HP AdvanceNet

Point-To-Point Workstation I/O

HEWLETT
PACKARD

Reference Manual

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New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

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This manual describes the operation of point-to-point workstations and how they interface with each of the HP 3000 Asynchronous Port Controllers (the Advanced Terminal Processor (ATP), the Advanced Terminal Processor/Terminal Interface Controller (ATP37), the Asynchronous Data Communications Channel (ADCC), and the Asynchronous Terminal Controller (ATC)).

The ATP is designed to control low, medium, and high speed bit-serial asynchronous devices attached to the HP 3000 Series 39/40/42/44/48/64/68. The ATP37 controls low, medium, and high speed bit-serial asynchronous devices attached to the Series 37. The ADCC controls low and medium speed bit-serial asynchronous devices attached to the Series 30/33/39/40/42/44/48. The ATC controls low speed bit-serial asynchronous devices on the Series II and III systems.

This manual is arranged as follows:

PART 1	presents an introduction to point-to-point mode operations.
PART 2	discusses both terminal and printer operation.
PART 3	provides a guide to programming for terminals and printers attached to an asynchronous port controller.
PART 4	discusses the functions of the ATP, ATP37, ADCC and ATC and defines the characteristics of each terminal and/or printer port.
PART 5	describes other options in point-to-point communications on the HP 3000.
PART 6	describes how to prepare the peripheral device for HP 3000 operation.
APPENDIX A	compares the four asynchronous interfaces: ATP, ATP37, ADCC and ATC.
APPENDIX B	lists some of the common problems encountered while operating and programming peripheral devices and possible solutions.
APPENDIX C	lists error messages and system failures which may be received during ATP, ATP37, or ADCC initialization and recovery steps.
APPENDIX D	provides instructions for building ATP cable assemblies.

Additional information can be found in the following reference manuals:

- *DSN/MTS Reference Manual* (32193-90002)

- *Workstation Configurator Reference Manual* (30239-90001)

- *MPE Commands Reference Manual* (MPE IV: 30000-90009, MPE V: 32033-90006)

- *Computer User's Catalog* (5953-2450)

- *MPE Intrinsics Reference Manual* (MPE IV: 30000-90010, MPE V: 32033-90007)

- *File System Reference Manual* (30000-90236)

- *HP 3000 Console Operator's Guide* (MPE IV: 32002-90004)

- *MPE IV System Manager/System Supervisor Reference Manual* (30000-90014)

- *MPE V System Operation and Resource Management Reference Manual* (32033-90005)

- *Fundamental Data Communications Handbook* (5957-4634) Additional product sections:
  Section E (MTS): 32193-90006
  Section J (Workstation Configurator): 30239-90006

- *Advanced Terminal Processor (DSN/ATP) On-line Diagnostics Manual* (For MPE IV or V/P: 30144-90004)

- *Terminal (TERMDSM) On-line Diagnostic/Support Monitor Reference Manual* (For MPE V/E: 30144-90013)

- *HP 3000 Distributed Systems Network/Advanced Terminal Processor Off-line Diagnostic Procedures Manual* (30144-90003)

- *Asynchronous Data Communications Channel-Main and Asynchronous Data Communications Channel-Extended Diagnostic Manual* (30070-90037)

- *Native Language Support Reference Manual* (32414-90001)

- Data Communications Primers:

  Touring Datacomm (5957-4622)
  Connecting to Your Computer (5957-4625)

CONVENTIONS USED IN THIS MANUAL

NOTATION

DESCRIPTION

nonitalics

Words in syntax statements which are not in italics must be entered exactly as shown. Punctuation characters other than brackets, braces and ellipses must also be entered exactly as shown. For example:

    EXIT;

italics

Words in syntax statements which are in italics denote a parameter which must be replaced by a user-supplied variable. For example:

    CLOSE *filename*

[ ]

An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets means the user may select any one or none of these elements. For example:

    $\begin{bmatrix} A \\ B \end{bmatrix}$ User *may* select A or B or neither.

{ }

When several elements are stacked within braces in a syntax statement, the user must select one of those elements. For example:

    $\begin{Bmatrix} A \\ B \\ C \end{Bmatrix}$ User *must* select A or B or C.

. . .

A horizontal ellipsis in a syntax statement indicates that a previous element may be repeated. For example:

    [,*itemname*] . . . ;

In addition, vertical and horizontal ellipses may be used in examples to indicate that portions of the example have been omitted.

A shaded delimiter preceding a parameter in a syntax statement indicates that the delimiter *must* be supplied whenever (a) that parameter is included or (b) that parameter is omitted and any *other* parameter which follows is included. For example:

    itema [*,itemb*] [*,itemc*]

means that the following are allowed:

    itema
    itema,itemb
    itema,itemb,itemc
    itema,,itemc

CONVENTIONS (continued)

Δ   When necessary for clarity, the symbol Δ may be used in a syntax statement to indicate a required blank or an exact number of blanks. For example:

SET[*(modifier)*]Δ*(variable)*;

underlining   When necessary for clarity in an example, user input may be underlined. For example:

NEW NAME? ALPHA

Brackets, braces or ellipses appearing in syntax or format statements which must be entered as shown will be underlined. For example:

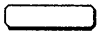LET *var*[[*subscript*]] = *value*

Output and input/output parameters are underlined. A notation in the description of each parameter distinguishes input/output from output parameters. For example:

CREATE (*parm1*,*parm2*,*flags*,*error*)

shading   Shading represents inverse video on the terminal's screen. In addition, it is used to emphasize key portions of an example.

⬡   The symbol ⬡ may be used to indicate a key on the terminal's keyboard. For example, (RETURN) indicates the carriage return key.

(CONTROL)*char*   Control characters are indicated by (CONTROL) followed by the character. For example, (CONTROL)Y means the user presses the control key and the character Y simultaneously.

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PART 1

INTRODUCTION

When you purchased your HP 3000 computer, you more than likely purchased a workstation to use with your HP 3000. A workstation is usually a terminal, a personal computer, or a printer. The workstations on your HP 3000 system can be supported in two modes: point-to-point and multipoint. The point-to-point mode operates through one of four I/O controllers:

- The Advanced Terminal Processor (ATP) on the HP 3000 Series 39/40/42/44/48/64/68

- The Advanced Terminal Processor/Terminal Interface Controller (ATP37) on the HP 3000 Series 37

- The Asynchronous Data Communications Channel (ADCC) on the HP 3000 Series 30/33/39/40/42/44/48

- The Asynchronous Terminal Controller (ATC) on the HP 3000 Series II/III

If you are unsure of which controller is used by your workstation, ask your System Manager or Operator.

The Advanced Terminal Processor (ATP) is an I/O controller for low, medium, and high speed bit-serial asynchronous devices and supports speeds up to 19.2K bps. The interface consists of a System Interface Board (SIB) and up to 8 Asynchronous Interface Boards (AIB). It can multiplex data for up to 96 ports which may be hardwired, on modems or a mixture of both. HIOTERM1 (for terminals) and HIOASLP0 (for printers) are the software drivers that operate the ATP hardware under the MPE operating system.

The Advanced Terminal Processor/Terminal Interface Controller (ATP37) is an I/O controller for low, medium, and high speed bit-serial asynchronous devices and supports speeds up to 19.2K bps. The interface consists of up to 4 ATP37 boards. Each can multiplex data for up to 7 ports, 6 of which are hardwired and one which can be either a hardwired or modem connection. HIOTERM1 (for terminals) and HIOASLP0 (for printers) are the software drivers that operate the ATP37 hardware under the MPE Version G.01.00 or later.

The Asynchronous Data Communications Channel (ADCC) is an I/O controller for low and medium speed bit-serial asynchronous devices, supporting speeds up to 9600 bps. The interface consists of ADCC Main and Extend PCAs which multiplex data transmission for 8 ports. The ports may be hardwired, modem, or a mixture of both. The software driver HIOTERM0 operates the ADCC hardware under MPE IV or V/P; HIOTERM2 (for terminals) and HIOASLP2 (for printers) are used with MPE V/E. In this manual, when ADCC is listed without its driver name, the information applies to the ADCC hardware with either software driver.

The Asynchronous Terminal Controller (ATC) is an interface for low-speed bit-serial asynchronous devices, supporting speeds up to 2400 bps. The controller can multiplex data transmission for up to 16 ports which may be hardwired, modem, or a mixture of both. IOTERM0 is the software driver that operates the ATC hardware under the MPE operating system.

The multipoint mode is supported by the Multipoint Terminal Software (MTS). For a full description of the MTS facility, refer to the *DSN/MTS Reference Manual.*

This manual deals primarily with the operation of point-to-point workstations (peripheral devices) and how they interface with each of the I/O controllers. In addition to modem and hardwired connections, this manual also discusses asynchronous connections using a PBX.

HOW MPE IDENTIFIES PERIPHERAL DEVICES

MPE identifies a peripheral device by the logical device number (ldev) of the port to which it is attached. Each port has a unique logical device number that was assigned during system configuration. Additional port characteristics defined during system configuration include Device Type and Subtype, size of output record, and default communication speed. Terminal ports are configured with these port characteristics as well as a default Terminal Type. (Refer to Part 4 for a description of Terminal Type.) They are also defined as session- and job-accepting and/or data-accepting.

Ownership of Devices

Devices under MPE are subject to ownership. For example, a terminal may be said to be owned by a session or job if it is being used for input and output by that session or job. A terminal can also be owned by an MPE Spooler program if data is being transferred between that device and disc. Between the time you press carriage return and establish your session, MPE owns the device and you will see the SYS account as ownership. When a device is owned, there are restrictions on its use by other processes.

Input and Output Devicefiles

When you initiate a session on your terminal, MPE associates a Standard Input Device, a Standard Input File, a Standard Output Device, and a Standard Output File with the session. If your computer has been configured so that your terminal port's input and output channels have the same logical device number (this is the standard way to configure the system), your Standard Input and Standard Output Devices are both your terminal. The Standard Input File for your session is $STDIN, and the Standard Output File is $STDLIST. When your port is configured conventionally, and your terminal's electrical connection to the port consists of the conventional single transmit, single receive, single ground wire, and modem control lines (if needed), the computer receives input from your terminal and writes output back to your terminal.

When you initiate a job on your terminal, MPE associates a Standard Input Device, a Standard Input File, a Standard Listing Device, and a Standard Output File with the job. If your terminal port has been configured conventionally and your terminal's electrical connections are as described in the preceding paragraph, your terminal is the Standard Input Device and the Standard Output Device. The name of your Standard Input File is $STDIN, and the name of your Standard Output File is $STDLIST. You can override the standard job listing file by specifying another device in the OUTCLASS=*parameter* of the :JOB command.

Obtaining Information about Files

Several MPE commands are available for obtaining information about your devicefiles. These are :SHOWIN, :SHOWOUT, and :SHOWDEV. :SHOWIN and :SHOWOUT can provide summarized or detailed information about your input and output files, respectively. :SHOWDEV provides additional information, including logical device number, availability, and ownership of the device. Refer to the *MPE Commands Reference Manual* for further discussion of these commands.

Data Devicefiles

The :DATA command provides you with a method of associating a data devicefile with a specific username and accountname (*user.account*) and optionally, a filename. Devices that accept the :DATA command (data-accepting devices), always attempt to read the first command automatically. MPE scans the :DATA command for validity. If the command is syntactically correct, and the user and account specified in the command are present on the system, the devicefile is created. At this point, the specified user could access this devicefile without operator intervention, but only via the *username.accountname* and optional *filename* specified in the :DATA command; in this way, the device file is allocated to a session or job upon its initial request for the devicefile. This mechanism simplifies the task of trying to keep track of what data belongs to what user.

Operator Assigned Devicefiles

Input devices that do not accept a :HELLO , :JOB , or :DATA command do not automatically recognize data. When you request input data from a non-accepting device, the Operator may be asked to assign the device for your exclusive use. Files on such devices are called operator-assigned devicefiles; they begin simply with your first data record. Operator-assigned devicefiles cannot be spooled.

Output Devicefiles

Output devicefiles are files composed of data produced by user programs destined for output devices such as terminals, printers, card punches, magnetic tape units, and graphic plotters. Session or job output devicefiles will be discussed here.

When you have requested special forms on a line printer, MPE initiates a dialogue with the Operator to direct the alignment of forms. Listing does not begin until the Operator indicates to the system that the forms are properly aligned. If the special forms are already mounted on a device, and the output devicefile does not require special forms, MPE will automatically ask the Operator to mount standard forms.

TOPICS IN THIS MANUAL

This manual is divided into six parts with this section being **Part 1**, the introduction.

Part 2 is intended for the inexperienced as well as the experienced user of selected HP 3000 peripheral devices. By **user** we mean the operator of the device, the person who enters and/or receives data at the device. By **devices** we mean those devices (or peripherals) which are connected to the HP 3000 through one of the Asynchronous Port Controllers (the ATP, ATP37, ADCC or ATC) or through another device that is so connected. If you are unsure about how your device is connected to the computer, consult your Operator or System Manager.

The primary emphasis of Part 2 is terminal operation, with secondary emphasis on printer operation. Other devices discussed in this manual are treated as terminals or printers by the HP 3000; therefore, this manual contains little detailed information on such devices. The devices discussed are:

- Configured Terminals and Data Capture Devices

- Configured Remote Spooled Printers

- Slaved Devices, such as card readers, plotters and paper tape readers

- Workstation Peripheral Devices, such as cartridge tape units and flexible disc drives

- Other Asynchronous Serial Devices

Part 3 is a guide to programming for terminals and printers attached to ports on the ATP, ATP37, ADCC or ATC. Its audience is the programmer who already has some experience writing programs on the HP 3000. It consists partially of material drawn from other Hewlett-Packard references but also includes information not available elsewhere. If you need further information on these topics, refer to the *MPE Intrinsics Reference Manual* and to the *File System Reference Manual* in conjunction with this manual.

The topics covered in Part 3 are:

- Programming strategy

- Overview of terminal and printer access

- Initiating access to a terminal or printer

- Ending access to a terminal or printer

- Writing output to a terminal or printer

- Reading input from a terminal or printer

- Reading in Paper Tape Mode

- Sharing a device among users--spooling

- Programming for non-standard attachments

- Programmatic control of multiple devices

- Controlling device functions with FCONTROL

- Cautions to the programmer

- Error-checking

- Syntax of the key MPE intrinsics for terminal and printer I/O

Part 4 discusses how the ATP, ATP37, ADCC, and ATC provide a number of communication functions, such as providing connection points for your peripheral devices (terminals and/or printers) and helps define characteristics of each terminal and/or printer port and how to change them. The modes of operation (standard, transparent, and binary) for terminals are also discussed.

Part 5 discusses asynchronous options other than simple hardwired or modem connections, specifically how PBX fits into an HP 3000 network.

Part 6 is intended for the System Manager, who needs to prepare the peripheral device for operation with the HP 3000. It informs you of three facets in preparing your device:

- Configuring the device's port into the MPE I/O system

- Physically attaching the device to its asynchronous port

- Setting the switches and configurations of each HP supported peripheral device

PART 2

OPERATING ASYNCHRONOUS DEVICES ATTACHED TO THE HP 3000

DEFINITION OF A TERMINAL

When using the term **terminal**, we are referring to peripheral devices with a keyboard and a video screen or hardcopy system. Terminals can operate in four modes:

- **Session-accepting Devices** are opened with the `:HELLO` or `:(command)` logon command and access the HP 3000 through MPE commands.

- **Programmatic Devices** are opened by an application program that is run independently from the device.

- **Job-accepting Devices** are opened with the `:JOB` command.

