasons:

- a. Less task memory is used, freeing more memory for program statements and/or variables.
- b. Upgrading to a new OS in the future will be much easier; no programs will need to be reinterpreted.

See the 'New TOOLS DROM' article for more detail on this new DROM.

Whichever upgrade method you choose, the steps are similar.

1. Obtain a source code file of the program through one of the following methods:
  - a. Load the old revision of the operating system.
  - b. LOAD the program into memory.
  - c. SAVE the program onto a disc or tape.

or

- a. Find the original source code of the program (DATA file, not PROG type file).
2. Reload the program under the new OS using one of the following procedures:

If you choose to attach the new version of binaries:

- a. Load the new revision of the operating system.
- b. LOADBIN the appropriate binary programs.
- c. GET the SAVED source version of your program.
- d. RE-STORE the program under the original name.

If you choose to reload the programs with the TOOLS DROM:

- a. Load the new version of the operating system with the TOOLS DROM loaded.
- b. GET the SAVED source version of your program.
- c. RE-STORE the program under the original name.

Your programs will now run on the new version of the operating system.

Remember that HP applications and utilities may also contain binary programs. It is important to run these programs on a compatible operating system. The following table shows which revisions of HP applications are compatible with recent operating system revisions.

Operating System Revision

	<u>A.03.XX</u>	<u>B.04.XX</u>	<u>B.05.XX</u>	<u>B.06.XX</u>
DSN/RJE	A.02.00	A.03.00	B.05.00	B.06.00
DSN/DS	NA	A.01.00	A.02.00	A.03.00
TEXT/250	NA	A.01.00	A.02.00	A.03.00
DSG/250	NA	A/B.01.00	B.02.00	B.03.00
SLIDE/250	NA	NA	A.00.00	A.01.00
OM/250	A.06.02	A.07.00	*	A.08.00**
FIN/250	A.06.02	A.07.00	*	A.08.00**
MFG/250	A.01.01	*	*	A.02.00**
APGL/250	A.06.02	A.07.00	*	A.08.00**



\*These applications are not necessarily updated with every OS release since they are sold with source code that can be updated to a new OS revision by the purchaser.

\*\*To be released soon following the release of OS 6.

# new features and capabilities

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## New Products

### The New HP 250 Model 26

Another model has been added to the HP 250 family of systems. The Model 26 is the third customer installable model in this family. The standard system comes with a flexible disc drive and a 14.7 MB integrated Winchester disc drive (the actual user storage space is 14.5 Mbytes, with 0.2 MB of disc space reserved for spare tracks).

The Model 26, with 14.5 Mb, is similar to the Model 30 (16 Mb) in capacity. However, there are still several differences which may cause one model to be chosen over another.

The main advantages of the Model 26 are:

- Low price
- Customer installability
- Compact, quiet unit

The main advantages of the Model 30 are:

- Single volume backup to cartridge tape
- OS can be loaded from the Winchester disc
- External peripheral interface channel allows additional HP-IB devices to be added easily.

Thus, depending on specific site requirements, the low price of the Model 26 may now make it an attractive alternative to the Model 30. Contact your Hewlett-Packard representative for availability of the new HP 250 Model 26.

### HP 250 Network Communications Announced!

The data communications capabilities of the HP 250 have been greatly enhanced with the addition of a new product, NETWORK/250. NETWORK/250 provides asynchronous system to system communications for the HP 250. It will allow a user on one HP 250 system to operate as a workstation on another system (virtual workstation mode), as well

as copy any type of file from one system to another.

NETWORK/250 requires that one ASI port and memory block on each system be dedicated to network communications for two HP 250s to be connected via NETWORK/250. NETWORK/250 can only be run from a remote workstation (i.e. HP 2622D or HP 2649D), and cannot be run from an integrated console. This is because NETWORK/250 works by redirecting I/O on the ASI, and the integrated

console does not interface with the ASI. It is possible to connect together more than two systems, either in a chain or a star configuration. However, each

connection between two 250s is independent and requires an ASI port and memory block on each system.

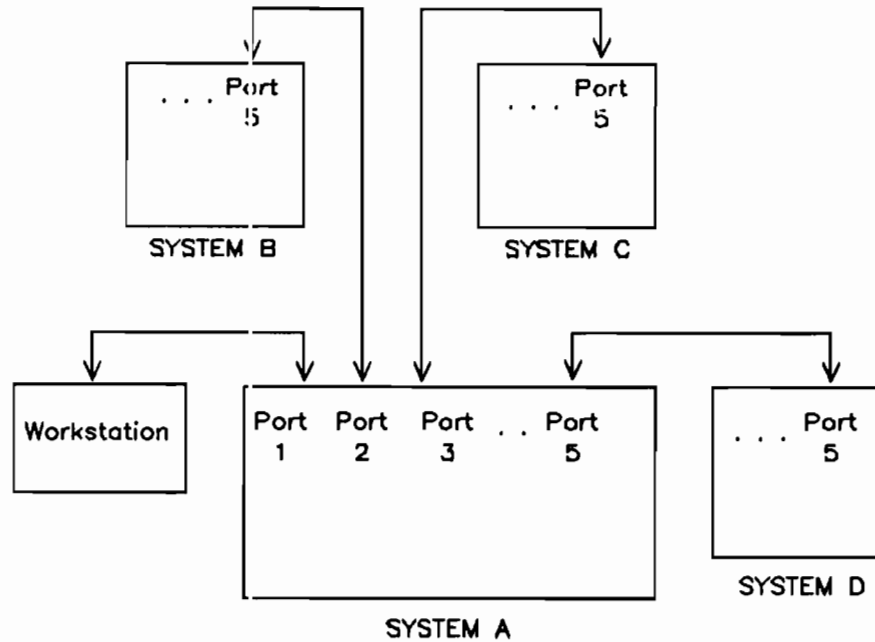


Figure 1 - NETWORK/250 Star Configuration

Note: If modem connections are used, a single port on System A could be used to connect to any of the other systems, one at a time.

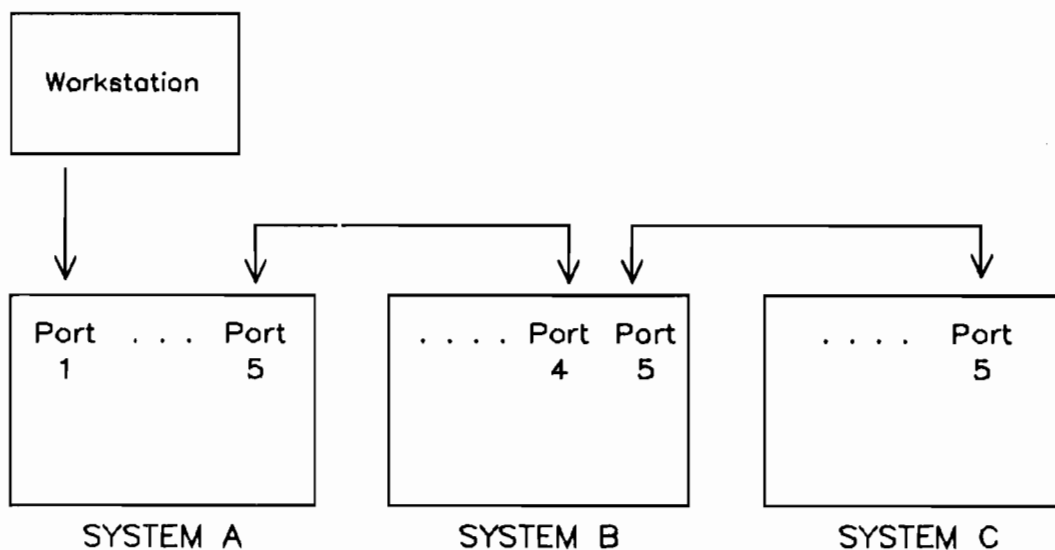


Figure 2 - NETWORK/250 Chain Configuration

The software components of NETWORK/250 include:

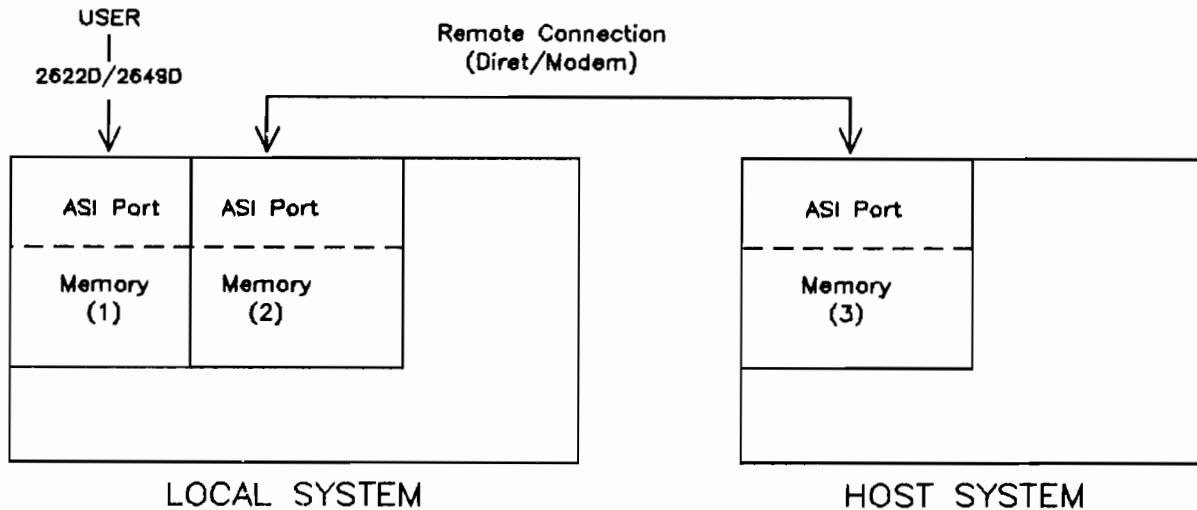
1. The NET250 DROM - This new DROM will reside on the system disc that is shipped with every system. This DROM must be loaded in order for NETWORK/250 to run, and can only be accessed by the NETWORK/250 programs. Therefore, the DROM should be loaded only on those systems where NETWORK/250 will be used.