- **Data-accepting Devices** are opened with the `:DATA` command.

In many instances, these operation modes overlap. For example, it is possible to initiate a job from within a session, or to run a program that exercises control over the terminal in which the session is running; data-accepting devices must operate in conjunction with a program.

Session Devices

During a session, the terminal is used for interactive (conversational) communication with the computer. The terminal operator may do the following:

- Enter MPE commands.

- Run programs.

- Enter data.

- Receive output from the computer.

- Place the terminal under partial control of a program running on the computer.

- Communicate with other terminal operators and with the Operator.

- Transfer data and control information between the computer and a slaved device connected to the terminal.

- Execute designated console commands.

- Move the "logical" console to the terminal.

- Receive selected console messages.

- Change the port's line speed.

- Terminate the session at will.

Programmatic Devices

Programmatic devices operate under the control of a program running on the computer; included among the programmatic devices are terminals in which the user has entered the :DATA command. The controlling program accesses the terminal through the MPE File System. Terminals on which :DATA has been entered can be used for input or output of data. Other programmatic devices can be used for input, output, or both, depending on how the controlling program opened them.

Job Devices

With some important exceptions, job-accepting devices can operate much like session-accepting devices. See the list on the previous page. Job-accepting devices differ from session devices in the following ways:

- The Command Interpreter does not prompt you for input with a colon. The process (if any) that controls the device controls the prompt.

- If you make an error the job cannot recover from, the job is automatically aborted. This is analogous to job data files on disc.

- You cannot change the line speed (via the :SPEED command).

- They should not operate in Block Mode.

- The "logical" system console should not be moved to them (via the :CONSOLE command).

- They are not associated (via the :ASSOCIATE command) with console commands.

Data-accepting Devices

Data-accepting devices should operate in Character Mode only, and do not permit changing the port line speed.

INITIAL TERMINAL SETTINGS

If you intend to operate your terminal as a session, job, or data-accepting device, you must follow Steps 1-6, below. If your device is going to be used as a programmatic device, follow Steps 1-4; after successful completion of Step 4, your terminal is ready for communication with the controlling program.

Required Steps

1) Turn terminal on.

2) Set terminal to the REMOTE (on-line) mode. HP 264x terminals have a REMOTE key; press it down. Other Hewlett-Packard terminals have a REMOTE function key setting, displayed by pressing (MODES). The REMOTE function key label should display an asterisk; if it is not displayed, press the funtion key once.

3) Your terminal may offer some additional control settings. These should be set as follows:

BLOCK MODE   When your terminal is turned on, Block Mode is OFF. If a program needs Block Mode ON, it should change the terminal setting itself; however, it may be necessary to turn Block Mode ON manually in order for the program to be able to operate the terminal. In this case, the program should prompt you when it is time for you to turn the Block Mode setting ON and back OFF. To turn Block Mode ON, press down the BLOCK MODE key on 264x terminals; for other terminals, Block Mode is a function key setting, displayed by pressing (MODES). Block Mode is ON when the function key label displays an asterisk.

AUTO LF   When your terminal is turned on, Auto LF is OFF. (Speed-sensing usually does not work with Auto LF on.) If a program needs Auto LF ON, it should change the terminal setting itself. To turn Auto LFe ON, press down the AUTO LF key on 264x terminals; for other terminals, Auto LF is a function key setting, displayed by pressing (MODES). Auto LF is ON when the function key label displays an asterisk.

DUPLEX   For HP 264x terminals, set duplex to FULL unless you are communicating with the computer over a half duplex modem, in which case, it is set to HALF (ATC and Series 30/33 only). Other Hewlett-Packard terminals always operate in full duplex

PARITY   Set parity to NONE (or OFF) unless parity checking of input data is desired. Parity-checking provides a limited degree of error detection. Check with your System Manager or refer to Part 6 of this manual for parity checking options available with the different interfaces.

LINE SPEED   The setting must match the configured speed for the port if the port is configured as speed-specified. If the port is configured as speed-sensing, the setting may be any speed supported by both the controller and the terminal.

For ATC, it should never be set above 2400 bits per second. For ADCC, it can be set up to 9600 bps. For ATP and ATP37, settings up to 19,200 bps are acceptable.

If your terminal is connected to a port that is configured as speed-specified, the port controller is not able to establish communication with your terminal if it is set to the wrong speed. This is evident when you attempt to log on. Usually, you do not receive any communication from the computer (not even the colon prompt); occasionally, garbage characters may be printed.

Once communication has been established, the terminal speed can be changed via the MPE :SPEED command, or for programmatically-controlled terminals, via FCONTROL(10), (11) and (37). Changing terminal speed is described more fully below.

4)   If the terminal is communicating with the computer by means of a dial-up (switched) telephone connection, follow these directions. Otherwise, proceed to Step 5.

    a) You need to have a modem (or an acoustic coupler). The modem must be compatible in duplex type (half or full) and speed with the terminal and the terminal port on the computer. (If you are uncertain about this, check with your System Manager.) The modem may be built into the terminal or may be a separate unit.

    b) Dial the computer telephone number. (Get the number from the System Manager or Operator.) The phone should ring once or twice and then return the receiving modem's carrier signal. You know the carrier signal is being transmitted when you hear a steady tone or see the carrier light on your modem go on. If you hear a busy signal when you dial, this may be because the modem at the computer's end is not free to handle your call; try later. If the phone rings without an answer, the computer may not be in operation, or someone may need to answer your call (not all modems can answer without human intervention). In either case, you may wish to telephone the Operator for assistance.

    c) When you receive the carrier signal, press the DATA button on the modem. Your modem may not have a DATA button, but instead a Force Answer Switch. When you receive the carrier signal with this type of modem, move the switch to FA (Force Answer). This "forces" the modem to complete the connection. If you have an acoustic coupler, place the telephone handset firmly in the coupler, making sure the receiver mates to the receiver cup, and the transmitter to the transmitter cup. The terminal is now ready for use. Refer to the modem documentation for more information.

Your modem must be placed into operation within a set time limit. The ATP, ATP37, ADCC, and ATC allow the use of the full two-minute time limit for establishing the phone connection. If the connection is made, it resets the timer to allow the user the full time limit in which to log on.

5)   Press (RETURN) to transmit a Carriage Return character to the computer. If your terminal's speed and parity settings are what the computer expects, it returns a colon [:] prompt to your terminal. This prompt signifies that MPE is ready to receive a logon command from your terminal. If the character you type appears twice, the duplex setting is HALF and the computer expects FULL. (Subsequently, : indicates the computer is "listening" to your terminal for input.)

6)   Enter the :HELLO, : (*command*), :JOB, or :DATA command.

For example:

      :HELLO BARB.LEWISTON,TERMIO

      :(RUN JELLY.BEANS)RAUL.SMITH

      :JOB NUKES.ALEX

      :DATA DAVEY.STOCKADE

You may need to include additional parameters in the logon command you use (such as a password or the TERM parameter). The logon commands and all their parameters are described in the *MPE Commands Reference Manual*.

Checklist for Logging On to the Computer

1. Turn terminal on.

2. Make sure the following terminal keys (or configuration menu fields) are set as indicated:

REMOTE	--	on
AUTO LF	--	off
BLOCK MODE	--	off
DUPLEX	--	full
PARITY	--	none
SPEED	--	at speed supported by controller, terminal, and modem (if one is used).

3. If you are using a dial-up phone connection with the computer, establish this connection.

4. Press (RETURN) on the terminal.

5. When you get the colon prompt from the computer, enter one of the following logon commands:

> :HELLO *Username.Accountname*[*,Groupname*]
>
> :(*command*) *Username.Accountname*[*,Groupname*]
>
> :JOB *Username*[*/Pass*].*Accountname*[*/Pass*][*,Groupname*[*/Pass*]
>
> :DATA *Username.Accountname*[*,Groupname*]

Problems Encountered while Logging On

Difficulty at Step 4 may be due to one or more of the following:

- Cable connecting the terminal to local modem is not properly attached.

- Local modem may not be turned on.

- Remote modem may not be functioning (call Operator).

Failure to get a prompt at Step 5 may be due to one or more of the following:

- REMOTE not "on."

- AUTO LF "on."

- BLOCK MODE not "off."

- Computer halted (call Operator).

- Telephone connection broken (check Carrier light at your modem).

- Cable connecting terminal to local modem not properly attached.

- Speed or parity set incorrectly.

TERMINATING COMMUNICATION WITH THE COMPUTER

You can voluntarily terminate communication with the computer by issuing an MPE command.

- For sessions, the commands are :HELLO, :BYE, :EOF:, or :DATA.

- For jobs, the commands are :EOF: or :EOJ.

- For data-accepting devices, the commands are :EOD or :EOF:; this will be effective only if the controlling program has already "opened" the terminal.

After communication with the HP 3000 has been initiated, a number of conditions prevail by default. The particular set of conditions depend on the Terminal Type of your terminal's port. For an explanation of Terminal Type, refer to Part 4. The port will operate at its configured speed or at a speed sensed from the first Carriage Return character received from the terminal.

For example, if your terminal port was "opened" with Terminal Type 10, it has the following characteristics at the beginning of your session:

- Character Mode operation.

- Echo Facility enabled.

- System Break enabled.

- Subsystem Break disabled.

- Tape Mode disabled.

- Carriage Return recognized as record (line) terminating character.

- Standard editing facility enabled.

TERMINAL DISPLAY SETTINGS

As you enter information at your terminal keyboard, two factors -- **Echo Facility** and **Duplex Mode** -- determine whether or not that information also appears on the terminal's display. The Echo Facility determines whether input characters are echoed back to the terminal as they are input. The Duplex Mode, which is set at the terminal, determines whether the terminal prints keyboard input as it is typed and/or prints input when it is echoed back from the computer. What you see on the terminal display is the result of interaction between the Echo Facility and the Duplex Mode (See figure 2.2-1).

Duplex Mode

When the terminal is set for half duplex operation, the terminal writes input to the screen as you type it. The terminal also writes any printable characters it receives from the computer to the screen. When the terminal is set for full duplex operation, keyboard input is not printed at the display by the terminal, but any printable characters received from the computer are printed. When a terminal operates in either full or half duplex, the mode is selected by using the appropriate switch or configuration setting on the terminal.

Echo Facility

When Echo is on, terminal input is echoed back to the terminal by the computer as it is received. If the terminal is operating in full duplex mode, the echoed information appears as normal printed lines. If the terminal is in half duplex mode, the echoed printing is illegible. For instance, as you enter the input on some terminals, it is simultaneously printed by the terminal and then subsequently overwritten by the information, resulting in "garbage". On other terminals in half duplex mode, the characters are duplicated during echoing so that any character entered appears twice: HHEELLLLOO   UUSSEERR..AACCCCCOOUUNNTT

When the Echo Facility is off, input read from the terminal is not echoed by the computer. If the terminal is operating in full duplex mode, no printing of input occurs. If the terminal is in half duplex mode, the input is echoed by the terminal itself, and appears as normal, printed lines. When you log on, the Echo Facility is enabled automatically for most Terminal Types. You can disable it by typing (ESCAPE) followed directly by a semi-colon:

(ESCAPE) ;

You can turn the Echo Facility back on by pressing (ESCAPE) followed directly by a colon:

(ESCAPE) :

You can programmatically turn the Echo Facility on and off by using the FCONTROL(12) or FCONTROL(13) intrinsic. This is discussed in Part 3 of this manual.

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

> If your input data is ever echoed on a line-by-line, rather than on a character-by-character basis, this could be due to your port being configured as "non-duplicative". The Echo Facility would not cause this problem. Ask your Operator to check the configuration for your port.

LIMITATIONS. With certain Terminal Types, the Echo Facility is not automatically turned on when you log on. All standard Terminal Types recognize (ESCAPE) ; and (ESCAPE) :. Refer to Terminal Types, in Part 4.

The Echo Facility is for use when terminals are operating in Character Mode, only. If you are operating your terminal in Block Mode, the facility should be OFF. Refer to the discussion on Block Mode later in this section.

MPE

ECHO
ON

ECHO
ON

ECHO
OFF

ECHO
OFF

I
N
P
U
T

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I
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U
T

E
C
H
O

E
C
H
O

TERMINAL   Full-duplex   Half-duplex   Full-duplex   Half-duplex

PRINTED   Print line   *I~+`F>C   Print line
OUTPUT

Printing   Garbage   No Printing   Printing
              (or duplicated
               characters on
               HP 2640/44)
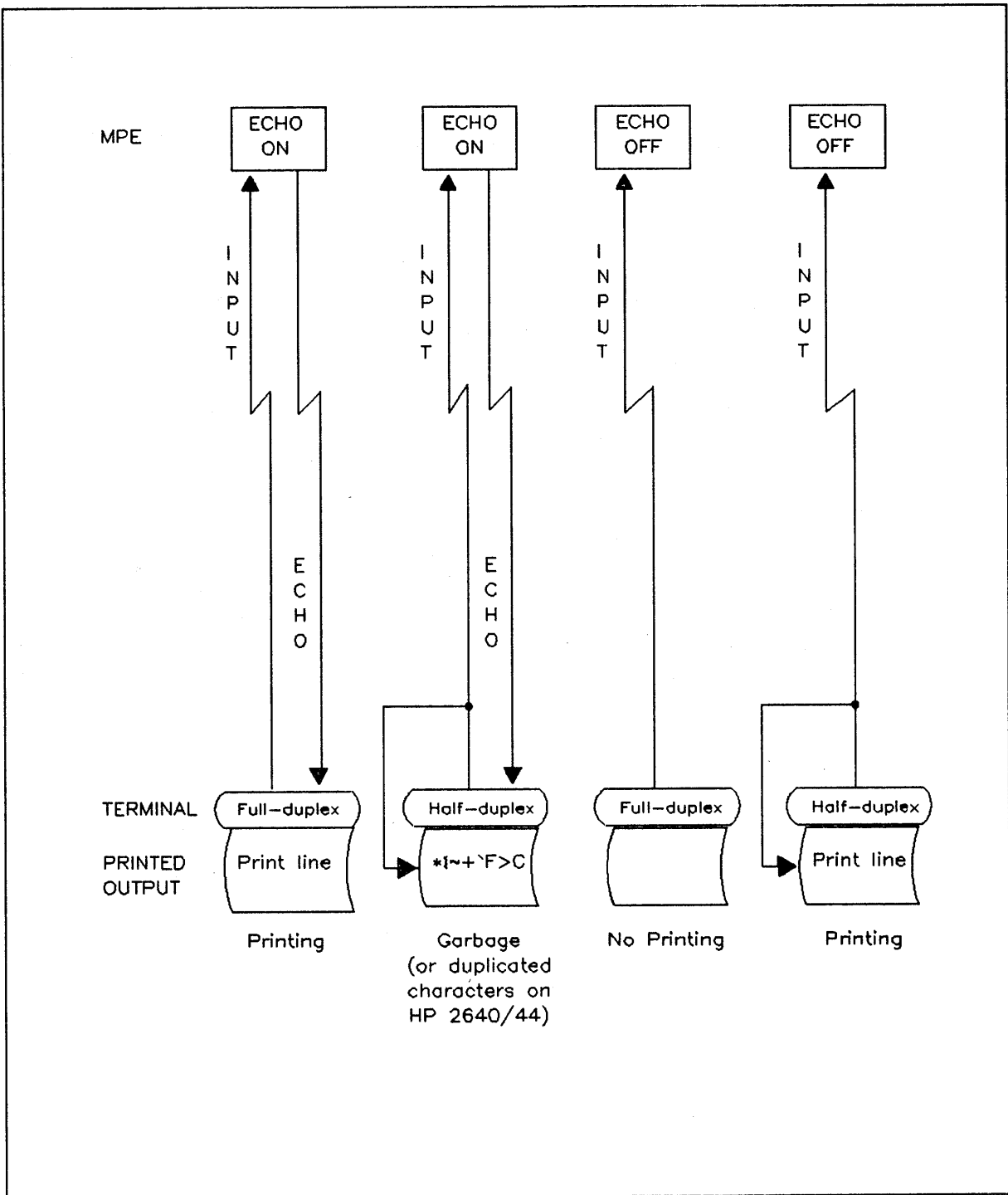
Figure 2.2-1. Echo Facility and Duplex Mode

System Break

Under default operating conditions, the HP 3000 responds to a System Break signal from your terminal. The System Break function allows you to interrupt execution of programs, subsystems and most MPE commands. Once the program or subsystem has been interrupted, you can abort it by entering the :ABORT command or continue with the program by entering the :RESUME command.