2. The NETWRK binary program - This binary program allows the user to request access to and operate on another HP 250 system. This binary must be loaded in order to initiate communications between HP 250s.

3. The NTCOPY utility program - This utility consists of several

overlay programs that together provide the capability to copy files between two connected systems. The source and destination systems must be connected either directly, or through modems. To copy files between two systems that are connected through a third HP 250 (chain configuration), the files must first be copied to the intermediate system, and then to the final destination.

NETWORK/250 works by redirecting I/O from a standard workstation (other than integrated console) to another HP 250 system. In the simplest case, there will be three ports and tasks involved:



- (1) Control Task
- (2) I/O Task
- (3) Host Task

Figure 3 - NETWORK/250 Task Assignments

When the system is first powered up, the user will be running on the local system. When the user selects to enter virtual workstation mode

(run on the host system), that user's task becomes a Control Task. All input data from the control task is redirected to the I/O Task. The

I/O task in turn outputs the data to the ASI port where it is transmitted to the Host Task on the host system. Here it is processed as if it were input from a directly connected workstation. All output to the task is directed similarly, from the host task through the I/O task to the control task. Thus the user is effectively running on the host system.

### Configuring NETWORK/250

To run NETWORK/250, all of these tasks must be properly configured and the RIO and NET250 DROMS must be loaded. For each network connection from an HP 250, a Network task will be configured. A Network task has two access modes:

First, a Network task can be used to allow a user on a local system to access another system as a virtual workstation. Task 2 in the diagram is being used in this capacity.

A Network task can also be used to allow a user on another system to access the local system as a virtual workstation. Task 3 in the diagram is being used for this function.

Thus a network task can be either an I/O task or a host task, depending on the way it is currently being used.

A Network task is configured as a workstation port of either type NT22 or NT49. These two types are to allow for the two types of workstations. The host task type should match the type of workstation being used by the control task. For example, if an HP 2622D were being used for the control task, the host task should be configured as type NT22. If these do not match, the result will be the same as if an HP 2622D terminal were configured as an HP 2649D terminal.

### Network/250 Commands

The NETCONNECT statement is used to initiate remote access from one system to another (virtual workstation mode). The NETWRK binary must be loaded in order to execute this statement. The port to be used as the I/O task is specified when executing a NETCONNECT.

There are two ways to exit virtual workstation mode. The user may either permanently or temporarily release the task. If the task is released permanently, a Control/Halt will be executed in the host task and the user will return to running on the local system. If the task is released temporarily, the user will return to running on the local system, but the host task will continue whatever program is running there (similar to a DETACH from a secondary task). There is both a command and a key sequence to execute either the permanent or temporary release:

#### Permanent:

NETDISCONNECT RESET  
Control/Shift/Execute

#### Temporary:

NETDISCONNECT  
Control/Shift/Enter

NOTE: There are some differences between the disconnect commands and keystrokes when running on a multiple system chain configuration. See the NETWORK/250 manual for details on these commands.

The NETDISCONNECT commands are accessed by loading the NETWRK binary. This binary also provides a RESET command to allow a user to free a Network port (NT22, NT49) on his system if it is reserved or being used by a user on another system. This should be used with

extreme caution as a user on another system may be executing an application and resetting the task would terminate his access with a Control/Halt. However, if a remote user forgot to do a permanent reset when he exited NETCONNECT mode it may be necessary for the local user to reset the port so that he may use it.

#### Network File Transfer

To transfer files to and/or from a remote system, the NTCOPY program should be run on the local system. This program will then ask for the ASI port of the I/O task on the local system and for the device specifier or volume label on which NETWORK/250 resides on the remote system. This is because a NETWORK/250 program must be run on the host task in order to transfer data. When the file transfer

program is exited, a permanent reset will be executed on the host task.

#### Uses For NETWORK/250

There are many ways in which NETWORK/250 can be used. For example:

- o An OEM can provide remote support for his customers through NETWORK/250.
- o Software can be installed and upgraded from a central site.
- o Data can be transferred to a central site for processing, and reports or data returned to remote sites.
- o A single system can be used as a resource center for costly peripherals (e.g. HP 7912P Disc, HP 2687A Laser Printer).

# Enhanced System Software

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## Intertask Communications Capability on OS 6 (TASK-II)

One of the more frequently requested HP 250 enhancements is the capability to communicate between tasks. With the release of OS 6, the TASK DROM has been enhanced to provide this capability. This enhancement will be referred to as TASK-II, although the DROM will continue to be named TASK.

TASK-II has essentially two major functions: intertask communications and control of secondary task(s) by a primary task.

### Intertask Communications

TASK-II allows any HP 250 task to communicate with any other HP 250 task on the same system. To prevent interruptions, no messages can be sent to a task unless the receiving task has opened a communications channel specifically to receive messages from the sending task. This communications channel can be opened and closed with the ON MESSAGE# and OFF MESSAGE# statements, specifying a taskid to indicate a specific channel of communication. This communications channel is actually a special memory buffer used to hold messages. After a message has been received, the MREAD\$ function can be used to return the message.

Messages are sent to another task by identifying the printer as (100+TASKID), using the TASKID of the task you want to send to, and

then executing a PRINT statement. If communications have not been enabled by the receiving task when the sending task executes the PRINTER IS statement, an error 133 will be returned.

Before sending a message to another task, the MSTAT function can be used to determine how many bytes of storage are available in the communication buffer of the receiving task. Typically this function is executed before a message is sent to ensure that there is sufficient storage space for the current message. Otherwise, the sending task may appear to 'hang' until the receiving task has accepted sufficient data from the buffer to allow the current SEND MESSAGE operation to complete. This is similar to sending data to a printer when the printer's buffer is temporarily full.

### Intertask Control

The control function of TASK-II is somewhat more complex than the communications function. This part of TASK-II allows any primary task to monitor and control the activities of all secondary tasks that are owned by that primary task. This includes the ability to send commands and input to the secondary task, and to 'press' softkeys by using the SEND KEY# command. Two functions are provided to allow a user to determine the status of a particular task, and to determine which primary task is the owner of a particular secondary task.



Example application:

In this example, task 4 is a report generator. It accepts file names from tasks 1, 2 and 3, leaving them in the communication buffer until it is ready to process them.

Task 4 has a 3 element integer array to keep track of how many file names are left to be processed for each of the three tasks. When an interrupt is received by task 4, indicating that a message has been received, it

increments the number of files left to process for the corresponding task. After task 4 processes a file, it decrements the count accordingly.

Any time task 1, 2 or 3 is ready to send a file name, it checks to ensure that there is sufficient space in the communication buffer to avoid delay. If sufficient space is available, output will be directed to task 4 by means of the PRINTER IS 104 statement and the file name

## PERFORM DROM Enhances HP 250 Turnkey Operation

Because the HP 250 is often sold to first time users in an operatorless environment, it is important that all operations be as automated as possible. This includes the running of applications, error handling, database recovery and modification, and many other tasks. We have for some time now recognized the need for a programming tool to facilitate this kind of operation, and feel the newly released 'PERFM' DROM fills this need and much more.

The HP 250 PERFM DROM, released with Operating System B.06:00, allows the system to process a specified data file (the 'Perform file') as a series of user-supplied input. This input may be used as system commands or as data for program input requests. This capability can be used to automate most procedures which require keyboard entry. However, as all inputs must be predetermined by the programmer, this is most appropriate for a repetitive, predictable type of application.

### The Perform File

The Perform file is a DATA file containing ASCII string data. The file may be written in either serial or direct mode, but each string is limited to 160 characters in length. When in PERFORM mode, strings are read sequentially from this file and each is interpreted as a 'Perform record'. The Perform file must be on line until Perform mode is terminated.

Each Perform record, excluding Perform 'special commands', is displayed on the screen and then executed (similar to the way a typing aid key works). If the task goes into an input state (via a statement in the currently executing program), the next record will be read, displayed, and entered as the response to the input statement. If the task goes into a wait or idle state, the next Perform record will be read and executed as a command. In addition to normal HP 250 BASIC statements, special Perform records may be included to 'press' softkeys or check errors.

It is crucial that the commands and input responses in the Perform file be correct and in the proper order. The most common problem encountered in Perform mode is a Perform record being executed at the wrong time or an input response being handled as a command. Since PERFM will read and execute the next Perform record whenever the system goes into an input, wait or idle state, any records out of order may cause errors.

The Perform file is a simple text file which can be created with the EDITOR utility. Each Perform record must be entered as a separate line of text.

#### Statements and Functions

The PERFORM statement is used to initiate execution of a Perform file and enter Perform mode:

```
PERFORM <filespec>
```

When executed from the keyboard, the first record in the Perform file will be interpreted as a statement or command and executed. When the PERFORM statement is executed from within another Perform file, Perform file execution jumps immediately to the start of the second file. As only one Perform file can be active at any given time, the first Perform file is terminated at this point. If the PERFORM statement is executed from a program, data will not be read or interpreted from the Perform file until the program reaches an INPUT, PAUSE, END, STOP, or indefinite WAIT statement. If the program enters an INPUT state, the first record from the Perform file will be read and interpreted as a response to the INPUT statement. In any other case, the first record of the Perform file will be interpreted as a

statement or command.

```
PERFORM WAIT <time>
```

The PERFORM WAIT statement causes a delay after the processing of each Perform record.

```
RESUME
```

The RESUME statement will resume processing of a suspended Perform file.

#### Special Perform Commands

There are a variety of special functions that can be included as records cards in a Perform file to perform such functions as error control, conditional or repetitive execution, and 'pressing' softkeys. These special command keywords are preceded by a colon (:) to distinguish them from ordinary Perform records. Listed here are a few of these special keywords:

```
:COMMAND <command string>
```

This special command will display the <command string> as line output and then force the <command string> to be executed, even in an INPUT state. The :QUIET command is similar, but does not display the <command string> on the screen.

```
:KEY# <key number>
```

When this special command is processed, the user defined softkey indicated is 'pressed'. There must be an ON KEY # definition active for the specified key.

```
:IF <condition> THEN  
:ELSE  
:END IF
```

These special commands allow conditional execution of records in the Perform file.

**:END**

This command terminates Perform mode and processing of the Perform file ceases at this point.

### **The Parameter Array**

Local variables independent from the user program are available through the PARM array. These may be used as status flags to aid in error control, etc. Special Perform commands are available to dimension the size of the PARM array, and to return or set the value of any element in the array. The PARM array is an integer array that resides in common memory and may contain up to 10,000 elements.

### **Perform and HP 250 Utility Programs**

Many HP 250 utilities require the user to select a device or devices at the start of the utility. It may not always be desirable for this device selection to be included as part of a Perform file. In order to allow the user to select a device while PERFORM is used to run the utility, supply input, and terminate the utility, two commands are available: **ATTENDED** and **UNATTENDED**.

When **ATTENDED** mode is selected, HP 250 Utilities will pause to allow the user to select a device from the softkeys and then continue in Perform mode. When **UNATTENDED** mode is specified, all input, including device selection, will be read from the Perform file. The default is **ATTENDED** mode, which will be set whenever Perform mode is initiated or terminated. **UNATTENDED** mode must be specified after Perform mode has been entered.

### **Perform Errors and Error Handling**

Several statements are available with Perform to handle and/or recover from execution errors. Unless otherwise specified, Perform mode will be suspended if any execution errors are encountered. It is possible however, to allow processing to continue if errors occur, determine which errors have occurred, and recover from them through conditional execution.

There are several error codes specific to Perform. Errors 440 through 448 indicate a problem either within the Perform file itself, or in the execution of that Perform file.

## **New TOOLS DROM Simplifies Program Upgrades**

A new DROM is included with the B.06.00 Operating System. The TOOLS DROM contains a wide variety of commands and functions, previously available only through the binary programs on the Utilities disc.

**What are binaries and DROMs?**

The Operating System contains various commands (most BASIC commands) that are available to all users. A DROM is an optionally loadable module of the operating system that is available to all users when loaded. A binary program is also an extension of the OS, but is only available to the task in whose memory partition it has been loaded. All three of these (OS,

DROMs and binaries) are written in the same assembly code. They were split into modules to allow each system to make the most efficient use of available memory by loading only those modules needed.

#### What is the purpose of the TOOLS DROM?

With each new major revision of the operating system any programs that have binary programs attached to them must be reloaded with the new version of the appropriate binaries. This is because the binaries contain direct references to the operating system that may not be valid with a different version of the OS.

The TOOLS DROM was developed to eliminate this upgrade process. Instead of loading the binaries with individual programs, the TOOLS DROM can be loaded to provide these commands to all users. This DROM

contains all of the commands from the ACCEPT, BIT, CATBIN, DATE, DBPASS, DBSTOR, DUP, R-ONLY, REVCHK, SCAN, SHOW and XCOPY binaries. The commands from the DBUTIL binary are already duplicated in the IMAGEU DROM and so are not included in the TOOLS DROM.

The two main advantages of using the TOOLS DROM are:

1. More user memory is made available for programs and data.
2. For OS updates in the future, programs will not need to be reloaded with the new versions of the binaries.

See the article on "Upgrading to a New OS" for details on how to upgrade your programs to OS 6 using this new DROM.

## IMAGE/250 Performance Enhancement

Hewlett-Packard is continually investigating improved software techniques and considering the implementation of customer enhancement requests. From these efforts have come an IMAGE/250 enhancement that can dramatically improve access times to a data set that utilizes ASCII values as search keys.

One of the major advantages of IMAGE is that data entries can be retrieved relatively quickly, without serially searching through all of the data. This is done by 'hashing' the search key into a record number and placing the entry in that record. The actual hashing

algorithm involves taking the numeric value of the search key and deriving a number between one and the number of records in that data set. This assumes that no two entries will have exactly the same search key value. However, there are some cases in which two search values will hash to the same record number. In this situation, the second entry will be put in another empty record with a pointer from the first entry to the second. This is known as a synonym or secondary entry. Retrieval of entries is handled in a similar way. To retrieve a data entry, the search key is hashed into a record number and the entry is read from that record. If the entry that is read is not the entry we are looking for, the system will read the next entry in the chain, or the entry that is pointed to by the first entry.

However, if very many entries hash to the same record, these chains may get long and access times to these records will increase. Therefore, a new hashing algorithm has been implemented in OS 6 for ASCII search keys to minimize the number of keys that will hash to the same record. This results in a better distribution of entries across the data set, and decreases access times by as much as 50%. This algorithm does not affect data sets with numeric search keys, as these data sets typically do not produce many synonyms.

There are two ways to take advantage of the new hashing algorithm:

For existing data bases:

1. Back-up your system using FVBACK.
2. Unload your data base using DBUNLD.
3. Purge the database using DBPURGE.
4. RUN "SCHEMA" and create your new root file using the 'STANDARD' softkey.
5. Create your database using DBCREATE.

## HP250 Now Supports Pre-Certified Tapes

Initializing tapes on the HP 250 can be a time consuming process, due to the fact that INIT must perform a read/write test on the media (certification) before setting up the directory and availability table

6. Reload your database with DBLOAD.

For new databases:

1. RUN "SCHEMA" and create your root file using the the 'STANDARD' softkey.
2. Create your database using DBCREATE.

Remember that in order to utilize this new performance feature, OS 6 must be installed.

If you wish to retain the current method of hashing you need only select the appropriate softkey when building new databases. Some HP 250 users have utilized special routines in their programs to modify search keys before the entry is DBPUT to the database. This is done so that the hashed values will be more evenly distributed across the data set. Such programs would receive no benefit from the new algorithm. If you have such a situation you may elect to select the "PRE-OS 6" softkey option.

in HP 250 format. Many HP 250 users have also noticed that while a tape is being initialized, the corresponding disc cannot be accessed because of the single controller configuration. Now this process can be significantly shortened when pre-certified tapes are purchased from Hewlett Packard's Computer Supplies Operation (CSO).

Prior to Operating System B.06.00, the HP 250 INIT program did not recognize that these tapes are already certified and so would recertify them during the initialization process. Tape certification takes 15-20 minutes on a 150' tape, and about 1 hour on a 600' tape.

With the release of Operating System B.06.00, the HP 250 now supports these pre-certified tapes, recognizing that they do not need to be recertified. The INIT program must still be run to set up the directory and availability table,

but the time to initialize a pre-certified tape under OS 6 is less than one minute. This also means that once an uncertified tape has been initialized on the HP 250 (including certification), it will then be recognized as certified and can be re-initialized in the same time as the pre-certified tapes.

Although these pre-certified tapes are slightly more expensive, the amount of time saved in initializing media will make it worthwhile for most HP 250 users to buy tapes that are already certified.

## New System Status Functions

Two new commands that will prove to be very valuable in a multiuser or networking environment are the new SHOWTASK and SYSID\$ commands.

### SHOWTASK Function

The SHOWTASK function (available through the 'SHOW' binary) will return the current status of all tasks configured on the system. The information returned includes whether a given task is currently operating in the foreground or in the background, if a secondary task is owned by any primary task, and if

any task is currently executing. The current status of each task will be shown as either Busy or 'Check Task'. The 'Check Task' status appears if the system cannot determine whether or not a task is executing. This might be the case if someone is typing in a program. The task will be idle much of the time, but is actually processing each line as it is entered. If the SHOWTASK function is being used to determine if the system can be shut down, it is important not to assume that a task listed as 'Check Task' is idle.

The output from the SHOWTASK command appears in this format:

TASKID	TYPE	OWNER	BUSY
1	PRIMARY		YES
2	PRIMARY		CHECK TASK
3	SECONDARY	2	YES
4	SECONDARY		CHECK TASK
5	PRIMARY		CHECK TASK

## **SYSID\$ Function**

When networking two or more systems together, it becomes important to be able to determine which system you are presently working on. The SYSID\$ function was developed for this purpose. A system identifier of up to 20 characters can be configured in the 'Misc. Configuration' section of the CONFIG utility. After the system is rebooted, this identifier will be returned whenever the function SYSID\$ is referenced.

## **SD and SI Commands**

A much requested enhancement has been to simplify the SPACE DEPENDENT and SPACE INDEPENDENT commands, similar to the way the MASS STORAGE IS command can be abbreviated by MSI. Thus, the SD and SI commands were born! Under OS 6, these commands can be used interchangeably with the SPACE DEPENDENT and SPACE INDEPENDENT commands.