You transmit a System Break signal to the computer by pressing (BREAK) on your terminal. System Break can be disabled programmatically. Refer to the *MPE Intrinsics Reference Manual* for more information on System Break.

Avoid using the (BREAK) key when you are operating your terminal in Block Mode. MPE expects Character Mode input following a System Break. A hard RESET of the terminal sometimes allows input to continue. Generally, the :RESUME command does not work.

Similar problems may exist with other application programs that alter the characteristics of your port. In general, System Break should be used carefully.

Subsystem Break

The Subsystem Break function, which allows you to interrupt execution of a program-local or subsystem-local command, is not enabled by default. This function must be enabled programmatically. Subsystem Break is used when you want your program to stop what it is doing and return to command input state. When the computer is performing Standard Editing, you invoke Subsystem Break by holding down (CONTROL) and typing an uppercase or lowercase Y. During Transparent Editing you may be required to type other keys to get a Subsystem Break because FCONTROL(41) has been used to define an alternate Subsystem Break character.

Parity Checking

Parity checking is used to detect data transmission errors. When input errors are detected by a controller, it reports an I/O error to the program that receives the input. Most terminals display the DEL (▒) character when they detect an error.

All of the terminal I/O controllers "sense" your terminal's parity by examining the parity bit of the initial Carriage Return. Because five options are possible: Even parity, Odd parity, 0's parity, 1's parity, and *no* parity (called None or 8-bit pass-through), and only one data bit is available to distinguish them, the driver software/controller must choose which option to select. Options are based on hardware capability. (Refer to Part 4 in this manual for a detailed discussion of parity.) The ATP, ATP37, and ADCC set parity to NONE (8-bit pass-through) if the parity bit of the initial Carriage Return is 0 or to EVEN (where the parity is both generated and checked) if the parity bit is 1. When the parity bit is 0 or 1 respectively, ATC generates ODD or EVEN parity, but does not check it. In addition, the ATC always changes the parity bit to 0 after the data is received.

Because the controller makes one of two choices every time it receives an initial Carriage Return, (either NONE (8-bit pass-through) or EVEN) the other 3 possible parity settings cannot be set in this manner. An example, using the ADCC driver is as follows: If you configure your terminal to set every eighth bit to 1 (called None(1) or 1's), the ADCC controller would see that the eighth bit on the initial carriage return is a 1. It would then select EVEN parity for data generation, making it such that from then on the controller and the terminal look at the eighth bit of every character in a different way. They will more than likely not be able to understand one another, and the terminal will intermittantly display garbage or null characters. The port may eventually hang.

You cannot directly enable parity generation and checking by any action you take at your terminal, but parity checking and generation at the computer can be activated programmatically. Refer to FCONTROL 24 and 36 in section 2 of Part 3 . See also Parity Checking and Generation in Part 4.

For programmatic devices, the parity defaults for all standard Terminal Types after FOPEN are:

- ATC – generate ODD;

- ADCC, ATP37, and ATP – None (8-bit pass-through).

Tape Mode

Tape Mode is a facility for reading paper tapes. It is available with the ATC only. By default, Tape Mode is disabled when you log on to the computer.

TERMINAL AND PORT COMMUNICATION SPEED

Asynchronous data transmission rates on the HP 3000 range from 110 to 19200 bits per second, depending on the type of port controller being used. The rates available with each controller are shown in table 2.2-1.

Table 2.2-1. Data Transmission Rates

Controller	Rates (bits per second)
ATP or ATP37	300, 600, 1200, 2400, 4800, 9600, 19200
ADCC	150, 300, 600, 1200, 2400, 4800, 9600
ATC	110, 150, 300, 600, 1200, 2400

You can change the speed of your terminal's port to any of the speeds shown above. If your port was configured as "speed-sensing" (subtypes 0, 1, 2, 3, or 9), the speed change can be made before or after logging on. If it was configured as "speed-specified" (subtypes 4, 5, 6, or 7), its speed can be changed only after logging on. Under MPE V/E, subtypes 4 and 5 are mapped into subtypes 0 and 1, respectively, and therefore are not speed-specified.

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        NOTE
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Terminals opened initially as programmatic devices cannot have their speed changed, except by the controlling program.

To change the speed prior to logging on (subtypes 0-3, speed-sensing only), perform the following:

- Adjust your terminal's speed setting.

- Press (RETURN).

The computer senses the terminal's speed from the speed at which the Carriage Return character comes in.

To change the speed after logging on (with a :HELLO or :JOB command only), use the MPE :SPEED command. The same speed for input and output must be specified for ATP, ATP37, and ADCC ports. Separate input and output speeds may be requested for ATC ports. Change the speed as shown in the steps that follow.

Steps to Change Terminal Speed

1) Enter the :SPEED command as follows:

> :SPEED *inspeed,outspeed*

Enter *inspeed* and *outspeed* in characters per second, where *inspeed* is the desired input speed and *outspeed* is the desired output speed. Characters per second means bits per second divided by 10. (There is one exception: 110 bits per second should be entered :SPEED 10,10)

For ATP, ATP37, and ADCC ports *inspeed* and *outspeed* must be equal. For ATC ports, *inspeed* may be different from *outspeed*.

MPE responds by printing the following message, at the old speed:

CHANGE SPEED AND INPUT "MPE":

<div align="center">

NOTE

</div>

> If you enter the :SPEED command with an invalid input or output speed, MPE will issue the following error message:
>
> INPUT SPEED SPECIFIED NOT SUPPORTED BY THIS DEVICE (CIERR 1642)

2) Manually change the speed control settings on the terminal to the desired speed.

3) Enter the characters MPE to verify the new input speed. If it is verified, the computer sends a colon prompt, and you can proceed with your activities at the terminal. If the speed change cannot be verified, MPE transmits the following message to your terminal at the old speed:

SPEED CHANGE NOT VERIFIED - OLD SPEED RETAINED. (CIWARN 1644)

If you have adjusted the terminal to the new speed (Step 2), this message does not appear. Reset the terminal to the old speed, press RETURN, and the colon prompt should appear. Return to Step 1.

If you did not adjust the terminal's speed, you are able to read the message. Return to Step 1.

The program executing with your terminal also may change your terminal's speed. If it does, it should request you to manually change the terminal's speed setting.

INPUT MODES

Commands and data can be input to the computer in Character Mode or in Block Mode. These modes are relevant only during input to the computer. There are a number of significant differences between Character Mode and Block Mode, which are summarized in table 2.2-2. Record Separator or Group Separator are those characters typically defined by software to be End-of-Record characters in Page Block Mode.

Table 2.2-2. Comparison of Character and Block Modes

Feature	Character Mode	Page Block Mode
Standard End-of-Record Character	Carriage Return	Record Separator or Group Separator for HP terminals
EOR Character with Transparent Editing	Character defined in FCONTROL(25) and in FCONTROL(41)	Record Separator or Group Separator for HP terminals

Pacing Methods	Input: DC1-data
	Output: ENQ/ACK
	        XON/XOFF
		Input: (DC1-DC2-DC1)-data
		Output: ENQ/ACK
		        XON/XOFF

Echo Facility	Full duplex: Enabled Half duplex: Disabled	Disabled
System Break	OK to Use	Should not be used. When the computer sees a break, it assumes the terminal is operating in Character Mode.
Subsystem Break	OK to Use	Should be used at the end of the data. If it is used in the middle of the data, it can cause the data to overrun the interface.

Character Mode

Character Mode operation is available with all Terminal Types except those intended for use by printers. In **Character Mode** the terminal sends characters to the computer individually, as you enter them. If the Echo Facility is enabled, the computer writes each character back to the terminal as it is input.

As you finish each line, press (RETURN) to let the computer know you are done. If you are executing a program that has defined an alternate character as the line-termination character you must use that character to signal you have finished a line. Be sure that your terminal's Automatic Line Feed function is turned off.

All of the Special Function keys listed in table 2.2-3 can be used in Character Mode. Note, in particular, that it is generally safe to use (BREAK); this is not true for Block Mode. Also, since the HP 3000's Automatic Line Feed function normally sends your terminal a Line Feed character after input is complete, AUTO LF should not be enabled at your terminal. The extra character transmitted after the end of normal input may cause problems within the proper operation of your port.

The design of the Character Mode editing facility expects human typing speeds of less than 20 characters per second (independent of line speed). When using higher speed input devices (such as the function keys of an HP terminal), do not include any of the editing characters in the input data stream. Under some heavy load conditions, the HP 3000 may not be able to process an edit character before the following character arrives, causing a data overrun and an I/O Error.

Block Mode

As with Character Mode, the term **Block Mode** applies only during input of data to the computer. Block Mode operation is only available with terminals that have Block Mode capabilities.

When the terminal is in Block Mode, all data entered remains in the terminal's memory until you press (ENTER). This means that you can freely edit your data at the terminal and can interact with any devices attached peripherally to your terminal--tape cartridge readers, flexible disc drives, etc.--without involving the computer at all.

Since characters you type remain in the terminal until you specifically transmit them, you can use all of the HP terminal's editing keys when preparing your data. You can insert and delete lines, insert and delete characters, freely use (TAB), the cursor and page positioning keys, and (BACKSPACE) before transmitting your data to the computer.

To enter non-alphanumeric characters that have graphic representations (such as certain protocol characters) enable DISPLAY FUNCTIONS and type the key(s) that produce the characters. Be sure these characters are accepted by the program operating the terminal.

When you want to transmit data to the computer, press (ENTER). On some terminals (RETURN) may be re-defined to function as an ENTER key; in this case, you can press (RETURN) to transmit data. In some cases, you have to position the cursor at the beginning of the data before you transmit it (refer to the appropriate documentation on your application and your specific terminal.)

PAGE BLOCK MODE. Page Block Mode can be enabled programmatically--that is by executing a Block Mode program from your terminal. When you execute a Block Mode program from an HP 264x terminal, the program asks you to press the BLOCK MODE key to activate Block Mode, or it programmatically activates it. All HP 262x terminals capable of Block Mode operation can be programmatically reset for Block Mode operation. You should expect your program to do this for you, rather than requiring you to press any keys. One of a Block Mode program's actions is to disable the input-echoing facility (described earlier in this section); it also may disable System Break (rendering (BREAK) on your terminal inoperative). Sometimes a program re-defines your terminal's (RETURN) as an ENTER key. When this happens, data is sent to the computer every time you press (RETURN).

When you are typing data in Page Block Mode, it is helpful to enable your terminal's Automatic Line Feed facility. This way, whenever you press the Carriage Return key, the cursor moves to the beginning of the *next* line.

TERMINAL EDITING

In addition to the standard alphabetic and numeric characters, your terminal can transmit **special characters** to the computer. These special characters have a variety of functions, including deleting one or more characters from your current input line, deleting your current input line, interrupting the execution of a program, and suspending output of data to your terminal. The effect that the special characters have on the input data stream and on your terminal depend on what kind of interface your terminal is connected to, what type of editing the interface is performing, your Terminal Type, the model of your terminal, and whether the interface has time to process the characters.

Control Character Conventions

Control characters are entered by holding down the (CONTROL) (CNTL or CTRL) key while typing the second key. For example, to type CONTROL-X, hold down (CONTROL) while you type X (upper or lower case "x"). All of the keys listed in table 2.2-3 are stripped from the user's input when the computer responds to them. To enter an Escape sequence, press (ESCAPE) and then type the character without holding (ESCAPE).

There are three different types of editing: Standard, Transparent, and Binary. Standard Editing is shown in table 2.2-3; the effect of Transparent Editing is shown in table 2.2-4.

CAUTION

Because bursts of data are sent to the computer when your terminal is operating in Block Mode, the interface frequently does not have time to interpret and respond to control characters that are embedded within your data. The data often overruns the interface as a result. However, if a single control character (or two) is placed at the end of your data, the interface normally is able to process it without subsequent data overrunning the interface.

The same consideration holds for the use of Special Function (or "soft") keys in Character Mode.

Be careful not to build long strings of special characters that transmit to the computer in a single burst when you press the Special Function key. Function keys that are used for communication with the computer should not be programmed with more than two special characters in a row. Also, a high density of special characters in a given string should be avoided. It is not possible to give precise limits to the number of special characters to string together, since the speed at which the controllers process incoming data is partly dependent upon the processing load on the entire computer. If, however, you appear to be experiencing data overruns at the computer, check whether you are sending strings of special characters.

The HP 3000 recognizes the special characters (CONTROL)X, (CONTROL)H, (CONTROL)Q, (CONTROL)S, and (CONTROL)Y even when they follow an (ESCAPE). However, entry of an (ESCAPE) followed by any other characters (except colon or semi-colon) is interpreted as a two-character string.

Standard Editing

The special control functions available during Standard Editing are described in table 2.2-3.

Table 2.2-3. Special Control Functions—Standard Editing

Key	Function
(BACKSPACE) or (CONTROL)H	Deletes previous character from the current input line. The response of the terminal depends on the Terminal Type and the type of terminal. HP 264x and HP 262x terminals connected to the port with Terminal Type 10 backspace the cursor once each time the key is pressed.
(BREAK)	Requests System Break, suspending current program and returning control to MPE. Will cause loss of some data if program is writing to terminal at the same time as (BREAK) is pressed.
(CONTROL)A	On the system console, or where console has been moved (logical console) via the :CONSOLE command, it indicates that a console command follows.
(CONTROL)F (ACK)	The acknowledge character for the Enquiry/Acknowledge handshake (refer to Part 4). HP terminals transmit it automatically.
(CONTROL)Q (DC1 or XON)	Causes the writing of output to the terminal to be resumed (after its suspension by (CONTROL)S).
(CONTROL)R (DC2)	Significant for terminals with Block Mode only. Indicates that the terminal is ready to transmit a block of data. HP terminals strapped for Page Block Mode operation automatically send a DC2 when (ENTER) is pressed (or when (RETURN), defined as the ENTER key, is pressed).
(CONTROL)S (DC3 or XOFF)	Causes writing of output to the terminal to be suspended. ((CONTROL)Q used to resume.)