# New Peripherals Supported

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## Introducing Bar Code Reader Support on the HP 250

Under Operating System B.06.00, the HP 39800A Programmable Bar Code Reader is now supported on the HP 250. This is a perfect complement to the newly supported printers that print bar codes. See the article, 'OS 6 Supports Five New Printers' later in this section for more information about these printers.

The HP 250 supports all of the available options on the HP 39800A. Below is a listing of the codes which can be read using this bar code reader on the HP 250:

- Code 3 of 9 (AIM USD-3;  
MIL-STD-1289)
- Interleaved 2 of 5 Code  
(AIM-USD-1)
- Industrial 2 of 5 Code

Option 001 must be ordered to read the following codes:

- Universal Product Code
- European Article Numbering Code
- Japanese Article Numbering Code

The HP 39800A is connected to one of the Asynchronous Serial Interface (ASI) ports with a standard direct connect RS-232C cable (Hewlett-Packard part number 8120-3258). Once connected, it must also be configured into the system

by using the "CONFIG" utility. The following is the procedure for connecting and configuring the bar code reader (BCR) to the HP 250:

A) On the HP 250:

1. Select an unused ASI port to connect the BCR to.
2. RUN "CONFIG" from your system disc.
3. Select the "DROM Edit" function (#2) and:

- Configure the TIO DROM (#9) to be loaded.
- Record the configuration.

4. Next select the "Remote I/O Configuration" function (#9) and:

- Configure the port that the BCR is connected to as follows:

```
CLASS: Terminal
TYPE: 26xx
FORMAT: 701*
```

\* NOTE, this is not the only FORMAT that the reader will work on but if a different FORMAT is selected, then the PARITY and STOP BIT switches on the BCR must reflect the change.

5. If you have one of the pod-based models of the HP 250 (45260A), set the switches on the ASI connector panel for DIRECT CONNECT RS-232-C. These external switches replace a set of internal jumpers that serve the same purpose on the desk models (4525xA and 45251B). If your HP 250 is one of these



models, then you should contact your Hewlett-Packard representative to ensure that these jumpers are set correctly.

B) On the HP 39800A:

1. Ensure that both the BCR and the ASI port are set to the same baud rate.

For example:

- If the HP 250 ASI port is set at 9600, set the BCR to 9600 baud:

Switch 0: 0 (off)  
1: 1 (on)  
2: 1 (on)

2. According to the HP 250 format configuration given above set the parity and stop bits:

PARITY: Odd Sw 3: 1  
4: 1  
STOP BITS: One 5: 0

3. Below are the settings for the remaining switches:

CHARACTER DELAY Sw:  
Disable 6: 0  
S/W HANDSHAKE:  
Standalone Enq/Ack 7: 1  
8: 1  
MODE: Character 9: 0  
LOCAL ECHO:  
Disabled 10: 0  
TERMINATOR: CR 11: 0  
12: 0  
BLOCK MODE  
TERMINATOR: None 13: 0

For CODE SELECTS, CHECKSUMS, and LABEL LENGTHS (switches 14-23), refer to the Operating and Installation Manual that comes with the bar code reader.

- C) Power the HP 250 off and then on (re-boot) to download the new configuration to the ASI

firmware. Run the test program 'BCRTST' from the HP 250 Utilities Disc to verify that the bar code reader is connected and functioning properly.

Once the BCR is configured into the system, a program must be written to access and control the BCR. This is achieved by using standard TIO and PRINTING escape sequences to the bar code reader. The scans are read from the bar code reader with the AREAD\$ function (TIO).

In order to maximize the efficiency and minimize the amount of code that a user would have to write to use the BCR on the HP 250, a set of five subprograms (HP 250 BASIC) are available. These subprograms are resident on the B.06.00 HP 250 Utilities Disc under the program name 'BCRSUB'. The following is a brief description of each subprogram and its function:

Bcr\_initiate

This subprogram requests exclusive access to the port on which the bar code reader is connected. It causes the BCR to do a hard reset and to get into an intercept data mode. It also allows you to enable the good-read beep. If the good-read beep is enabled, then it allows you to set the pitch of the beep.

Bcr\_tell\_oper

This subprogram passes information to the BCR operator by turning on/off the red and green LEDs (Light Emitting Diodes) on the reader. It also provides an audible tone as a means of informing the operator.

Bcr\_id\_status

This subprogram is used to return to the user the model number and

the current status of the bar code reader.

#### **Bcr\_\_accept\_\_msg**

This subprogram enables the BCR for one GOOD scan, then disables it and returns the message in ASCII. This subprogram also allows a timeout if a good scan does not occur within a specified period of time (to allow further operator prompting, etc).

#### **Bcr\_\_terminate**

This subprogram releases exclusive access to the port which the bar code reader is connected to.

For more information on these subprograms and their use, refer to the HP 250 Utilities Manual. If you have any problems or questions regarding the connection and/or operation of the bar code reader, contact your Hewlett-Packard Representative.

## **Data Capture Terminals on the HP 250**

It is now possible under Operating System B.06.00 to use the Hewlett-Packard 3081A Data Capture Terminal on the HP 250. It will also be possible in the near future to use the HP 3075A, HP 3076A, and HP 3077A Data Capture Terminals. Although the HP 3081A is supported with the release of B.06.00, the HP 307X line will not be supported until testing has been completed.

The primary application for data capture terminals is factory data collection. In general, all of the terminals may be used for manufacturing management, stock control, finance reporting, and time reporting. Each terminal has a wide variety of options allowing the user to configure it for a particular task.

The HP 3081A is a small and low cost terminal that has been designed to withstand many of the harsher manufacturing environments. The

HP 3081A differs from the other data capture terminals in the way it is connected to the host computer. It requires a special 4-channel adapter (product number HP 92922A) to interface the terminal to the system. There are two reasons why this adapter is required with the HP 3081A. First, the HP 3081A is only available with a current loop interface and secondly, it does not have an internal power supply. The adapter is used to convert the interface from current loop to RS-232-C, while also providing the necessary power for the terminal.

To use data capture terminals on the HP 250, they must first be configured into the system.

#### **A. HP 250 Configuration:**

- 1) RUN "CONFIG".
- 2) Select function #2 (DROM Edit), set the TIO DROM for auto-load and RECORD the new configuration.
- 3) Select function #9 (Remote I/O Configuration) and define the

CLASS: Terminal  
TYPE: 26XX  
FORMAT: 701

configuring these terminals refer to the reference manual for the terminal.

Note: This is not the only format supported on the HP 250 but if a different format is selected, then the terminal will have to be configured differently from the configuration given under 'Data Capture Terminal Configuration'.

RECORD the new configuration.

4) Re-boot (Power off and then on) the HP 250.

**B. Data Capture Terminal Configuration:**

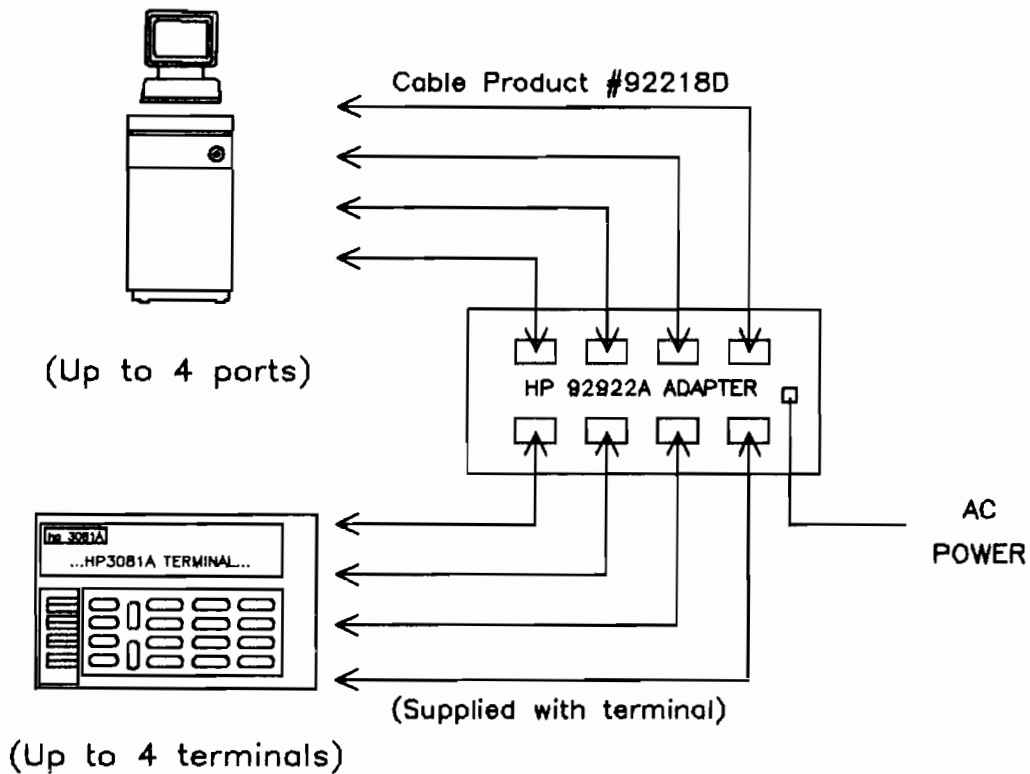
1) HP 307X:

Set all switches, except I-3 and I-4 to 0 (OFF). For more information on

2) HP 3081A:

a. Set switches 2, 3 and 8 to 1 (ON). Switch 1 is set to 1 (ON) if a bar code reader is attached, otherwise set switch 1 to 0 (OFF). For further information see the terminal's Reference Manual.

b. The HP 92922A Adapter does not require any special configuration. It should simply be connected between the terminal and the system. Remember this is a 4-channel adapter and not a multiplexer, so one ASI port on the HP 250 is required for each HP 3081A connected to the system.