Table 2.2-3. Special Control Functions--Standard Editing (cont'd)

Key	Function
(CONTROL)X	Deletes all of current line being typed. The computer sends three exclamation points (!!!), followed by a Carriage Return and a Line Feed. You may enter a new line after deleting the old line.
(CONTROL)Y	Requests a Subsystem Break. (Use during execution of some part of a program to halt that execution and obtain a program prompt.) If your terminal is in Tape Mode, (CONTROL)Y terminates the PTAPE read and returns the terminal to Normal Mode. (For ATP, ATP37, and ADCC, a PTAPE read is used only to transfer data directly from the terminal to disc.)
LINEFEED (LF) or (CONTROL)J	Under V/E: For terminals with a Line Feed key, pressing this key causes the computer to write a Carriage Return to the terminal. This facility is primarily for those terminals that do not have an automatic line wrap-around feature. When input record is longer than width of terminal line, the LF character may be included so that the input will be displayed on more than one line. In this way, the overstrike of characters in the last column position of the terminal will be avoided.
(RETURN) or (CONTROL)M	Normal end-of-record character. When echoed to the terminal, causes cursor or typing head to return to the beginning of the line.
(CONTROL)R(RETURN) (two-character sequence)	When embedded anywhere in the input stream, this character pair and all data up to and including the CR are stripped and a DC1 ((CONTROL)Q) is written to the terminal.
(ESCAPE) :	Causes Echo to be turned on, so characters typed at terminal are echoed back to the terminal. *DO NOT USE while your terminal is operating in Block Mode.*
(ESCAPE) ; (two-character sequence)	Causes Echo to be turned off, so characters typed at the terminal are not echoed back to the terminal. Echo should be turned off in Block Mode.

Transparent Editing

Sometimes the program you are running will switch your port to Transparent Editing Mode. During Transparent Editing, all control characters except those produced by the keys listed in table 2.2-4 are left in your input data stream (and hence, are not acted upon by the asynchronous interface).

Binary Editing

In Binary Editing, no special characters are recognized, except (CONTROL)A on the console. All data you type in at your terminal (control characters or others) is passed by the interface to the user's Terminal Buffers. Your input is terminated by read timeout or the number of characters input, rather than by some control character (such as Carriage Return). Consult documentation on your program for more information.

Table 2.2-4. Special Control Functions--Transparent Editing

Key	Function
(RETURN)	When Echo is enabled, it causes that cursor or typing head to return to the beginning of the same line. The character that indicates the End-of-Record is defined programmatically. NOTE: In Transparent Editing Mode, the Linefeed character is not sent to the terminal upon receipt of the Carriage Return character.
(CONTROL)F (ACK)	The Acknowledge character for the enquiry/acknowledge handshake, if enabled; otherwise, it is a data character.
(BREAK)	Causes a System Break (when enabled) and transfers control to MPE. If :RESUME is entered, Transparent Editing is resumed.
(CONTROL)A	On system console, indicates that the next input will be a console command. When command execution is complete, Transparent Editing is restored.
(CONTROL)Q (DC1 or XON)	The "resume output" character is the XON/XOFF handshake. This character is stripped from the input data.
(CONTROL)R (DC2)	When input as first character, it is stripped out. A DC1 ((CONTROL)Q) is then written to the terminal. When not input as the first character, DC2 is a data character.
(CONTROL)S (DC3 or XOFF)	The "halt output" character of the XON/XOFF handshake. This character is stripped from the input data.

DEFINITION OF A PRINTER

A **printer** is a device that is capable of printing or displaying output from the computer but is unable to convey user input to the computer. From the user's perspective, it is a "one-way" mechanism. The fact that a device can only accept output is due to its physical design (that is, it was designed to be a listing device only), or to its being configured onto the HP 3000 as a printer (Device Type 32), or both. Any device that can be physically connected to an asynchronous port, and that can conform to the specifications of the corresponding I/O configuration, can be operated as an asynchronous printer.

Hewlett-Packard supports the use of the HP 2631B and Hewlett-Packard's HP 2631B-compatible printers when attached to an asynchronous port controller. Some printers known as PCL (Printer Control Language) printers are also supported; these include HP 2563A, HP 2686A, and the HP 293xA family of printers. All of the above printers are supported as Serial Spooled Printers. Printers supported as Application Printers include HP 2601A, HP 2602A, and HP 2687A. For more information on printers, refer to "Printer Control" and "Supporting Serial Printers" in Part 4. Refer to Section 3 of Part 6 for configuration information on a specific printer. You can configure other devices as printers (such as a hardcopy or video terminal, a plotter, or another asynchronous device), but HP does not guarantee proper operation.

The full facilities of the MPE spooler are available to devices configured as Device Type 32. (To see if a particular printer is supported as a spooled device, check the configuration tables in Part 6.) A printer is provided spooling services by the MPE Spooler, which means it can be shared by multiple users. The fact that a printer is spooled also means that the listing process can be interrupted by the console operator without causing data to be lost. Hence, you can switch the printer "offline," disconnect the data cable, or turn off printer power, all without jeopardizing proper operation. (You would not normally want to disconnect the cable or turn the printer off while it is printing output.) Also, a listing to the printer can be started while the printer is offline, disconnected, or powered off, and no data is lost. If special forms are required before listing begins, a message to that effect will be sent to the system console, or to the user associated with the device.

TYPES OF PRINTERS AND THEIR OPERATION

Your asynchronous printing device will fall into one of three classes:

- Serial spooled printers

- Application printers

- Slaved printers

Serial Spooled Printers

A **Serial Spooled Printer** is an asynchronous printer supported as a spooled printer under Device Type 32. In normal operation, no data is lost or printed incorrectly. Actions taken by a prior job are not allowed to disrupt the proper printing of the job to follow. Operation with MPE is reasonably efficient, with device errors reported to the Operator via the console. Data integrity is guaranteed when parity is used with 7-bit Terminal Types.

Application Printers

Application printers operate under the control of an application program executing on the computer. This allows the application to read the printer's status (whether offline or not). If any spooling is to occur, the application must provide it; MPE does not. The program is responsible for opening the printer, writing to it, and closing it again. An application printer may be configured as a *terminal* (Device Type 16). You, as printer operator, need to consult the documentation on the application to see if status is read before placing the printer offline, or data may be lost. If an application requires special forms to be mounted or some other user action to be taken before listing begins, a message requesting the action is (or should be) sent to the system console or user's terminal.

Slaved Printers

Slaved printers are devices that are connected to a port that is configured for another device (usually a terminal). They generally operate as peripherals to their "master" devices. Slaved printers are discussed in greater detail below in Operating Slaved Asynchronous Devices. They are not supported by MPE directly.

OPERATING OTHER DEVICES AS TERMINALS OR PRINTERS

Any device other than a terminal or printer that is attached to a serial asynchronous port must be made to look like a terminal or printer. If the port is configured with Device Type 16, the device must look like a terminal; if the port is configured with Device Type 32, the device must look like a printer. The only exception to this is if the device is being operated as a Slave. (Refer to Operating Slaved Asynchronous Devices which follows.)

Card readers are generally attached to terminal ports. Plotters are attached to terminal ports or to printer ports; in the latter case, they are operated as non-spooled printers.

OPERATING SLAVED ASYNCHRONOUS DEVICES

A **slaved** device is one that is attached to a port that was configured for a terminal. The terminal, which is referred to as the **master**, may or may not also be physically connected to the port. Slaves typically are output devices, though any of the following could in theory be attached as a slave: printers, plotters, card readers, flexible disc drives, cassette tape drives, and terminals

Usually, any device that can be connected to a port as a master device can also be connected as a slave.

Slaves Attached as Pass-through or Remote

Slaved devices can be attached in two ways:

1) between the computer and the terminal, or

2) on the side of the terminal that is remote from the computer.

Devices attached between the terminal and computer are said to be **Pass-through Slaves**. Asynchronous serial card readers and HP plotters are typically operated as pass-through slaves. These devices will have been strapped or configured (at the devices themselves) for pass-through operation. Pass-through devices may or may not have a terminal attached to them; they can operate without the terminal.

Devices attached on the remote side of the terminal are called **Remote Slaves**. Printers, tape drives, flexible disc drives are generally attached as remote slaves.

Operation of Slaved Devices

Pass-through slaves operate under the control of escape sequences sent by the controlling program. These escape sequences are used to instruct the slave to pass data through or to hold it for itself. By default, pass-through slaves are in Pass-through Mode; that is, they pass data through to the terminal. However, when they receive the proper escape sequence, they switch out of Pass-through Mode and process the data that comes across the line. Pass-through slaves are responsible for responding to protocol characters received from the computer; the terminal does not participate in the exchange of protocol. A consequence of the slave passing data on and bearing sole responsibility for protocol exchange is that you cannot disconnect the master while the computer is writing to it without losing data. (The computer has no way of knowing that the terminal is not receiving its data). Also, if you remove the slave from the line and connect the master to the port and then attempt to run an application that believes the slave is present, the master may not function properly (if it does not know what to do with the escape sequences sent out for the slave).

Remote slaves operate under control of the master. Access to the device is by means of escape sequences; the escape sequences instruct the master to pass through data to or from the slave. If the slave is not present, the terminal's operation is not affected. However, data destined for the slave could be lost, unless the controlling application asks the terminal whether the slave is present before it begins writing.

Error Messages

The error messages generated in conjunction with the use of slaved devices are the same as are generated for terminals attached without slaves.

PART 3

PROGRAMMING FOR ASYNCHRONOUS DEVICES

OVERVIEW OF TERMINAL AND PRINTER ACCESS

Although terminals and printers are the devices normally attached to the port controllers, any device that can be attached in conformity with the supported interface standard can be communicated with programmatically. However, the device must be able to look like a terminal or printer. Devices attached to the port controllers are accessed programmatically through the MPE File System. The File System interfaces with the MPE I/O system, which communicates with the device on the basis of its port configuration. This means that your program has only to treat the device as a file (a **device file**), and the HP 3000 handles the actual communication with the device (including use of the proper protocol).

Programmatic interface to the File System occurs primarily through the MPE Intrinsics. Useful MPE intrinsics include:

- FOPEN
- FWRITE
- PRINT
- FREAD
- READ

- READX
- FFILEINFO
- FGETINFO
- FCONTROL
- FCLOSE
- FDEVICECONTROL

FOPEN is used for opening files, FWRITE and PRINT are used to write to a device file. Reading is achieved by means of FREAD, READ and READX. FFILEINFO and FGETINFO are used to get information about the file. To add control directives to the device file, use FDEVICECONTROL. FCONTROL is used to change characteristics of the port. FCLOSE is called when file operations are complete and the programmer wishes to eliminate the device file. (This is different from a disc file, which can be "saved" when it is closed.) Also, HP BASIC allows device access through the PRINT, PRINT USING, and LINPUT statements.

In addition to the MPE intrinsics, the VPLUS/3000 intrinsics are available for Page Block Mode programming.

The first successful open of an inactive device is called a **device-open**. A device-open can be brought about by:

- The user logging on to the device (via the :HELLO, :(*command*) or :JOB command)

- The action of a program that is already running on the HP 3000.

Devices that are opened as a result of a user logging on to them are called **logon devices**; in most cases these are terminals. Devices that are opened at the initiation of a program are called **programmatic devices** or **program-captive devices**.

There are some important differences between these two classes of devices. The logon device -- or logon terminal -- interfaces to the HP 3000 operating system through the MPE Command Interpreter. Programs are started via the :RUN command. This command can be broken and aborted unless the System

Break function is disabled by the program. On the other hand, the programmatic device is really a captive of the program. The program issues the first FOPEN against the device; while the program is running, the operator's access to the computer is through the program only. Since there is no Command Interpreter process set up for the device, no MPE commands can be executed from the device, except when initiated by the controlling program.

Following device-open, additional files may be opened on a device. In fact, each additional process wanting to access the device opens files against the device for itself to use. These additional openings are not, however, considered "device opens."

If you are using these devices exclusively in programmatic mode, it is recommended that you have the System Manager configure the ports so that they are not job or data accepting devices.

INITIATING PROGRAM ACCESS (FOPEN)

Before your program can write to or read from a device, it must open one or more files on that device. If the device is a logon device, these files are in addition to any other files already open. Call FOPEN each time you want to open a file.

NOTE

When you log on to a device, whether by means of the :HELLO, :JOB, or :(command) logon, MPE automatically opens two files. One file, $STDIN, is the input file; the other file, $STDLIST, is the output file.

FOPEN Calls

Before initiating FOPEN calls, the following steps are recommended:

- Use a formal file designator rather than one of the system-defined files, $STDIN, $STDINX or $STDLIST. If the device is unique in the system, use the device's name as its formal designator; this will make it easier to remember what formal designator was chosen.

  The use of a formal designator instead of a system-defined name has several advantages:

  - You can open the file as an input and output file.

  - The file can be directed to another device or device class by means of the MPE :FILE command.

  - The FOPEN intrinsic returns a file number. This file number is required when calling several of the other MPE intrinsics.

- In the *foptions* parameter, specify carriage control (CCTL), undefined record length, and ASCII.

- In the *aoptions* parameter, specify exclusive access, input/output, and NOBUF.

- Select a record size that is larger than the largest data transfer that takes place.

If you open a terminal for reading only, you will not be able to read from the terminal until the :DATA command is entered at that terminal and until the Operator enters the go-ahead reply at the system console. If the :DATA command is entered before FOPEN is called, no Operator action will be required. However, you won't be able to use the terminal for anything else until the FOPEN executes. In either case, the :DATA command must be entered with the same user and account ID as the session or job from which your program is executed.

Issuing Multiple FOPENs

A program can have several FOPENs active at one time. The reasons for multiple active FOPENs include:

- A need for writing input to and receiving output from different devices.

- A need for directing output to several locations.

- A need for some processes spawned by your process to have access to the same device.

A terminal can be opened multiple times by the same user without specifying shared access (SHR). You might do this to allow the use of several different read-terminating characters. You can call FCONTROL(25) to define any non-default characters.

ENDING PROGRAM ACCESS (FCLOSE)

Before your program finishes execution, it must close the file(s) it opened on the device it was communicating with. It must do this by issuing one FCLOSE for each file on each device that it opened. If the device was originally opened by MPE as a logon device, an additional call(s) to FCLOSE is made by MPE when the user's Session or Job is terminated.

The File System keeps track of the number of FOPENs issued against a device. It also counts the corresponding FCLOSE calls. (This includes the FOPENs and FCLOSEs issued by MPE.) When the number of FCLOSE calls equals the number of FOPEN calls, the File System initiates a "device close." This causes the device driver to do some additional housekeeping. It resets internal tables (an "active" bit in the DIT (Device Information Table) is turned off, and two bits in the LPDT (Logical-Physical Device Table) are turned off to indicate the device is unowned), restores speed-sensing to ports configured for speed-sensing and reverts to a default Terminal Type.

If a device was initially opened with the :HELLO, :(command), or :JOB command, a device close can be brought about by means of the :EOF:, :ABORTJOB, =LOGOFF, :BYE, :EOJ, :DOWN, and :ABORT commands. If a remotely connected device (one connected through a modem) is disconnected, the device automatically becomes closed, although no device close has been issued to it.

Devices attached to the ATP, ATP37, or ADCC. When the final FCLOSE is issued, MPE sends a Carriage Return and Line Feed to the device if the last character output was not a Line Feed or a Form Feed. (MPE does this because it believes that the device's "carriage" is not at the beginning of the line.)

Devices attached to the ATC. When the final FCLOSE is issued MPE sends a Carriage Return and Line Feed to the device if the last character output was not a Line Feed. (It does this because it believes that the "carriage" is not at the beginning of the line.)

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Certain device characteristics, if altered through calls to FCONTROL, will not be restored to their initial condition by FCLOSE . These are listed under FCONTROL .

WRITING OUTPUT (FWRITE AND PRINT)

Once a terminal or printer is open, your program can write to it. It does this via either the FWRITE or PRINT intrinsic. FWRITE requires your program to supply a file number. PRINT uses the system-defined file $STDLIST, and consequently does not require you to provide a file number.

There is no distinction between Character Mode and Block Mode operation of terminals during writes.

File System Buffering--Terminal Buffers

MPE employs buffers in the transfer of data from a program to a device. These buffers, called **Terminal Buffers** (TBUFs), are linked to each read or write operation. When you call a write intrinsic, a TBUF is found for your program, and data is written from your program to the TBUF. With terminals, once all data has been transferred to the TBUF, the File System reports to your program that the write is completed. This may occur before the data is physically transferred to the device.

Your program has no control over buffering of data for I/O. (This corresponds to the NOBUF option of the FOPEN *aoptions* parameter.) The system always uses Terminal Buffers for I/O involving devices attached to the asynchronous port controllers. If, during a write, the supply of TBUFs is temporarily exhausted, the write is impeded until a TBUF becomes available; therefore if the computer is heavily loaded, the I/O system may not get the TBUF soon enough and your program may have to wait.

Critical Writes

For printers, all writes are critical writes. When it is essential that your program successfully write to a printer before the File System reports that the write operation has completed, your program must request a critical write in the intrinsic call. Only when the printer itself indicates that it has received the data (by sending back a status signal in response to a status request ESC ?) is your program told the write operation was successful. Depending on the Terminal Type, the printer may or may not do status requests at the end of each (critical) write.

Carriage Control

In your call to FWRITE or PRINT, you define the carriage control to be used during the write. Carriage control options included carriage return, single or multiple line feed, formfeed, and pre-spacing. If you do not want MPE to send any carriage control commands to the device, specify a value of %320 in the FWRITE *control* parameter. Refer to FWRITE in the *MPE Intrinsics Manual* for a complete list of carriage control options.

You can also disable Carriage Return and Line Feed by calling FSETMODE(4). FSETMODE(0) restores normal operation. A call to FCLOSE also restores normal operation.

Part 4, Port Characteristics, explicitly describes each controller's carriage control actions with each Terminal Type.

Printer Capability

The drivers of all asynchronous port controllers are capable of reading status from Serial Spooled Printers. Hence, if your printer is offline or out of paper, writing to it causes the printer to be suspended by the driver. This is done through the use of Terminal Types 19-22 for the HP 2631B and Hewlett-Packard's HP 2631B-compatible printers, and Terminal Types TTPCL19 and TTPCL22 for Hewlett Packard's **PCL** (Printer Control Language) printers. PCL printers include HP 2563A, HP 2686A, and the HP 293xA family of printers. Terminal Types TTPCL19 and TTPCL22 are supported on MPE Version G.01.00 or later.

The HP 2631B and similar HP printers, as well as PCL printers, are supportable as Serial Spooled Printers, and no data is lost if the unit goes offline (the message LDEV *nnn* NOT READY appears on the console) or runs out of paper (the message LDEV *nnn* PAPER OUT appears on the console). In either case, when the unit is back online, printing continues in such a way that data is not lost.

Printers like HP 2601A and HP 2687A are incapable of returning status information to any program. (An available option on a HP 2601A is the PAPER-OUT switch, which allows the unit to send an XOFF when paper is out or the user presses a front panel button.) In either case, the driver waits for an XON before sending more data. Because of their inability to return detailed status information, these printers are not supportable as serial spooled printers and are considered application printers. They are supported under Terminal Type 18. The HP 2687A uses Terminal Type TTPCL18 with MPE Version G.01.00 or later.

The user program is not informed at all when the printer is out of paper or offline unless you programmatically send an :ASSOCIATE command for the printer device class in question, prior to the start of the print operations. (Note that the use of :ASSOCIATE must be allowed by the System Manager.) Refer to the *MPE V System Operation and Resource Management Reference Manual* or for MPE IV, the *Console Operator's Guide*.

MPE does not provide software for managing access to printers that are not serial spooled printers (aside from the standard File System software). This means if you want users to be able to share access to the printer, you have to write your own spooling program.

For more information, refer to Supporting Serial Printers in Part 4.

READING INPUT (FREAD, READ, READX)

Data and control or status information is read from a terminal or printer by means of the FREAD, READ or READX intrinsic. FREAD is the most versatile of the three; however, it requires the use of a file number. READ allows reading from $STDIN only; READX permits reading from $STDINX only. Neither READ nor READX use a file's number. The FREAD, READ and READX intrinsics can be used for Character Mode and Page Block Mode reads. However, you generally find Page Block Mode programming easier if you use the intrinsics supplied with the VPLUS/3000 subsystem.

File System Buffering--Terminal Buffers

The MPE File System employs buffers in the transfer of data from a program to a device. These buffers, called Terminal Buffers (TBUFs), are linked to each read operation. When you call a read intrinsic, for example, a TBUF is found for your program. Data is then read from the device to the TBUF. Once all data has been transferred to the TBUF, the File System reports to your program that the read has completed. This is before the data is actually transferred to your program.

Your program has no control over buffering of data for I/O (This corresponds to the NOBUF option of the FOPEN *aoptions* parameter.) The system always uses Terminal Buffers for I/O involving devices attached to the asynchronous port controllers.

If, during a read, the supply of TBUFs is temporarily exhausted, the read is impeded until a TBUF becomes available. If the computer is heavily loaded, the I/O system may not get the TBUF soon enough and your program may lose some data. When this happens, the program that issued the I/O request receives the File System error message: I/O ERROR (FSERR 69).

Character Mode Input vs. Block Mode Input

Terminal input to the HP 3000 can occur in Character Mode or Page Block Mode. The characteristics and limitations of each mode are determined by the characteristics of both the port controller on the HP 3000 and the attached terminal. Logons and device-opens take place in Character Mode.

CHARACTER MODE. Characters are transmitted to the computer individually, as they are typed in. This is the way the computer expects to receive them. If the Echo Facility is operative, input characters are "echoed" back to the terminal by the computer as they are received. Character Mode reads are customarily terminated by the Carriage Return character.

The HP 3000 provides two mechanisms for editing Character Mode input. These mechanisms are available during Standard Editing Mode only, and are enabled automatically, without program action. The operator can delete unwanted characters, or the entire line (refer to table 2.2-3).

Since Character Mode input is normally received by the HP 3000 character-by-character as it is typed, usually there is enough time between characters to allow the controller to process any control characters. However, if the terminal operator transmits a series of control characters in a burst--by pressing a soft key loaded with control characters--it is possible the characters will overrun the controller. Data overruns frequently cause a port to "hang." The terminal operator should be cautioned about this.

PAGE BLOCK MODE. A full screen of data may be typed. No data is transmitted to the computer until the computer requests it, or until the terminal operator presses (ENTER) and the computer has responded. This means the operator has access to all the terminal's local editing and cursor control features while typing in data.

Because Page Block Mode transmissions are a long burst of characters, it is imperative that the data should not contain series of control characters. The controllers may not have time to process them so that data overruns may occur.

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A common misconception is that the difference between Character Mode and Block Mode is: in the former mode only one character is sent at a time. In fact, data is transmitted in either mode one character (literally, one bit) at a time. Since transmissions are asynchronous, all characters are bounded by start and stop bits, whether transmitted in Character or Block Mode; this means the characters look the same in both modes. It is true that in Block Mode characters are likely to be transmitted in a single "burst". However, nothing exists to prevent a terminal operator from sending one character at a time in Block Mode; likewise, the operator could send a burst of characters while in Character Mode simply by pressing a soft key that had been programmed with multiple characters.

Page Block Mode Programming Considerations

USING THE VPLUS/3000 INTRINSICS. It is recommended you use the VPLUS/3000 intrinsics for your Block Mode programming. VPLUS/3000 automatically carries out a number of the actions recommended below. VPLUS/3000 disables the Echo Facility and control character editing for all but the End-of-Record character. The subsystem sends out the escape sequences necessary to set up the terminal for Block Mode operation. When (ENTER) is typed, VPLUS/3000 automatically homes the terminal cursor and locks the keyboard until the next read starts.

Using both the VPLUS/3000 intrinsics and the MPE intrinsics at one time is not recommended. The exact modes of operation for the VPLUS/3000 intrinsics are not specified and may change. Therefore, your programs may not operate with future releases of MPE and VPLUS/3000. (Definitely avoid using FCONTROL, FREAD, and FWRITE with VPLUS/3000 intrinsics; they are likely to cause problems.)

If you are not using the VPLUS/3000 intrinsics, be sure to observe the recommendations in the following paragraphs.

INVOKING PAGE BLOCK MODE. To invoke Page Block Mode on an HP terminal your program should do the following:

- Write the escape sequence ESC^ to the terminal to request primary status.

- Read the status:

    The D, G and H straps must be open and the Block Mode function enabled for Page Block Mode operation. The following escape sequences can be sent to a terminal to invoke Page Block Mode:

    (ESCAPE)&s1D (opens D strap to select Page Mode)

    (ESCAPE)&s1G (opens G strap to enable Block Transfer Handshake)

    (ESCAPE)&s0H (closes H strap to enable DC2 transmission)

    Some terminals do not allow these straps to be set programmatically; they have to be set by hand. Consult the appropriate terminal reference manual for information on this.

    (ESCAPE)&k1B (enables Block Mode function)

    On some terminals, the Block Mode switch must be manually depressed by the terminal operator to enable the Block Mode function.

- Read the primary status again to ensure that Page Block Mode is properly enabled.

- Issue another read against the terminal and wait for the operator to send data.

NOTE

The D and G straps must be open, the H strap closed, and the Block Mode function enabled for the terminal to operate in Page Block Mode.

DISABLING SYSTEM BREAK. It is strongly recommended that your program disable System Break when initiating Page Block Mode operation. If you want the terminal operator to be able to request a System Break, you should write a System Break routine, and give the operator a method to activate it.

The reason you do not want to allow the terminal operator to set normal Character Mode or to access to the System Break function is that MPE is not able to set Character Mode for the Command Interpreter or to restore Block Mode after the operator enters :RESUME. System Break is disabled via FCONTROL(14). Also, the EOR character has probably been set to RS (Record Separator), so pressing (RETURN) has no effect after typing :RESUME.

A custom System Break routine should do the following:

1. Suspend program execution.

2. Store the terminal configuration/strapping present at the time your program's "System Break" command is entered.

3. Change the EOR character to CR with FCONTROL(25).

4. Enable Break via FCONTROL(15) for the terminal and send message to terminal telling operator to press (BREAK).

   -- or --

1. Call the MPE intrinsic CAUSEBREAK for the terminal operator's process. The Command Interpreter then sends a colon to the terminal.

2. When the operator wishes to resume program execution, the operator then types :RESUME. The program resumes execution at the next statement after the CAUSEBREAK call.

3. A routine in your program should then restore the terminal to its pre-break state.

Consider a Page Block Mode application which uses softkeys. Assume one softkey is dedicated as a "System Break" key. When the program detects the pressing of this key (either through VPLUS intrinsics or FREAD and subsequent handshake interactions), the program could call the appropriate FCONTROLs or VPLUS intrinsics to set the terminal back to the original (MPE) state, then do a CAUSEBREAK. After completing whatever actions the user wanted to do, enter :RESUME. After CAUSEBREAK, the Break routine should put the program back in Page Block Mode, restore the screen and straps to Block Mode states, and then wait for more user input. If the next input happened to be the System Break softkey again, the process could repeat.

The difficulty with disabling System Break is that the user can no longer halt execution of your program. If the program contains a bug that causes it to loop or hang, the program must be aborted at the console by the Operator.

DISABLING ECHO FACILITY. The Echo Facility should be disabled to prevent echoed characters from colliding at the terminal with out-going characters. Echoing is provided by the port controller and its driver; the programmer has nothing to do with it. It can, however, be programmatically disabled through FCONTROL(13).

DISABLING SUBSYSTEM BREAK. The Subsystem Break facility should be disabled because Subsystem Breaks detected in the middle of a read could cause a loss of data.

RESTORING TERMINAL CONDITIONS AFTER HARD RESET OR POWER OFF. Your program should also be capable of recognizing when the user's terminal is given a "hard" reset or is powered off and on again. It should then restore the Block Mode strappings to the terminal.

ENABLING TRANSPARENT EDITING MODE . It is strongly recommended that your program enable Transparent Editing Mode before Block Mode is initiated. In Transparent Mode, only a handful of control characters are recognized by the HP 3000. Thus, by using Transparent Editing, the likelihood of control-character processing causing data overruns at the port controller is reduced. Transparent editing would be enabled using FCONTROL (41) with a parameter of %14422.

SEPARATING FIELDS OF DATA. Use the **Unit Separator** (US) character to separate fields of data. In Transparent Mode, the US character will be passed to your input buffer.

TRIGGERING BLOCK MODE TRANSMISSIONS PROGRAMMATICALLY. You can programmatically cause a terminal to send its display memory contents by sending it the escape sequence "ESCd." In effect, the "ESCd" takes the place of the user pressing (ENTER). The sequence of events would be as follows:

- Your program would post a read against the terminal, causing the HP 3000 to send a DC1.

- When the terminal user was ready to transmit, the user would press a soft key that had been pre-programmed by the program as a transmit-request key.

- When the program was ready to receive the data, it would respond by: positioning the cursor, sending "ESCd," then issuing another Read, which would send another DC1 to receive the data.

CAUTION FOR REMOTE COMMUNICATIONS. Some HP terminals send CR after DC2. If there is a long enough lag between the DC2 and the CR, the HP 3000 may interpret the CR as the final data character of the next read and terminate. The data you had wanted will not be transmitted to your program. This problem can occur when the link between your terminal and the HP 3000 is over a statistical multiplexer or a public network like Telenet or Tymnet.

CUSTOM BLOCK MODE PROTOCOLS. You can define your own Block Mode protocol via FCONTROL (29). FCONTROL (29) allows the DC2 (from the terminal) to be passed to your program, via an FREAD. Also, it disables the Block Mode read timer. With the timer disabled, you can control the timing of data transfers from the terminal.

Terminating READs in Character Mode

Reads can be terminated by receipt of a special editing character, by fulfilling the specified character count, or by exceeding the preset read duration timer.

The use of the Read Timer is recommended to prevent indefinite suspension of program processing events. The Read Timer is most important when reading the status of some device, or requesting input that is supplied without operator action. If the user at the terminal is typing, it is likely that enough characters eventually are entered to satisfy the byte count.

When using the VPLUS intrinsics, the receipt of the DC2 from the terminal satisfies the Read Timer. A second Block Mode Read Timer is started when the second DC1 is sent.

STANDARD EDITING. Character Mode reads terminate by one of the following:

- Receipt of a End-of-Record (EOR) character sent from the terminal. There are two types of EOR Characters:

  Type 1. The character terminates the read, but it is not included in the data returned to the program or the actual count of characters read. It therefore, is impossible to determine which character in the set was received.

  When the EOR character is detected, the driver generates the characters necessary to place the terminal cursor at the beginning of the next line, unless disabled through FSETMODE . If the EOR is a CR, the driver generates a LF; if the EOR is a LF, the driver generates a CR; if the EOR is anything else, the driver generates both a CR and LF.

  Type 2. The character will be included in both the data and the actual count returned. The read will be returned with a special status indicating the read terminated by the special EOR character. (This is seen by the user as a CCL returned condition code and a file system error number of FSERR31.) The terminal cursor will not be affected.

- Receipt of an alternate End-of-Record character sent from the terminal. FCONTROL(25) is called to define this character. The functionality of this character is the same as the Type 2 EOR Character.

- The input byte count being reached. This byte count is set in your call to FREAD (in the *tcount* parameter), READ (in the *expectedl* parameter) or READX (in the *expectedl* parameter).