3081A, 92922A, 40253A, 2314A Operating and Service Manual (HP part # 03081-90001) for more information on the HP 3081A terminal and the HP 92922A 4-channel adapter.

If you have problems and/or questions about correctly

configuring and operating your Hewlett-Packard data capture terminal, contact your local Hewlett-Packard Representative.



## Five New Printers For the HP 250

Under Operating System B.06.00, five new printers have been introduced on the HP 250. They are: the HP 2932A, HP 2933A, HP 2934A, HP 2563A and HP 2687A. Each of these printers represents a significant reduction in the cost of output on the HP 250. Below is a brief description of their features.

### HP 2932A

This is a 200 character-per-second (cps) dot matrix impact printer. It can be connected to the HP 250 with either an RS-232-C or an HP-IB (HP-Interface Bus) interface, depending upon the system configuration. The HP 2932A supports both expanded and compressed print modes when used at a slower speed than 200 cps. Available character sets include: USASCII, Roman Extension, and Katakana. Another feature available on this printer is raster graphics. The HP 2932A is capable of handling forms up to six parts and 13.6 inches wide.

### HP 2933A

The HP 2933A supports the same features as the HP 2934A printer,

except for the optional font cartridges. See the description of the HP 2934A below for a listing of the features.

### HP 2934A

The HP 2934A is another member of the HP 293x family of printers. In addition to the features of the HP 2932A, it is capable of matrix letter quality printing at 100 cps. Among its other features are: proportional spacing, left and right justification, and auto-centering. There are optional plug-in font cartridges that will provide you with a variety of print styles (e.g., Courier and Prestige Elite). The HP 2934A can also be used for bar code printing.

### HP 2563A

This is a 300 line per minute (lpm) general purpose dot matrix printer. Matrix letter quality print can also be achieved with this printer at 150 lpm using the high density print mode. The four print modes available are: compressed print; double high, double wide print; bar code print; and raster graphics. The character sets include: USASCII, Roman Extension, and Katakana. The HP 2563A can handle forms up to six parts and 16.75 inches wide. As with the HP 293x

mode. The four print modes available are: compressed print; double high, double wide print; bar code print; and raster graphics. The character sets include: USASCII, Roman Extension, and Katakana. The HP 2563A can handle forms up to six parts and 16.75 inches wide. As with the HP 293x printers, this printer can be connected to the HP 250 via an RS-232-C or an HP-IB interface.

### HP 2687A

Laser printing can now be achieved on the HP 250 thanks to the new HP 2687A. It is a 12 page per minute laser printer with 300 dot per inch resolution. This high resolution produces output with quality comparable to that of offset printing. The HP 2687A is a

compact, desk-top printer that uses single sheets that are automatically fed from an input cassette. The cassettes hold either 8-1/2" X 11" paper or European A4 size paper. At this time two character fonts are available: pica and elite. Some of the word processing features include: superscripts, subscripts, auto-underline, portrait/landscape printing and multi-copies. Only an RS-232-C interface is supported on the HP 250.

The article on printer connections later in this issue contains information on the types of factors that should be considered when choosing an interface option for a printer (RS-232-C or HP-IB). If you have any questions about these printers, please contact your Hewlett Packard Representative.

# articles of interest to all HP 250 users

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## Workstations vs. Terminals What are the Differences?

Often the distinction between a 'workstation' and a 'terminal' on the HP 250 is unclear and confusing. There is, however, a very important difference which makes it necessary to distinguish between the two.

The HP 250 is unlike most computers in that standard terminals cannot interface directly with the HP 250 operating system. Many of the HP 250's unique features and ease of use are due to the way a workstation is customized to interface with the HP 250 Operating System. This customization reduces some of the overhead normally involved in display processing.

When a key is pressed on a standard ASCII terminal, that ASCII character is sent to the computer, which then echoes the character back to the terminal. An HP 250 workstation has special firmware that handles 'keycodes' instead of ASCII characters. The utilization of keycodes means that when a key on the keyboard is pressed, a character representing the position of that key on the keyboard is sent to the operating system, instead of the actual ASCII character itself. The operating system in turn determines which language is configured and returns the appropriate character to be displayed for that keycode based on the language being used (keyboards differ between languages). This means that language configuration is a function of the software configuration, not the hardware. Thus the handling of foreign languages is simplified.

Another difference between an HP 250 workstation and a standard terminal is the way the CRT display contents are handled. The HP 250 operating system keeps the contents of the entire display in memory and handles the processing of all keys such as insert character, delete character, tab, etc. The workstation itself is responsible only for sending the keycodes of the keys pressed and displaying what is returned by the OS. A terminal on the other hand, has its own memory in which the display is stored. All insert, delete and cursor positioning keys are handled by the terminal locally. When a terminal is connected to a computer, the computer OS has no way of knowing what is currently in the terminal's display memory.

Noticable results of the difference in display handling include:

1. Since the HP 250 OS knows what is on the entire workstation screen, the cursor can be positioned anywhere on the screen, the return key pressed, and the OS will interpret and/or execute whatever was displayed on the line that was entered. This feature is known as a 'live' screen and its main advantage is that lines can be modified and/or re-executed without having to be typed in again. When Return is pressed on a terminal, only those characters that have been typed in will be executed, even if the screen contains something different or has been entirely cleared.
2. Because insert and delete functions are handled by the HP 250

operating system, they can be automatically turned off when the cursor is moved to the next line. On a terminal, the insert character function stays on until it is specifically turned off by the user.

This is not to say that terminals cannot be used on the HP 250. They can be used (typically as data entry terminals), but must be driven by an

HP 250 program that reads the input from the ASI port to which the terminal is connected.

Terminals cannot be configured as workstations. If a terminal was configured as a workstation and was sending ASCII characters to the HP 250, these characters would be interpreted as keycodes and meaningless garble would be returned to the terminal.

## Systems Management Primer

What would you do IF:

A fire destroyed your computer room?

Your senior programmer/analyst was hospitalized for an extended period?

Your business was without power for two days?

Your payroll data base was corrupted the day before paychecks were due?

These type of situations may not arise often in your day to day operations, but when they do occur, how you respond can have a major impact on your operations and business. Hewlett Packard is often asked what may be done to prevent losses and to optimize the effectiveness of a computer system. Much of what you can do to protect yourself in this type of situation comes under the heading of 'system management'.

As an overview, system management is basically resource management. System management should be approached like the management of

any valuable resource or asset. The management of a computer system centers around several responsibilities spread across various areas of concern:

Responsibilities:

Planning Controlling Organizing  
Training

Concerns:

Security/Protection Information  
Integrity Return on Asset  
Performance Productivity

Lets look at a few specifics which address the most common solutions to concerns in these areas:

Back-up: It is an accepted business practice to periodically back-up computer data. The data to be backed up usually includes the information and programs which are considered to be vital to the operation of the organization. Programs are usually not updated or changed very often, and so only one back-up of the most recent software need be kept. Data, however, is constantly being updated. It is not possible to always have a back-up copy of the current data, but a back-up should be done frequently

enough to allow most of the data to be recovered in case of a problem. Most companies have a schedule to perform the back-up on a daily basis. The particular back-up utility used will depend on your needs and requirements. The article "HP 250 Disc Structures" outlines some of the options available.

**Retention Cycle:** How long should a back-up be kept? This depends in part on the legal requirements for your area. In some states and countries, magnetic media is considered a legal record. The information that is contained on a disc or tape need not be duplicated on paper. However, the media must be kept for the period that a paper record would be kept. Typically these records include taxation information, payroll data, etc.

Apart from the legal requirements, business prudence dictates that sufficient information be retained for the business to continue in the event the system is damaged or the data lost. Usually a back-up should be kept just prior to the last update/posting, or summarization of detail data. This is when transactions are printed and updated to the master file, invoice summaries are printed, history files are updated, etc. Most businesses will retain the printed reports generated at the update/posting and have magnetic media back-up until the next update.

In addition to this pre-posting back-up, it is often beneficial to maintain a weekly and monthly back-up. For instance, if a disc failure causes some of your data to become corrupt, but this corruption is not noticed until after the daily back-up has been performed, data will have to be recovered from some other source. If no other back-up is available, the data may be lost.

It is suggested that you contact your software supplier to select the best back-up method for your installation. The manual "Managing Your HP 250" may provide ideas in this area.

**Off-site retention:** In conjunction with the above procedures, it is suggested that a periodically updated master copy be kept in a secure off-site location. This will protect your programs and data from fire and other disasters which would destroy your back-ups as well as the original data. Banks often have a service available for such off-site protection.

**Mutual assistance agreements:** Many companies will arrange a mutual assistance agreement with companies having similar computer equipment. If either company's equipment fails or is destroyed, their programs and data can be taken to the backup site (other company) to complete critical processing. This permits a business to continue many of its functions despite loss of equipment or facilities. Usually such agreements specify availability, fees, and other considerations. For on-line systems, consideration must be given to how data can continue to be entered at the backup site.

Within a mutual assistance agreement, companies often have a provision to 'rent' operators/programmers for those times when a personnel emergency occurs. Some OEMs provide such services also.

For further assistance in system management we suggest that you consult your local Hewlett-Packard sales office for availability and fees. If your application software is supplied by a Value Added Supplier (OEM), they should be consulted for recommended procedures.



## HP 250 Disc Structures

The contents of a disc drive are often a mystery to many HP 250 users. How files are stored, retrieved, and backed up is not always clearly understood. This article will explain the basics of file storage and clarify the difference between the various available backup programs.

The disc is divided into many 'sectors'. These sectors give us a way to read or write a particular area on the disc. All files are given a sector address specifying where that file resides on the disc.

A disc used on the HP 250 is organized into several areas:

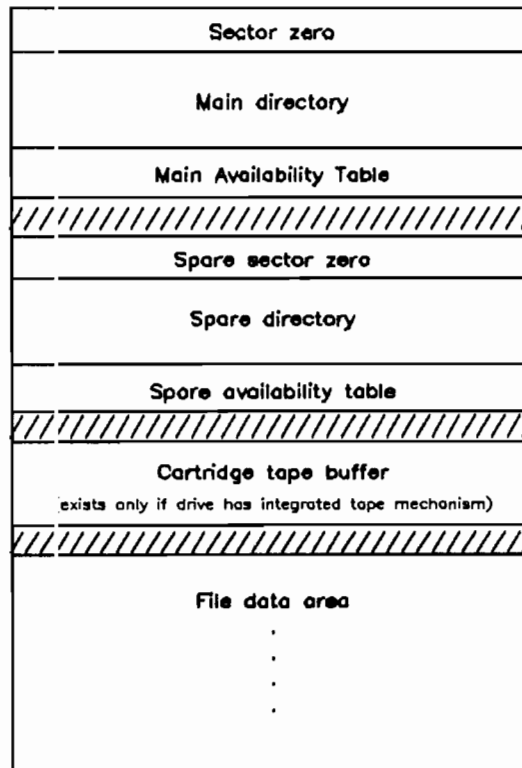
1. The first sector of the disc is always called 'sector zero' and contains identification information about the particular disc. This sector contains the size of the disc, the disc label, and sector addresses of the directory and data areas.
2. The next area of the disc is the directory. The directory contains one entry for every file on the disc. These directory entries include the file name, size, type, and sector address on the disc. Whenever a file is accessed, the HP 250 searches the directory until the entry for that file is found. The file can then be read using the sector address from the directory entry.
3. Following the directory is the availability table. This table keeps track of all of the unused spaces on the disc. There will be one entry in the availability table (AVT) for every contiguous unused area on the disc. Thus, if all of the entries in the directory were combined with all

of the entries in the AVT, the entire disc data area would be accounted for.

4. Since these three areas are critical to reading the contents of the disc drive, a spare copy of each one is kept, immediately following the main availability table. If for any reason the main sector zero, directory, or AVT becomes unreadable, the spare copy will be automatically accessed. In this case a warning message will be displayed informing the user that the spare has been accessed. Any time this happens, the disc should be backed up immediately. If it is a flexible disc or tape cartridge, the media should be replaced. If this warning occurs on any other type of media, your HP service representative should be contacted to determine what action to take.
5. On disc drives with integrated cartridge tape units (HP 7908P, HP 7911P, or HP 7912P), there is a buffer area for the tape following the spare sector zero, directory, and AVT area. The tape units were designed to transfer large volumes of data at one time instead of individual sectors of data. So whenever data on the tape is accessed, the requested sector plus the 571 sectors following that sector are copied from the tape to this buffer on the disc. All accesses to data within this 572 sectors of data are then read from and written to that buffer. When a different area of the tape is requested, or when the tape is unloaded, this buffer is updated to the tape. Through this process files on the tape can easily be accessed without requiring the tape to read individual sectors.

6. The remainder of the disc (other than the spare sectors) is devoted to data storage. When a file is created, the AVT is searched until an available space is found that is large enough for the desired file. The data area is then reserved by modifying the

AVT to reflect that this space is no longer available and creating a directory entry to point to the address of the new file. The actual data area may be written to or not, depending on what type of file is being created.



### Backup

There are several backup utilities, each of which has both advantages and disadvantages. The particular method you should select for backup depends upon your system's specific configuration and needs. Listed here are descriptions of some of these utilities along with the major advantages and disadvantages of each.

#### FVBACK

This utility copies sector zero, the directory, AVT, and data area to a set of backup files on a cartridge tape. The backup is then a mirror

image of these parts of the original disc.

**Advantages:** Fastest way to back up large volumes of data; simple and easy to use

**Disadvantages:** The entire contents of the disc must be backed up or recovered. there is no way to selectively backup or recover individual files. An HP 7908, HP 7911, or HP 7912 disc with tape drive is required. Recovery must be done to the same device type as the original backup.

#### BACKUP/RECOVER

This utility copies each file and its directory entry sequentially

into a backup file on any other device. The backup file then consists of a single directory entry and data for each file backed up.

**Advantages:** Flexibility in selecting which files are to be backed up or recovered. Flexibility in selecting backup device.

**Disadvantages:** Not as fast as FVBACK since each file is copied individually. Does not back up databases.

#### DUPL

This utility makes a duplicate copy of a disc or tape. The source and destination devices must be of the same type and size.

**Advantages:** Relatively fast and simple to run.

**Disadvantages:** Must have two identical disc drives and discs.

#### DESTORE

This is a binary which allows a duplicate copy of a database to be stored into a single backup file on any device. The backup file is a mirror copy of the database.

**Advantages:** Fast way to back up individual databases.

**Disadvantages:** Must be executed once for each database to be backed up. Only databases may be backed up.

#### Other Utilities

##### DBUNLD/DBLOAD

These are not backup utilities, but are often mistaken as such. These utilities should be used for database recovery or restructuring. Instead of just copying the database, each entry in the database is read and written to a data file by DBUNLD. The DBLOAD program then reads the data, unpacks it, and

reenters it into the database. This is usually used to change the capacity of a data set, or to clear up any corruption that may have occurred as the result of a disc failure.

#### REPACK

The REPACK utility, released with revision B.05.00, can be used to shift all of the files forward to the front of the data area. This leaves a single large available space for new files. REPACK works by sorting the directory entries in order of file address, and then shifting one file at a time forward over any unused areas. The directory entry for each file is rewritten as soon as the file is moved, so that if the program is halted before it is complete, all files except for the one that was being moved will still be accessible.

#### INIT

The INIT utility has two options: initialize or purge all. The initialize option will perform a read/write test to verify that the disc is readable. If any unreadable sectors or areas are found, these areas will be marked as unused and one of the spare sectors at the end of the disc will be substituted for the bad sector. Each disc has a limited number of spare sectors available, and if the number of unusable sectors found exceeds the number of available spares, an error message will be displayed indicating that the media is unusable. The purge all option, on the other hand, assumes that the disc has already been initialized at some time and so does not perform this read/write test. Next, regardless of which option was selected, the directory will be cleared, the availability table will be set to show that the entire file area is available, and sector zero will be recreated.

Sector zero is used to identify that a disc has been successfully initialized. If an ERROR 85 occurs, it is because sector zero contains

something other than the disc identification information.



## Printer Connections: HP-IB or RS-232-C?

With the addition of several new printers to the HP 250 product line, many HP 250 users may be wondering what kind of interface is best suited to their needs, HP-IB or RS-232-C. The primary considerations of each is listed below:

### HP-IB

There are two main advantages to using an HP-IB connection. First, this does not use an ASI port, allowing one additional asynchronous device to be connected to the system. Second, the HP-IB connection allows detection of when a printer is off-line or disconnected, by returning an error code (except for the HP 2563A). An HP-IB interface also allows faster transmission of data, but the print speeds of the printers remain fixed

and so this faster transmission may have very little effect on the actual output rate or system performance.

### RS-232-C

The main advantage of an RS-232-C connection is flexibility in the allowed distance between the computer and the printer or other peripheral. With an RS-232-C connection the printer can be located up to 50 feet away from the system with direct connect, up to 1 kilometer away if current loop is used, and any distance away if a modem connection is used. However, this type of connection does not allow the user to detect if a printer is off-line.

Another consideration when selecting a printer interface may be cost. Depending on the printer, one version may be less expensive than the other.

## HP Business BASIC Report

Most HP 250 customers are aware that an enhanced version of BASIC is being developed for the HP 3000. This new version of BASIC on the HP 3000 (HP Business BASIC) will be very similar to HP 250 BASIC and is intended to provide an upgrade path

to the HP 3000 for HP 250 users who have outgrown the HP 250's capabilities.

One of the objectives of the Business Basic project is to allow an HP 250 application to be upgraded to the HP 3000. The effort required to upgrade an application to the HP 3000 is estimated to be 5-10% of

the effort required to rewrite that application in another language. Performance characteristics of an application which has been moved to the HP 3000 are not expected to be the same as they were on the HP 250. It is unknown at this time exactly what the performance of a upgraded application will be. However, in order to improve overall performance and make use of other HP 3000 features, many users may find it advantageous to modify certain parts of their applications once they get them up and running on the HP 3000. Business Basic applications may also

be compiled if desired. This will usually result in faster execution.

HP 250 Utilities will not be duplicated in Business Basic for the HP 3000, as many of these utilities already exist on the HP 3000 in other languages (e.g., database creation and modification, backup, disc tools, etc.)

If you have specific questions about the implementation of Business Basic on the HP 3000, contact your HP sales representative.

# programming tips

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## Optimizing Performance On the HP 250

This article is intended to provide the applications programmer or systems analyst with information on systems performance in general, and with specifics on how to improve performance on the HP 250.

As with any computer system, there are four basic areas which may effect performance:

- Hardware
- System Software
- Application Software/Mix
- User Training/Experience

Every computer system has a maximum performance threshold. The performance threshold for any given machine is dependent on its architecture, peripheral structure and configuration, the operating system, instruction set, etc. By general definition, this threshold is looked at without regard to application or user environment. Specifically, the measure of performance threshold is made in a test environment. The common base measurement is 'millions of instructions per second' or simply MIPS.