- The Read Limit Timer expiring. If the read is terminated in this way, no data is returned to the user's stack and the TBUF associated with the read is purged. This timer is used to prevent a terminal or other input device from "hanging" because of an incomplete read. (Incomplete reads result when the terminal operator fails to enter data; the transmission link is interrupted, causing data to be lost or the device is not on.) This timer is set in a call to FCONTROL(4); it must be set independently for each read. The timer can be disabled after setting via another call to FCONTROL(4). In Character Mode reads, the timer is active from the time the File System initiates the read until the EOR data character is received by the computer, or until time runs out. When the timer expires, FREAD, READ or READX will fail and control is returned to your program. A call to FCHECK returns the error message SOFTWARE TIME-OUT (FSERR 22). Any data which was read before the timer expired is lost.

- Subsystem Break. If Subsystem Break is enabled, receipt of a Subsystem Break will terminate a read.

- Receipt of (CONTROL)A if the device is a console. If a (CONTROL)A is embedded in a input stream, it is passed to the user unless the device is a console; if (CONTROL)A is from a console, all data entered is lost and the computer waits for a console command.

TRANSPARENT EDITING. Use one of the following to terminate character mode reads:

- Receipt of a read termination character specified in a call to FCONTROL(41). There is no termination character available by default.

- Receipt of the Attention character specified in the same call to FCONTROL(41) (which is used to initiate a Subsystem Break).

- Receipt of [CONTROL]A if the device is a console (Refer to Standard Editing discussed earlier).

- The Read Limit Timer expiring (Refer to Standard Editing discussed earlier).

- Satisfaction of a byte count that was specified in your call to FREAD, READ or READX.

BINARY EDITING. Terminate reads with one of the following:

- Satisfaction of a byte count that was specified in your call to FREAD, READ or READX.

- The Read Limit Timer expiring. (Refer to Standard Editing discussed earlier.)

> ### NOTE
>
> No read-terminating characters are available in Binary Mode (the port controller doesn't screen input characters during Binary reads).

Terminating READs in Block Mode

You can terminate a read by one or more of the following:

STANDARD EDITING.

- The Record Separator (RS) character (assumes your software set the character).

- The Read Limit Timer expiring. (Refer to Standard Editing discussed under Character Mode.) In Block Mode reads, the timer is active from the time the File System initiates the read until a DC2 or another character is received from the terminal, or until the timer expires.

- The Block Mode read timer expiring. This timer is different from the read limit timer. It is automatically activated when MPE sends out the second DC1 (the "send data DC1"). It remains active until the RS character is received from the terminal or until a standard amount of time elapses. The length of the timeout is determined by the computer based on the number of bytes it expects to receive, the input speed of the device, and at least 10 seconds of extra time. The timeout value is not user-changeable, and if this timer expires, a file system error I/O TME-OUT (FSERR 27) (not SOFTWARE TIME-OUT (FSERR 22)) occurs.

- The input byte count being reached (same as in Character Mode).

TRANSPARENT EDITING.

- A receipt of a programmer-specified read termination character.

- The Read Limit Timer expiring. (Refer to Standard Editing under Character Mode.)

- The Block Mode Read Timer expiring. (Refer to Standard Editing under Character Mode.)

- Satisfaction of the byte count that was specified in your call to FREAD, READ, or READX.

BINARY EDITING.

- Expiration of the Read Limit Timer. (Refer to Standard Editing under Character Mode.)

- Expiration of the Block Mode Read Timer. (Refer to Standard Editing under Character Mode.)

- Satisfaction of the byte count that was specified in your call to READ, READX, or FREAD.

End-of-File Indicators

If included in input data at certain times, the : and certain MPE commands can cause an end-of-file condition. The end-of-file condition causes the read to terminate in error with a condition code return of "greater than" (>). A program must check for the end-of-file condition as the first step in reading input from a device. If one is found, the current device file must be closed because a read will not succeed. If the program attempts to read input that causes an end-of-file condition, the file system keeps terminating the read.

The command :EOF: causes a "hardware" end-of-file condition. If you enter this during a session or job, you are logged off. This is because the MPE Command Interpreter sees an :EOF: on the standard input device. If any characters precede :EOF:, the data is treated as normal data and does not cause an end-of-file condition. Their use is not recommended except in conjunction with application programs specifically designed to handle input end-of-file conditions.

End-of-file indicators terminate the current read. It is the programmer's responsibility to figure out that an :EOF: occurred and handle it appropriately.

The end-of-file conditions are shown in Table 3.1-1.

Table 3.1-1. End-of-File Conditions

Type of File	Indicators
Standard Input Files for Sessions	: followed by any other character } Terminates $STDIN :EOD :EOF: } Terminates $STDINX
Standard Input Files for Jobs	:EOJ :JOB :EOD } Terminates $STDIN or $STDINX :DATA :EOF: : followed by any other character } Terminates $STDIN This record is then interpreted by the Command Interpreter as the next command to execute.
:DATA files	:EOD :JOB :DATA :EOF:

Measuring the Duration of READs

The duration of a timed read can be measured and the results returned to your program. The **read duration timer** measures the span between the time your read begins, and the time it completes, in hundredths of a second. Timed reads are enabled by a call to FCONTROL(21), and disabled via FCONTROL(20). FCONTROL(21) must be called before each read you wish to measure. The timer starts timing when the read following the FCONTROL(21) begins, and stops timing when the read completes. Results of the timing sequence can then be read through FCONTROL(22). FCONTROL(22) must be used in order to obtain the duration of the read. If you want the duration of subsequent reads, FCONTROL(21) must be called before each read to reset the timer, and FCONTROL(22) should be called immediately after the read to get the duration.

Eight-bit Data Transfers

Since 8-bit data is used most widely outside the United States, you may wish to reference *Native Language Support Reference Manual* if you are using a language other than 7-bit USASCII.

User defined terminal types which use 8-bit data are also available through the use of the Workstation Configurator.

ATP, ATP37, OR ADCC. For Hewlett-Packard terminals, use terminal type 10 (Device Type 16) as usual, but make the following corrections to the configuration of your terminal:

Parity	None(8-bit pass-through)
Check Parity	No
ASCII 8 bits *	Yes
Data Bits *	8
Language	the language of your terminal

    * Set whichever of these appears in your particular terminal configuration.

For printers (Device Type 32), use Terminal Type 20 or 22.

ATC. Use terminal type 12 for terminals and follow the above settings. 8-bit data transfers on printers (Device Type 32) are not supported with this controller. The HP 2635A/B printing terminal is supported under Terminal Type 15 (Device Type 16).

BINARY DATA. Binary data transfers are also 8-bit. If you are using this type of data transfer, follow the settings listed above, but binary transfers need to be enabled programmatically through FCONTROL.

READs and the :DATA Command

In order to read from a device file opened for read-only access, the :DATA command must be entered at the device. This is true whether or not any other file--including $STDIN or $STDINX--had already been opened on the device.

The :DATA command must be entered with exactly the same session or job name, user ID, and account ID as the session or job in which your program is executing. This is an MPE feature which insures that on a multiterminal system, the right user gets the right data.

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The minimum format of the :DATA command is:

:DATA *username.acctname*

and has other parameters (refer to the *MPE Commands Reference Manual*).
The association of a :DATA command with a *user.account* allows the
MPE operating system to insure that the data entered at the input device is
sent to the proper user.

The :DATA command precedes all other operations at the data terminal. Once the command has been accepted, program data may be entered. Your program can read the data that follows. In the case of card readers, the :DATA command is contained in the first card of the input card deck. In the case of terminals, this command is typed in by the terminal user. There are two situations in which you might want to use the :DATA command. The first is when different sets of data are to be input through the same device, and a different program wants each set. The :DATA command can be used to ensure that the right data goes to the right program. In the second situation, a single program wants to obtain different data sets from the same device or from distinct devices. Each data set can be uniquely identified using a parameter of the :DATA command. The port must be configured as "data-accepting" ("A") to use the :DATA command.

Once the command has been received by the computer, the device cannot be used for any other action until your program issues an FOPEN and a read against the device. Your FOPEN does not work unless your process was launched with exactly the same logon identifiers as are used in the :DATA command (same User identifier, Account identifier, Session identifier, etc.).

If the file you are reading from is opened before the :DATA command is entered, the message FILE ___ ON LDEV# ___? is displayed at the system console. If the operator responds NO, the FOPEN returns an error. If the operator responds YES, the File System looks for a :DATA command. If none has been entered at the terminal yet, the message is sent to the console again.

EXAMPLES. Devices that Accept the :DATA Command

Example 1 -- If your program is reading a single set of data:

- The device operator types the following:

  ```
  :DATA TEST1,IMAGE.LAB/PASSWX  } TEST1  is the Job identifier
                                  IMAGE  is the User identifier
                                    LAB  is the Account identifier
                                  PASSWX is the Account password
  ```

- Before or after the device operator enters the :DATA command above, the individual running the program that accesses the above device logs on, enters a :FILE command, and runs the program:

  ```
  :HELLO TEST1,IMAGE.LAB/PASSWX }  The exact same logon identifiers that were
                                   used above are used here.
  ```

  ```
  :FILE TERM;DEV=56             }  This file equation associates the specific device
                                   being accessed with the file your program opens.
  ```

  ```
  :RUN DATAPROG                 }  This is the program that accesses the device.
  ```

- The portion of your program that will access the device will need to FOPEN the device and call one of the read intrinsics (FREAD, READ, or READX). It could look like this:

  ```
  INTRINSIC  FOPEN,QUIT,FREAD;
  INTEGER    IN;
  BYTE ARRAY NAME(0:4)="TERM";
               .
               .
               .
             IN:=FOPEN(NAME,%255,0);
             IF<>THEN QUIT(1);
  ```

  The program issues an FREAD:

  ```
  LENGTH:=FREAD(DATA1,BUFFER,-80);
  ```

  The program then checks for an EOF condition (CCG) or an I/O error (CCL). If none are found, it proceeds to the next step.

  The two previous steps are repeated until the EOF condition is found, at which time the read is terminated.

Example 2 -- If several distinct sets of data are read by one program:

- The :DATA command is entered once for each set of data (once for each distinct input device or successive times on one or more distinct devices). Each :DATA command includes the *fileset* parameter, which identifies which set of data is associated with the Data session.

  :DATA TEST1,IMAGE.LAB;DATA1   } DATA1 identifies the first set of data

  :DATA TEST1,IMAGE.LAB;DATA2   } DATA2 identifies the second set of data

  :DATA TEST1,IMAGE.LAB;DATA3   } DATA3 identifies the third set of data

- A controlling Session or Job is launched with the same identifiers used in the above commands:

  :HELLO TEST1,IMAGE.LAB   or   :JOB TEST1,IMAGE.LAB

- At about the same time the :DATA commands are entered above, a :FILE and :RUN command are entered through the controlling Job or Session. (Actually, these actions may be completed whenever desired. Bear in mind, however, the data devices are unavailable for any other use until your program reads from them.) For example:

  :FILE DATA1;DEV=56
  :FILE DATA2;DEV=57   }   These are the data sets to be read.
  :FILE DATA3;DEV=60

  :RUN DATAPROG   }   This is your program.

SLAVES, EMULATORS, AND UNCONVENTIONAL DEVICES

In order to program slaved devices, terminal or printer emulators, and any other asynchronous devices (that aren't terminals or printers), these devices must be connected to one of the controllers (ATP, ATP37, ADCC, or ATC), or to an HP terminal (when the terminal is connected to a controller).

Slaved Devices

A wide variety of devices can be attached to terminal ports as slaves. Included are terminals, printers, card readers, flexible-disc drives, cartridge tape units, and plotters. Slaves can be connected in one of two ways, pass-through (also called eavesdrop) or end-of-line (also called remote). These connections are illustrated in figure 3.1-1.

Card readers and HP plotters frequently are operated as pass-through devices; however, any pass-through device may also be operated stand-alone. Printers customarily are attached through the terminal; this includes terminals that are being operated as printers. Tape cartridge units also are attached stand-alone.

MPE has no special knowledge of slaved devices. It is the programmer's responsibility to make sure the program interprets any errors according to the specific application. For example, there is *no* error message like: SLAVED PLOTTER DOES NOT RESPOND (FSERR399).
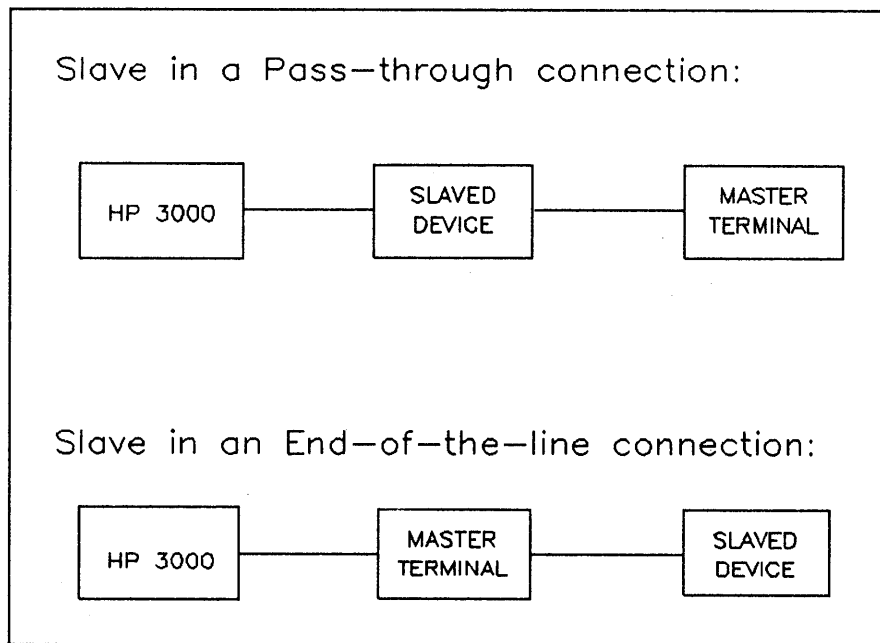
Figure 3.1-1. Pass-through and End-of-Line Connections for Slaves

PASS-THROUGH. In the pass-through connection, the slaved device is connected to the port, and the master terminal is connected to the slave. The slave passes data through to the master until it is instructed, by the computer, to keep the data for itself. A pass-through slave that is turned off or that fails may prevent its master from having access to the computer. This is not true for end-of-the-line slaves. Programmatically, pass-through devices are switched into and out of pass-through mode by means

of triggers. These vary depending on the device. If the pass-through triggers are sent out when there is no slave present, they may cause the master terminal to behave improperly. Such devices generally only react to data coming from the computer, and simply pass data going the opposite direction straight through.

END-OF-LINE. A slave that is attached at the end of the line is connected to the computer through the master terminal. There must always be a master terminal in this kind of connection.

End-of-the-line slaves are generally connected to the terminal's secondary data port. Card readers and HP plotters frequently are operated as pass-through devices; however, these and any other pass-through device may also be operated at the end of the line, with additional programming. Printers customarily are attached to the terminal; this includes terminals that can operate as printers. Tape cartridge units also are attached to the end of the line. Programmatically, the end-of-line slave operates differently than the pass-through slave. Data transfer to or from end-of-the-line slaves is triggered by means of terminal operator action or escape sequences sent to the terminal by the program. The operation of the terminal is not affected if the slave is not present or is not functioning properly (aside from the possibility that the slave is not able to provide the terminal with data it needs).

Error messages associated with the operation of slaved devices are the standard terminal error messages listed in the error section at the end of this section.

Emulators

Terminal or printer emulators are devices or programs that behave like the kinds of terminals or printers that can be attached to the aysnchronous port controllers. As such, they are programmed exactly as if they were terminals or printers, and are usually used for testing purposes or for operating a Personal Computer as a terminal.