However meaningful the term MIPS is to a computer scientist, computer users are concerned with throughput and productivity. Although MIPS figure into the overall throughput and productivity of a system and its users, it may not be what is most important. To most of us, getting paid on time or meeting a deadline is what is important. We would like

as little 'hassle' as possible. The more 'hassle' one has, the more productivity and throughput decreases. This fact of life has led many to consider the 'hassle factor' as the measure of a machine's performance. This includes the measure of ease of use, overall throughput, reliability, response time, and perceived value.

Studies have shown that the average computer user can cause a more meaningful change in performance in two of the four areas listed above:

- Application Tuning
- User Training

This is not to say that performance may not be increased in other ways. An example of one way is outlined in the article on the new IMAGE/250 Hashing algorithm. But let's concentrate on what you may do to directly and quickly affect the performance of your system.

Consideration should be given to the types of peripherals that are on the system. Some discs and printers are much faster than others. Peripheral speed can contribute greatly to the overall performance of the system.

Application Tuning:

Application Tuning centers around two areas:

- Application Design
- Application Utilization

On the HP250, an applications designer can impact both perceived and actual performance by following some basic tips:

Softkeys - The use of special function softkeys will provide a low 'hassle factor' approach to user choices. We have found that this is particularly true when presented in a rapid decision sequence. Such a sequence defines the softkeys before the rest of the screen is displayed. This allows the user to select the next option (if desired) without waiting for the entire screen to be 'painted'. Experienced users benefit from this approach. Frustration is greatly reduced and both perceived and actual execution is faster.

Action Monitoring - Individuals operating a workstation typically expect feedback within 2-4 seconds. It is not always possible to respond so quickly to an operator action, but often frustration can be lessened if the operator perceives some action. Posting a flashing message such as 'Processing Data' is one way to show that processing is taking place. Also, it is often helpful to provide a way for the user to temporarily interrupt the action and report the progress of an application. Both of these actions reduce the hassle factor.

Disc Storage layout - one major contributor to poor response time and throughput is the location of data items on disc. If related master and detail data sets are located at the greatest distance apart possible, extra response time is introduced into the application while the disc searches back and forth.

One way to minimize disc search time is to use the

will 'condense' the disc data area by moving all files toward the first sectors of the disc. This technique will not insure that related data sets are adjacent, however, since

individual data sets may be separated by other files. To optimize the placement of a data base, it is suggested that several actions be taken in the design and tuning of an application.

First, within the design of the application, it is suggested that the programmer include a mechanism for keeping statistical counts on data set 'hit' rates. These counts may be used to tune the application disc utilization. Such a counter may generate additional processing overhead. Therefore, we recommend that the use of such a mechanism be limited to short periods of time, and be used only in an environment where maximum throughput speed is not critical. Such code may be disabled or removed when not in use. The length of the required test period should be determined by how long it takes to get a significant representative sample.

Next, it is suggested that the application designer take a best guess pass at setting up a disc layout prior to creating the data base. The data sets should be laid out in the order that they will be most heavily used, keeping associated master and detail sets together when possible. It is suggested that the root file be placed first, since it will be accessed whenever the data base is opened or closed, and is frequently updated. If multiple disc drives are being utilized, the data sets should be placed on different drives. This will allow a heavily used application to minimize disc head movement. When this approach is used for a system with multiple applications, the designer must choose which application will take precedence for performance optimization. At a later time, the statistics that have been kept may be used to fine tune the system by reorganizing the disc.

The application program may also be structured in a way that will reduce the hassle factor. Coding constructs that are quickly executed may be used. A careful look at your programs for 'wasted' code may be helpful.

Within the System Software for the HP 250, the CONFIGurator program allows configuration of several options which may affect performance. One of these options is the use of disc caching (DCACHE), will help application speed. For details on DCACHE please refer to issue 7 of the HP 250 COMMUNICATOR.

Also within the CONFIG program is time slice configuration. Time slicing is a factor that may be adjusted to affect performance. Although the total amount of CPU time required for a task remains constant, the allocation of that time will affect the throughput of each user. On the HP 250, time slicing is used to allocate the CPU resource. More simply, each person gets a certain amount of processing time allocated to their task. Each time slice is roughly 20 milliseconds in duration (16 ms. on the HP 250/35).

Example:

Two tasks are running the same CPU intensive program. They are configured to have the same number of time slices. Each task

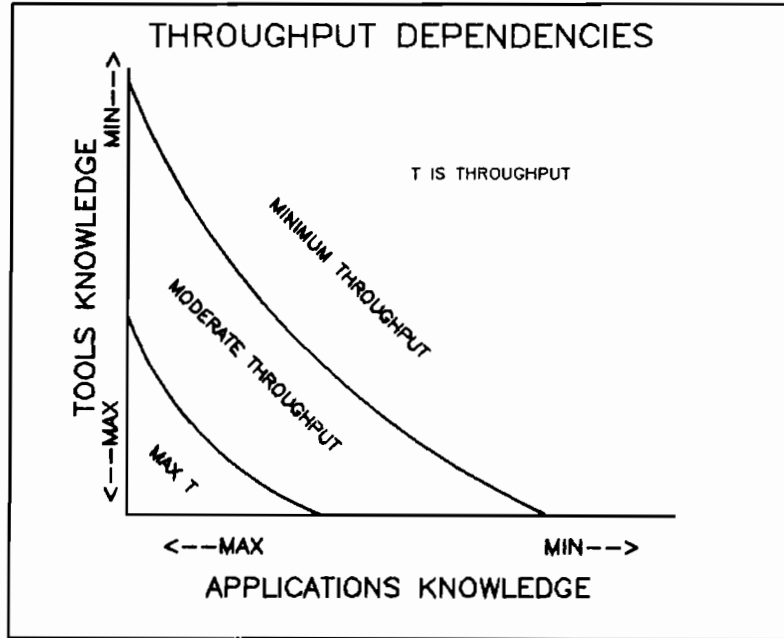
minutes total.

If task 1 is reconfigured to have 10 time slices and task 2 is left at 1 time slice, then task 1 will complete the program in 1 minute, while task 2 still completes in 2 minutes (2 minutes system processing time). This assumes that when task 1 completes processing, that task is idle for the remainder of the 2 minutes.

This example demonstrates how task throughput may be altered by increasing or changing the ratio of time slices.

Training - A critical element in both throughput and application acceptance is the training given to the workstation user. The following diagram illustrates the necessity for training.





As the hassle factor is reduced, the level of throughput increases. Training in the application and the tools increases productivity and system throughput.

Hewlett-Packard Systems Engineer to assist in this effort. We suggest that you contact your local Hewlett-Packard office for information on these services.

The application designer may wish to utilize the services of an

## Directory Caching (DCACHE and IMAGE/250-

The new directory cache feature implemented in OS 5 can be used to significantly improve the performance of an application. This cache contains a list of the most recently accessed files, and the address of the directory entry for each file. When a file is accessed, the directory cache is first searched for that file. If it is found, the system goes directly to the directory entry containing that file and reads the address of the file. If the file is not found in the directory cache, a serial search

of the directory is performed, and an entry for this file is put into the directory cache. This allows the directory search time for these files to be reduced considerably.

However, IMAGE/250 files (ROOT and DSET) are accessed differently. When a database is opened, IMAGE does its own search through the directory to find each data set. IMAGE does not make use of the general system file search routine, and so does not utilize the the directory cache. Once all data sets are located, their addresses are stored in memory as long as the data base is open. So, if a data base is opened only once and then

continually accessed, the directory will be searched only once. However, if a data base is being repeatedly opened and closed, each time it is opened, a serial search of the directory will be done to locate each data set. Since it can take up to 3 seconds to locate the directory entry for a file at the end of a large disc, and a data base can have up to 50 sets, this search could take a relatively long time.

There are two ways to improve the efficiency of an application in this area:

- 1) Place all database files that will be frequently accessed near the front of the disc (lowest sector addresses).
- 2) Do not repeatedly open and close data bases unless it is necessary.

## Efficiently Using FIND And SORT on the HP 250

One common programming practice on the HP 250 which can degrade performance is inefficient use of the FIND command. This command is often the easiest way to isolate entries of a data base with certain characteristics, but is relatively slow. Several factors should be taken into consideration when attempting to optimize the use of the FIND and SORT commands.

The WORKFILE IS # statement identifies a particular DATA file as a workfile within a program. A workfile contains a series of IMAGE record pointers. Each pointer is a one word integer in the range of -32768 to +32767. These pointers identify entries 1-65535 in a data set. To convert the one word integer to a data set entry number the following algorithm should be used:

$$\text{Rec} = \text{Pointer} + 65536 * (\text{Pointer} < 0)$$

A workfile is reset (EOF written to the first record) whenever the THREAD IS statement is executed, or if the database it is associated with is closed.

The FIND and SORT commands are, in effect, performing multiple DBGETs on the specified data set(s), unpacking the data, and looking at particular variables. This process can be optimized by unpacking only the variables which are being used to FIND or SORT on. This can be accomplished by executing an IN DATA SET USE statement prior to the FIND or SORT, specifying only those variables that will be used in the FIND/SORT. For any sets that are specified in the thread but do not contain variables used in the FIND/SORT, an IN DATA SET FREE should be executed.

If the workfile is empty when a FIND or SORT is executed, all entries in the threaded sets will be read to see if they should be included in the workfile. If the workfile contains any pointers already, the FIND or SORT will only affect those records currently in the workfile.