Other Devices

Any device capable of being attached to one of the controllers and able to communicate using Hewlett-Packard's asynchronous protocol can, in theory, be attached to an asynchronous port. This could include test instruments, data collection devices, etc. The most closely-suited Terminal Type should be chosen for use with the device or you may use the Workstation Configurator to create a new Terminal Type. For instance, if the device is incapable of ENQ/ACK handshaking, Terminal Type 10 should not be used (instead use 13, 18, or custom design a Terminal Type using the Workstation Configurator).

USING NO-WAIT I/O

Privileged-Mode users can employ no-wait I/O to multiplex I/O between their programs and multiple devices. The no-wait option must be selected in the *foptions* parameter of FOPEN. Additionally, no-wait I/O requires the use of the IOWAIT and IODONTWAIT intrinsics.

No-wait I/O is most useful for reads: with it, the system can post reads to many terminals at once without waiting for each one to complete before starting the next.

CONTROLLING DEVICE FUNCTIONS (FDEVICECONTROL)

The FDEVICECONTROL intrinsic allows programmatic control of a variety of functions. Among these are device input/output speed, the Echo Facility System and Subsystem Break, parity generation and checking, a read timer, the three editing modes, and port protocol type. This powerful intrinsic is described in Part 3, Section 2.

ERROR CHECKING

Your program should systematically check for errors after every intrinsic call. Most file system intrinsics return with a Condition Code of < (CCL) or > (CCG) whenever some abnormal event takes place. When this happens, your program calls the FCHECK intrinsic to obtain the File System Error Code and then takes the suitable recovery action. The text message corresponding to the error code can be obtained by calling FERRMSG . File information valid at the time the error occurred can be printed on a Session or Job device by means of the PRINTFILEINFO intrinsic. All three of these intrinsics are described in Section 2 of Part 3 and in the *MPE Intrinsics Reference Manual.*

As a rule, a Condition Code of < (less than, or CCL) indicates that the File System detected an end-of-file. When this occurs, your program must close the file (FCLOSE) because it no longer is possible to read from it. (If your program re-issues the read upon detecting a CCL, rather than closing the file, it will loop. This could result in a stream of prompts being sent to the terminal by your program). In most cases when an error occurs, no data is returned to the user's stack. An exception to this is when a read terminates on an alternate EOR character. In such a case, the read terminates "in error", but data is transferred to the user (ERROR CODE 31).

Sometimes a read (FREAD) returns a value of zero in the *tcount* parameter. When this occurs, assume that no data was transferred and do your normal error-checking. (It is possible when FREAD returns with a *tcount* of zero that the data transfer was partially or completely successful. However, since there is no ready way of verifying this, you may want to take appropriate action to re-issue the Read). With no-wait I/O, FREADs always return null. You must call IOWAIT to get the actual read length.

When overruns occur during input of data, the byte counter maintained by MPE is not properly adjusted. If MPE detects this on a read or write, it will return a condition code of > (greater than, or CCG), meaning an I/O error occurred. As a consequence, reads expected to terminate on a specific byte count may "hang." Hangs are most likely when your program is reading block transfers of status information from a printer or other device that doesn't regularly send blocks of input to the computer. (An interactive terminal is not likely to hang, since the terminal operator generally types something at the terminal, causing the read to complete.) Your program can protect itself from "hung" reads by setting the read limit timer in addition to specifying a byte count.

If there are not enough Terminal Buffers (TBUFs) available to your program, a File System Error can result. During reads, the error code is 33; this indicates that data was lost. If not enough buffer space is available during writes, they are impeded. The same error occurs when the computer is heavily loaded, since the I/O System may not get the required TBUF soon enough, which results in the File System error (FSERR33) and the loss of data.

MPE takes specific actions when the communications link with a remote device is broken. If the device was in a session, the session is logged off. If the device was a captive of your program, the port controller driver executes a "device close", but does not terminate the process that was communicating with the device. The error codes returned for files on slaved devices are the same as the master device codes, since MPE does not know when slaved devices are connected.

PROGRAM DEVELOPMENT AND TESTING STRATEGY

Overall Strategy

A recommended strategy for developing and testing programs is as follows:

- Before beginning the test, thoroughly check the peripheral device(s), then attach them to the port controller. For instance, you could attach the device to a known good HP 2623A or equivalent terminal; this terminal would be used to simulate the HP 3000.

  a) If the connection between the two devices is via an RS-232-C interface, connect Pins 2, 3 and 7 on one device to Pins 3, 2, and 7, respectively, on the other device. If the connection is via an RS-422 interface, connect pins 4, 6, 22, and 24 to pins 6, 4, 24, and 22, respectively.

  b) Type on the HP terminal keyboard and note the other device's responses. Note any unexpected behavior if the device you are testing is a terminal or printer.

- Write the program for accessing the device and test it *with the HP terminal*. Type on the HP terminal to simulate the other device. Continue until the program is debugged.

- Attach the device. Do any further debugging that is necessary.

Potential Terminal Problems

As a programmer, you should be aware of the following actions that the terminal user may have performed. Few of these conditions are easily detectable from the program, and most are not programmatically correctable:

- Entered a colon or the :EOD, :EOJ commands when the input file is $STDIN.

- Entered a System Break while the terminal was in Block Mode, with System Break enabled.

- Changed the parity or speed.

- Pressed the RESET key during a Page Block read.

- Pressed the XOFF (CONTROL S) and thought the terminal was not functioning.

- Set the FldSeparator or BlkTerminator characters in the menu to values other than US and RS (They are not normally reset programmatically).

- Left the AUTO LF function on and caused your carriage control to malfunction.

- Disabled Block Mode with the BLOCK MODE key and ruined your Page Block Mode read.

- Enabled the DISPLAY FUNCTIONS and made your terminal ignore escape sequences.

- Enabled MEMORY LOCK and destroyed your direct cursor addressing.

- Changed the straps (such as opening the G strap), causing faulty status requests and function key reads.

- Attempted to use Modify Mode without having the Start Column correctly set.

Potential Programming Problems

When you are ready to run your program, you should make sure you did not perform the following actions:

- Forgot to disable Subsystem Break on Block Mode reads.

- Attempted to operate with unprotected fields, then forgot to enable Format Mode (($\boxed{\text{ESCAPE}}$)W). Notice, the Operator can disable Format Mode.

- Ran Block Mode on a terminal that uses pre-editing and only transmits modified fields, which means you won't get the full screen of data (just US's or an RS).

- Forgot to enable Echo when it was initially disabled.

- Wrote a program which will not save/restore function key labels, settings and terminal straps.

- Wrote words to a file (FWRITE) but loaded an odd number of bytes. In other words, the last bytes were garbage.

- Wrote a program which identifies the terminal model number, but is not easily expandable to new terminals.

- Failed to correctly set what is necessary to perform Page Block Mode.

- Failed to turn Echo off during $\boxed{\text{ESCAPE}}$d transfers from the terminal.

A number of MPE intrinsics can be of value to the individual writing programs for asynchronous I/O. These intrinsics are listed below, with a brief statement of their purpose. On the following pages you will find more detailed discussions of most of the intrinsics listed below. Whenever possible, we have attempted to emphasize special considerations for programming for terminals and printers. Pay particular attention to the discussion of FOPEN and FCONTROL .

NOTE

Generally, you need to use this section in conjunction with the *MPE Intrinsics Reference Manual.* Also, there are other intrinsics you may need to use that are *not* listed in this section. Refer to the *MPE Intrinsics Reference Manual* for these as well.

Notice that there are letters over all intrinsic parameters in the syntax boxes of this section. The letters show the type of variable for each parameter. Refer to Table 3.2-1 for the variable abbreviations and their meanings.

Table 3.2-1. Variable Abbreviations

Abbreviation	Variable Type
BA	Byte array
D	Double
DV	Double by value
I	Integer
IA	Integer array
IV	Integer by value
L	Logical
LA	Logical array
LV	Logical by value

THE INTRINSICS

ASCII   Converts a binary word into an ASCII string.

BINARY   Converts an ASCII string into its binary equivalent.

CAUSEBREAK   Causes a System Break, and requires a :RESUME to continue program execution.

DASCII   Converts a two-word binary number into an ASCII string.

DBINARY   Converts an ASCII string into a two-word binary number.

The Intrinsics (cont'd)

FCARD	Drives the HP 7260A Optical Mark Reader (card reader).
FCHECK	Requests information about an I/O error.
FCLOSE	Closes a file.
FCONTROL	Provides extensive device-control options.
FDEVICECONTROL	Provides most of the same options as FCONTROL and adds a variety of control directives to a device file.
FERRMSG	Obtains textual error messages corresponding to an FCHECK error code.
FFILEINFO	Provides information about the characteristics of a file.
FGETINFO	Provides access and status information about a file.
FOPEN	Defines the physical characteristics of a file and sets up access to the file.
FREAD	Transfers a record of data from an input device to the user's stack.
FSETMODE	Suppresses the output of Carriage Return and Line Feed.
FWRITE	Transfers a record of data from the user's stack to an output device.
GENMESSAGE	Obtains an MPE message from the message catalog and routes it to a file or program.
IODONTWAIT	Initiates completion of a no-wait I/O request. Allows program processing to continue before an I/O operation completes.
IOWAIT	Initiates completion of a no-wait I/O request. Delays program processing until an I/O operation completes.
PRINT	Transfers a record of data from the user's stack to the file $STDLIST.
PRINTFILEINFO	Prints a display of file information on the session or job device.
PTAPE	Copies data from a paper tape reader or other input device to a disc file.
READ	Transfers a record of data from the file $STDIN to the user's stack.
READX	Transfers a record of data from the file $STDINX to the user's stack.
RESETCONTROL	Allows another Subsystem Break to occur.
WHO	Determines the attributes of the logon user running the program.
XCONTRAP	Enables or disables the (CONTROL)Y trap.

PURPOSE

Equivalent to pressing (BREAK) on a terminal--places the session master terminal in communication with the MPE Command Interpreter. The terminal operator enters :RESUME to cause the interrupted activity to resume.

This intrinsic is of particular value in Page Block Mode programs where the programmer wants to provide the user with the System Break function (by way of a program command or softkey).

CAUSEBREAK can only break a program that is running in a session. It also writes a colon prompt to the terminal.

```
┌─────────────────┐
│      NOTE       │
└─────────────────┘
```

To execute, 3000 words of available stack space are required.

PROGRAM EXAMPLE

```
begin

   intrinsic PRINT, CAUSEBREAK, QUIT;

   logical array before'break(0:21)
           :="Starting system break...do a :RESUME command!";

   logical array after'break(0:17)
           := "Returning after the system break... ";

   PRINT( before'break, -44, 0 );
   if <> then QUIT(1);

   CAUSEBREAK;                    <<Do the System Break>>
   if <> then QUIT(2);

   PRINT( after'break, -35, 0 );
   if <> then QUIT(3);

end.
```

FCARD

PURPOSE

To drive the HP 7260A Optical Mark Reader (card reader). The reader must be slaved to a terminal.

SYNTAX

```
           I      I     IA     I      I
FCARD(reccode,filenum,bufadr,count,status);
```

PARAMETERS

reccode   Required positive integer. Used as an input parameter, it requests one of a number of different options. Used as an output parameter, it reports to the program whether the call to FCARD has been properly executed.

filenum   Required integer. It is the file number that identifies the file to be read.

bufadr   Required integer array. It is the array to which the record is to be transferred. Should be set to 120 words.

count   Required integer. It is returned to the program upon completion of the read. It indicates the number of columns transferred from the reader.

status   Required integer. It indicates whether the requested operation completed successfully.

See the *MPE Intrinsics Reference Manual* for more information.

PURPOSE

To request details about file errors. You should use this intrinsic if some other intrinsic you call returns with a Condition Code of < or >. After calling FCHECK, you may want to use PRINTFILEINFO to display the error information.

SYNTAX

```
                IV        I        I        D        I
FCHECK( [filenum] [,errorcode] [,tlog] [,blknum] [,numrecs] );
```

PARAMETERS

filenum   Optional integer value. It is the number identifier of the file for which error information is desired. If this parameter is omitted, FCHECK assumes you want the last FOPEN error.

errorcode   Optional integer. The code indicating the type of error returned in this parameter. Use this parameter when programming for terminals. (Refer to table 3.2-1.)

tlog   Optional 1-word integer. Number of words actually read or written is returned to this parameter.

blknum   Optional double variable. It is the double variable to which is returned the number of physical records transfered to or from the file since the FOPEN.

numrecs   Optional integer. It is a word to which is returned the number of logical records in the bad block; this is the "blocking factor".

FCHECK

The following File System error codes could result from an error during a terminal or printer related intrinsic call; the table shows the File System code that is returned in the *errorcode* parameter. For further information on additional error codes, refer to the *MPE Intrinsics Reference Manual.*

Table 3.2-2. Status and Error Codes

FS Code (decimal)	Meaning
--	Operation completed normally.
0	End of file reached.
20	Invalid operation requested by program (e.g. "set Terminal Type to -24").
21	Parity error occurred during read.
22	Read limit timer set by user expired. (Timer set via FCONTROL(4).)
24	Terminal or printer not ready (not on line, modem Data Set Ready signal not "high," line disconnected.
27	Block Mode read timer (set by terminal driver) expired. Timer expires if driver never receives the RS character. A data overrun at the port controller or a problem with the terminal's function keys could prevent the driver from receiving the EOR character.
28	Timing error--device was not serviced in time, or a data overrun occurred.
31	Read of line ended on an alternate end-of-record character. (A character defined via FCONTROL(25).)
32	Input/output operation aborted by the ABORTIO command (or some other program-external action).
33	Data was lost, no buffer available, or a tapemode (PTAPE) record of too great a length was sent.
95	The read was halted because the terminal operator hit (BREAK). The File System will automatically re-start the read when the operator enters the :RESUME command.
97	The terminal operator typed (CONTROL)Y (requesting a Subsystem Break), but no (CONTROL)Y PIN exists.
98	User attempted to set too high an expiration value for the read limit timer. Maximum allowable value is 32767 seconds.

PURPOSE

To close a file.

SYNTAX

```
          IV        IV        IV
FCLOSE(filenum,disposition,seccode);
```

PARAMETERS

filenum   Required integer value. This is the file number of the file you wish to close.
                          This is the number that was returned in the call to FOPEN.

disposition   Required integer values. They are meaningless for terminals and printers, and
and seccode   should be set to 0.

When the last file opened against the terminal is closed, a "device close" is issued by the file system. The
actions taken on a device close (or modem disconnect) are:

- Clear all parity
- Clear ENQ/ACK wait
- Clear XON wait
- Perform FCLOSE
- Return EOF-saved TBUFs
- Flush I/O
- Clear tape mode
- Turn Echo on
- Disable System Break
- Disable Break
- Clear logon Terminal Type

- Hang up modem, if connected to modem
- Disable ENQ/ACK protocol
- Clear DC2 received
- Clear Break mode and Console mode
- Clear printer information
- Clear logon parity
- Set to default Terminal Type
- Initialize half duplex mode
  and full duplex mode
- Start idle read waiting for speed-sense

On any FCLOSE, the following actions are taken:

- Clear tape mode
- Re-enable (CONTROL)X Echo
- Disable read timeout
- Reset parity to logon

- Clear transparent mode
- Disable read duration timer
- Clear Subsystem break
- Return TBUFs

FCONTROL

PURPOSE

To alter device-handling properties of the controllers.