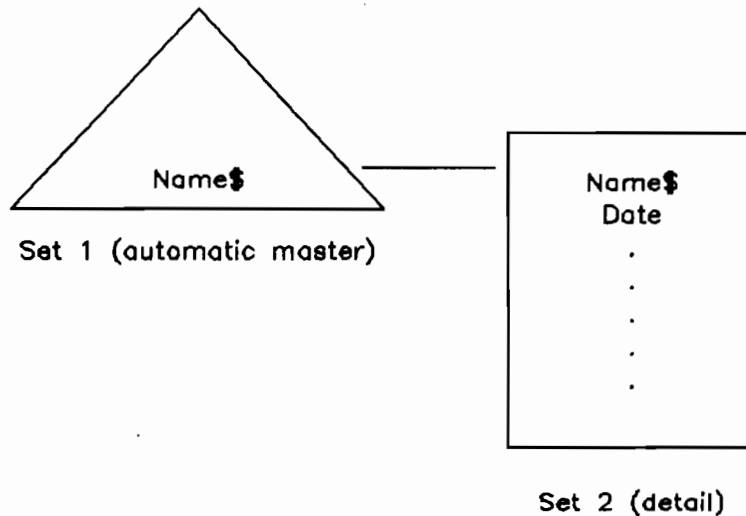
Pointers may be written to a workfile programmatically, as long as the values to be written are integer values, and the file has been defined as a workfile. The PRINT# statement can be used to do this as shown in the example below.

## Use of DBFIND instead of FIND

Issue 6 of the HP 250 Communicator contained a user contributed utility to improve FIND and SORT times. This was based on the idea that often, the search criterion for a FIND statement is a key value in an associated master set. In this

situation, a DBFIND statement can be used to quickly locate the appropriate entries. If these entries need to be sorted, the record numbers can be written to a workfile as they are found, and a SORT can then be executed on the contents of the workfile.

Example:



In order to find all entries in set 2 where Name\$="Anderson", sorted by Date, there are two alternative algorithms that may be used.

Alternative 1:

```
ASSIGN #1 TO "WORK"  
WORKFILE IS #1; THREAD IS 2  
FIND TRIM$(Name$)="Anderson"  
SORT BY Date  
DISP WLEN(1);" entries found"
```

Alternative 2:

```
ASSIGN #1 TO "WORK"  
WORKFILE IS #1; THREAD IS 2  
Search$="Anderson"  
Search$=Search$&RPT$(" ",30-LEN(Search$))  
DBFIND (Base$,Set2$,1,S(*),1,Search$)  
IF S(1) THEN Dberr  
FOR Entry=1 TO S(6)  
PRINT #1,Entry;S(10)  
DBGET(Base$,Set2$,4,S(*),"@",Buf$,S(10))  
IF S(1) THEN Dberr  
NEXT Entry  
SORT BY Date  
DISP WLEN(1);" entries found"
```

Although the code for alternative 2 is somewhat more complex, in a data set of 1000 detail entries (10 of which meet the criterion) and 100 master entries, the first program take 8 times as long to complete as the second program.

Although this technique cannot be used in all situations where a subset of data is being found, it is usually worthwhile in terms of performance to use a DBFIND instead of a FIND whenever possible.

# service information

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## Verifying Readability of a Cartridge Tape

Occasionally, data read errors (ERROR 88) are encountered when trying to recover information from a disc or tape. This is seen most often on soft media such as tapes and flexible discs, because soft media wears out after a given amount of use. ERROR 88 indicates that the data cannot be read from the media and is issued only when an attempt is made to read the data, not when the data is written.

The CHECKREAD function is often used on media other than the tapes to prevent errors in writing data. When CHECKREAD is turned ON, each sector is read back after it is written to verify that the data was written correctly. However, this function does not always work sufficiently on the tape drive because of the way data is buffered through the disc drive. The checkread is performed on the data in the disc buffer. When the data is later updated to the tape, no checkread is performed.

Several users have run into a problem when an ERROR 88 is encountered on a tape that was used for backup. In order to allow detection of this kind of situation when the backup file is created, the HMEDIA utility has been enhanced for OS 6 to verify the readability of a tape. HMEDIA is the program which is run when the 'MEDIA TEST' option is selected in the TEST program (located on the Operating System disc).

In order to verify the tape, HMEDIA first updates the data from the disc buffer to the tape. The verification is then performed. Since the buffer was updated to the tape, this forces the tape to be read, rather than just reading the data from the disc buffer. This verifies that the data can be read from the tape. It does not however, verify that the data is correct.

It is suggested that in any case where critical data is backed up to a tape, this utility be run to verify the tape before continuing with normal processing. If a read error is found on the tape, the data can be rewritten to another tape.

## Using Plotters on the HP 250

When using an HP 7220 or HP 7221 plotter on the HP 250, it is documented that the 'on-line' light must be on. This light actually has

three states: on, off, or blinking. In order to communicate with the HP 250, this light must be blinking, not on steady.

There has been some confusion about this, as under operating systems

prior to OS B.05.00 the plotter would work if the light was either blinking or steady. This was the result of a bug in the operating system which was corrected in OS 5. This bug caused the HP 250 to send data to the plotter, even if the plotter was not ready. The plotter would then accept the data and begin to plot. Under OS 5 however, data

will not be sent to the plotter until the plotter responds that it is in a ready state (on-line light blinking). So, if you are occasionally getting an error which indicates that the plotter is not responding, make sure that the on-line light is blinking, and then try again.

## The HP 250 Support Structure

In order to be successful, a product requires several elements in addition to the physical components of the product itself. One of these elements is the continuing support of the product for customers who purchase the product. Software support is very visible to most customers, yet is frequently not well understood. There are several factors involved in supporting and maintaining the HP 250.

First, there is the product itself. Each element of OS 6 has undergone design review by the product team. An important part of this is the inclusion of appropriate error detection and correction routines. This effort also included consideration of customer enhancement requests and implementation of those enhancements where appropriate and feasible.

Second, extensive testing is conducted. Each module has received a multi-dimensional test, testing for functionality, ease of use, and performance. OS 6 has been tested at several sites, both within HP and at customer sites. Each of these test sites has furnished feedback on the product and has helped us find design and programming errors.

Third, your local HP sales and support organization receives training on how best to provide support for the HP 250. This specific product training supplements your HP sales and support representatives' extensive background and general knowledge of computer systems.

Fourth, the manufacturing division provides support to the HP field organization, both during and after normal working hours. This means that if a situation arises which requires resources your local office does not have, a support engineer at the factory will be able to provide assistance over the phone.

All four of these elements combine to form the support package for your HP 250. Many end users also are supported by an OEM who provides application solutions. Each OEM has set-up their own network of support to address the specific needs of their customers.

"When and where do each of these levels of support come into play?"; "I turned in a 'bug' report. What happens next?"; "Just what is happening with my 'bug' report?". These are examples of the concerns and questions that may arise. An outline of what happens when a

problem occurs should help to clarify the support mechanism.

Generally, a computer user detects a problem and attempts to resolve it within their own expertise. Studies have shown that about 60% of all 'bugs' are solved by the user and that the problem was generally a misunderstanding. But, for those remaining problems, help is needed. The following example illustrates the most common path for seeking this help under a support contract.

1. The computer user contacts the computer supplier. For customers who purchased their computer from a Value-added Supplier (OEM), support begins with the Value-added Supplier. Computer users who have purchased their computer directly from HP should contact the nearest HP sales/support center.

Problems are most quickly solved when the user has a clear description of the problem and how to reproduce it before the computer supplier is contacted.

2. The Value-added supplier sorts out operations, applications, and systems problems. Operations problems are misunderstandings or questions about the correct use and operation of the system. Problems encountered in the software written by the software supplier or OEM should be classified as applications problems. Systems problems are problems with the Hewlett-Packard supplied and supported hardware or software. If the problem is either an operations question or an application problem, the Value-added Supplier handles it. For system problems, the OEM will report the problem to the appropriate HP sales/support center.

3. The HP Sales/Support center receives the request for Service. This may start out as a verbal

discussion about the problem, or may be a formal Service Request.

Before going further into the process, it is appropriate to point out that Hewlett-Packard offers several levels of support. Each of these levels has corresponding response times, costs, and services. This allows the customer or the OEM to tailor a support package to meet individual needs. Any HP 250 customer may elect to purchase system support from Hewlett-Packard directly. However, OEMs often have group support contracts with HP and pass the savings on to the computer user.

A Hewlett-Packard support representative (either a Systems Engineer or a Customer Engineer) will address the problem. If the situation warrants an on-site visit, then one is scheduled according to the support purchased by the customer. The SE or CE works closely with the customer or OEM to solve the problem and develop a workaround if necessary. If the problem is not resolved, the next level of support is called. If the workaround is sufficient for the current time, the HP support representative and/or the customer will complete a Service Request (SR). The SR contains a description of the problem, identifies the customer and the impact of the problem on the customer's operations. The SR is sent with supporting documentation to the HP Computer Support Division where it is logged and dispatched for review, investigation, and resolution.

4. The factory works with the HP support representative to characterize the problem. When an SR is received, an engineer works to investigate and resolve the problem.

Investigation and resolution of such problems are handled in a

prioritized manner. Problems that severely impact the customer's operations will receive attention first. A problem that causes only a minor inconvenience will receive a lower priority. When a fix is found for a software problem, it is usually included on the next release of the software.

Throughout the above process, each SR is tracked and timed. Reports are generated for the HP 250 Marketing and Development groups that indicate the status of all outstanding SRs. These reports help us to better tune our service to our HP 250 customers.

A customer publication, the Software Status Bulletin, lists all known problems and their suggested workarounds.

We invite your comments and input on the support structure. CUSTOMER SATISFACTION is our goal. Please let us know how we are doing and how we may improve. Please address your correspondence to:

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