SYNTAX

```
                IV        IV        L
FCONTROL(filenum,controlcode,parameter);
```

PARAMETERS

filenum   Required integer value. It is the number returned by FOPEN that uniquely identifies this file.

controlcode   Required integer value. It is an integer code indicating the kind of operation to be performed. Codes that can be used with the asynchronous port controllers are:

Codes		
	1	To cause a carriage control directive to be sent to the terminal or printer.
	4	To set a read timeout value.
	10	To change device input speed.
	11	To change device output speed.
	12	To enable character echoing.
	13	To disable character echoing.
	14	To disable the System Break function.
	15	To enable the System Break function.
	16	To disable the Subsystem Break function.
	17	To enable the Subsystem Break function.

Codes		
	18	To disable Tape Mode (Series II and III only).
	19	To enable Tape Mode (Series II and III only).
	20	To disable the timer that measures the duration of a read.
	21	To enable the read duration timer.
	22	To read the results of an FCONTROL call made with a control code of 21 .
	23	To disable parity checking.
	24	To enable parity checking.
	25	To define line-termination characters for terminal input.
	26	To disable Binary Editing Mode.
	27	To enable Binary Editing Mode.
	28	To disable Block Mode processing by the user program.
	29	To enable Block Mode processing by the user program.
	34	To print ! ! ! at the terminal when an input line is deleted.
	35	To block printing of ! ! ! at the terminal when an input line is deleted.
	36	On Series II/III:

On Series II/III:

To enable parity generation, but not parity checking, by the port.

On all other Series:

To determine the current parity.

	37	To allocate a non-:JOB and non-:DATA-accepting terminal.
	38	To set the Terminal Type.
	39	To determine the current Terminal Type.
	40	To determine the current device output speed.
	41	To enable Transparent Editing Mode.
	43	To abort a pending NO-WAIT I/O request.

parameter   Required logical word. It has various uses, depending on the value of *controlcode.*

FCONTROL

A large majority of FCONTROL codes affect all files open on a device. Consequently, when you close the file named in one of these calls, the action of the FCONTROL call will still be in effect for the other files. Only five apply to the file whose file number was used in the call. Table 3.2-3 shows the scope of each of the FCONTROL control codes:

Table 3.2-3. Affects of Control Codes

FCONTROL Codes Affecting *All* Files on the Device	FCONTROL Codes Affecting *Only* the File Specified in the FCONTROL Call
4 10 through 24 34 through 41 43	25 through 29

When the device is closed, all parameters are reset to defaults. (Refer to the FCLOSE intrinsic on device close actions.)

Setting Read Limit Timer Value--FCONTROL(4)

This is used to set a time limit for the *next* read. It is especially valuable when your program is reading from an unattended device. Its effect is to abort the read if it has not completed before the time expires, thus preventing the device from "hanging" because the HP 3000 is still expecting some input from it. Whenever this timer expires before normal completion of a read, the read completes and returns with a condition code of CCL. All data transmitted during the read (if any) is lost. A call to FCHECK after the read aborts returns `Error Code 22, Software Timeout`.

During Block Mode reads, this timer halts when the DC2 character is received.

Syntax

```
FCONTROL(filenum,controlcode,time);
```

Parameters

filenum   Required integer by value. This is the file number returned from the FOPEN call that opened your file on the device.

controlcode   Required integer by value. The integer is 4 to set the timer. The timer starts automatically on the next FREAD to the specified file.

time   Required logical word. Specifies value, in seconds, of time limit. Set to 0 to disable timer. The maximum value is 32767.

Program Example

```
FCONTROL'PARM:=30;  << 30-SECOND READ TIMEOUT>>
FCONTROL(FNUM,4,FCONTROL'PARM);
IN'LENGTH:=FREAD(FNUM,INPUTBUF,RECSIZE);
IF <
   THEN BEGIN
      FCHECK(FNUM,ERRORCODE);
      IF ERRORCODE <> 22
         THEN <<HANDLE ERROR>>
         ELSE  <<HANDLE TIMEOUT>>
   END;
```

FCONTROL

Setting Device Input and Output Speeds—FCONTROL(10) and FCONTROL(11)

FCONTROL(37), which is used to allocate a terminal, also can be used to set terminal speed. Refer to the description for FCONTROL(37).

A port's initial speed is set to the configured speed or is sensed from the speed of the first Carriage Return character received from the terminal. This speed can be changed programmatically by calling FCONTROL(10) or (11). There is no distinction between *controlcodes* 10 and 11 for the ATP, ATP37, and ADCC, since "split" line speeds are not allowed with these controllers. However, the ATC allows you to select different input and output speeds for ATC ports. This seldom-used capability allows a user running a mark sense card reader coupled to a terminal to operate the two devices at different speeds (for example, the card reader at 240 characters per second for input and the printer at 30 characters per second for output). FCONTROL(11) should be used to set both input and output speeds with HIOTERM1 and HIOTERM2.

Syntax

```
FCONTROL (filenum,controlcode,speed);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open this file on the terminal.

controlcode   Required integer by value. The integer is 10 to change the input speed, and 11 to change the output speed of the ATC. Using either code changes both the input and output speed of the ATP, ATP37, and ADCC.

speed   Required logical word. Value must be in characters per second (1 character per second = 10 bits per second except for 110 bps, where two stop bits make the character length 11 bits). The choices are: 10, 15, 30, 60, 120, 240, 480, 960 or 1920. When the intrinsic is executed, the previous input or output speed is returned to the calling process through this parameter.

Program Example

This example changes the speed of an ATP or ATP37 port from the current speed to 480 cps. *filenum* contains the terminal's file number.

```
SPEED:=480;
FCONTROL(FILENUM,10,SPEED);
OLD'SPEED:=SPEED;
```

This example obtains the current input speed of an ATC port by changing it and then setting it back to what it was.

```
SPEED:=30;
FCONTROL (FILENUM,10,SPEED);   <<CHANGE TO ARBITRARY SPEED
                                 TO GET THE OLD SPEED>>
IF <> THEN QUIT (414);
INSPEED:=SPEED;                <<SAVE THE OLD SPEED>>
FCONTROL (FILENUM,10,SPEED);   <<CHANGE THE SPEED BACK>>
IF <> THEN QUIT (415);
```

FCONTROL

Enabling and Disabling Input Echo--FCONTROL(12) and FCONTROL(13)

By default, the MPE Echo Facility is enabled whenever a terminal is first opened for most Terminal Types. Echo can be programmatically disabled and re-enabled by calling the FCONTROL intrinsic. You may wish to do this because some devices do not desire echoing (devices that always echo themselves, for example). A 264x terminal with its DUPLEX switch set to "HALF" does local echoing, i.e. echoes itself. Also, whenever input is read from the terminal in Block Mode, echo should be disabled so the echoed characters do not contaminate terminal memory by writing over data that is yet to be transmitted. FSETMODE(4) also may be required, if suppression of the MPE CR/LF is desired on inputs.

Syntax

```
FCONTROL(filenum,controlcode,previous);
```

Parameters

filenum   Required integer by value. Contains the file number retained in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 12 to enable Echo, and 13 to disable Echo.

previous   Required word, logical. The previous Echo status (previous to executing this call of the intrinsic) is returned in this word.

                 0 = Echo was ON
                 1 = Echo was OFF

Program Example

```
      << TURNING ECHO OFF >>

FCONTROL(FILENUM,13,PREV'ECHO);

      << TURNING ECHO BACK ON >>

IF PREV'ECHO = 0
  THEN BEGIN
    FCONTROL(FILENUM,12,PREV'ECHO);
  END;
```

Disabling and Enabling System Break--FCONTROL(15) and FCONTROL(14)

The System Break facility is enabled by default. When a user presses (BREAK), or when the CAUSEBREAK intrinsic is called, a System Break is executed by the computer. System Break is available during Sessions, only; it cannot be enabled for non-interactive devices.

It is recommended you disable System Break during Block Mode operation of a terminal. Since the Break occurs at any point within a line during a Block Mode read, there is no way to restart the read at the same exact byte. Therefore, either data is lost or extra data is sent. Also, the MPE prompt (:) and subsequent user inputs (:RESUME) would overwrite previous data and later be read in as part of the read, if it were restarted.

Break is disabled during a read in the Command Interpreter. If a Break is triggered during a character mode read, the data input prior to the Break is not lost; it is passed to the user's stack after typing :RESUME and after the read completes. This is *not* true for writes, as data can be lost in the time between the (BREAK) and the :RESUME. If the terminal operator enters a System Break during a Break-disabled session, a null or the full Break is echoed, but no data is lost.

NOTE

Use of this intrinsic does not affect the function of the CAUSEBREAK intrinsic.

Syntax

FCONTROL(*filenum,controlcode,anything*);

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 15 to enable System Break, and 14 to disable it.

anything   Required logical word. This is a dummy parameter not modified by FCONTROL(14) or (15).

Program Example

```
<<DISABLE BREAK>>

FCONTROL(FILENUM,14,PARAM);
IF <> THEN QUIT(411);
```

FCONTROL

Disabling and Enabling Subsystem Break--FCONTROL(16) and FCONTROL(17)

By default, Subsystem Break is not enabled for any devices; it must be explicitly enabled. It can be enabled on Session and Programmatic devices, but it only has effect on Session devices. Before calling FCONTROL(17), you must call the XCONTRAP intrinsic to arm the Subsystem Break procedure. In Standard Editing Mode, the Subsystem Break "attention character" is EM (End of Medium), produced on HP terminals by typing (CONTROL)Y. In Transparent Editing Mode, Subsystem Break is triggered by a user-defined attention character defined via FCONTROL(41). If this attention character is entered during a read, the read is terminated, and the data already entered is saved and passed to the program along with the attention character, after the Subsystem Break trap procedure returns. If Subsystem Break is disabled, the Break character is stripped from the input stream, and the read continues.

For more information about the (CONTROL)Y trap, refer to the discussion of the XCONTRAP intrinsic in the *MPE Intrinsics Reference Manual* or in this section of the manual.

Syntax

FCONTROL(*filenum,controlcode,anything*);

Parameters

filenum Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode Required integer by value. The integer is 17 to enable the break function, and 16 to disable it.

anything Required word, logical. This is a dummy parameter not modified by FCONTROL(16) or (17).

Program Example

```
        <<ENABLE SUBSYSTEM BREAK>>

XCONTRAP(@ CONTROL 'Y'HANDLER,OLD'PLAB);
                                    <<SET UP TRAP PROCEDURE>>

IF <> THEN QUIT(12);  <<FAILED>>
FCONTROL(INFILENUM,17,PARAM);
IF <> THEN QUIT(412);  <<FAILED>>
```

Disabling and Enabling Tape Mode--FCONTROL(18) and FCONTROL(19)

Tape Mode is available with the ATC on HP 3000 Series II/III Systems only. Tape Mode is used to read paper tapes, tape cartridges, and large blocks of data. When enabled, Tape Mode blocks the Line Feed normally issued whenever a Carriage Return is entered. It also blocks the operation of CONTROL X (line-deletion) and CONTROL H (backspace). To inhibit Carriage Return and Line Feed after an FREAD (but not a PTAPE read), use the FSETMODE intrinsic.

Syntax

```
FCONTROL (filenum,controlcode,anything);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 19 to enable Tape Mode, and 18 to disable it.

anything   Required logical word. This is a dummy parameter not modified by FCONTROL(18) or (19).

Program Example

```
      <<ENABLE TAPE MODE>>

FCONTROL (INFILE,19,DUMMY);
IF <> THEN QUIT(413);          <<FAILED>>
```

FCONTROL

Disabling and Enabling the Read Duration Timer--FCONTROL(20) and FCONTROL(21)
Reading Value of Timer--FCONTROL(22)

The read duration timer measures the time taken to complete a read, from the time it was requested to the time it completes. The measurement is in hundredths of a second. Only the first read to occur following the call to FCONTROL(21) is timed; subsequent reads are not measured unless the timer is set again. This intrinsic call does not actually return the timed result to your program; you have to call FCONTROL(22) to get the result. A condition code of > for FCONTROL(22) indicates that the read was longer than 655.35 seconds.

Syntax of FCONTROL(20) and (21)

```
FCONTROL (filenum,controlcode,anything);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer 21 enables the timer, and 20 disables it.

anything   Required logical word. This is a dummy parameter not modified by FCONTROL(20) or (21).

Syntax of FCONTROL(22)

```
FCONTROL(filenum,controlcode,readtime);
```

Parameters

filenum   Required integer by value. Must contain the file number for the terminal.

controlcode   Required integer by value. The integer is 22 to read the timer.

readtime   Required logical word. The measured time duration of the read is returned in this word. Value in hundredths of a second.

Program Example

Enables read duration timer and reads results.

```
FCONTROL(FILENUM,21,DUMMY);  <<Set the timer>>
IF <>THEN QUIT(2113);
IN'LENGTH:=FREAD(FILENUM,INPUTBUF,RECSIZE);
                              <<Start the timer>>
IF <> THEN QUIT(2);
FCONTROL(FILENUM,22,READTIME);  <<Get the result>>
IF < THEN QUIT(2213);
```

FCONTROL

Disabling and Enabling Parity Checking and Generation--FCONTROL(23) and FCONTROL(24)

FCONTROL(24) enables the parity conditions that were defined in a call to FCONTROL(36). FCONTROL(23) disables the parity set up by FCONTROL(36) and (24). FCONTROL(36) defines what parity is used with the port. If FCONTROL(23) disables parity use, after it was previously enabled, a call to FCONTROL(24) re-enables the use of the same parity.

Parity checking and generation must be disabled in order to receive and transmit binary data.

FCONTROL(23) and FCONTROL(24) cannot be used for printers with ADCC (MPE V/E), ATP, or ATP37.

Syntax

```
FCONTROL(filenum,controlcode,anything);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 24 to enable parity-checking, and 23 to disable it.

anything   Required logical word. This is a dummy parameter not modified by FCONTROL(23) or (24).

Program Example

See Defining Parity Control Conditions-- FCONTROL(36).

Defining an Alternate End-of-Record Character--FCONTROL(25)

This intrinsic call allows you to define an alternate record-termination character to signal the end of input during Standard Editing. During Standard Editing, the EOR (record termination character) recognized by default is the Carriage Return--for Character Mode input. By calling FCONTROL(25), you can instruct the port driver to recognize a period, an equal sign, an exclamation point, record separator, or any other character as a line-terminator. Subsequent reads from the same file number are terminated by the character. This means that the character is only valid as a line terminator for the file receiving the FCONTROL(25). Reads that end on an alternate character terminate "in error". You must call the FCHECK intrinsic to verify that the read did in fact end on the alternate character. The alternate character is returned to your input buffer and is counted in the read length returned by FREAD. Restore the default record-termination character by specifying a Null in the *altchar* parameter of the intrinsic.

Syntax

```
FCONTROL(filenum,controlcode,altchar);
```

Parameters

filenum   Required word, integer by value. Contains the file number returned in the FOPEN call number used to open a file on the terminal.

controlcode   Required integer by value. The integer is 25 .

altchar   Required logical word. The right byte of this parameter must contain the character to be used as the line terminator. Use the octal or decimal code for the character. The left byte of the word is ignored by the intrinsic. If the character Null (%0) is specified in both bytes of this parameter, the original, default end-of-record character is restored.

FCONTROL

The following characters may not be defined as alternate End-of-Record characters for devices attached to any of the port controllers:

Table 3.2-4. Unrecognized Alternate EOR Characters

ASCII Character	Terminal Keys	Octal Code
NUL (Null)	(CONTROL)@	% 0
BS (Backspace)	(CONTROL)H	% 10
LF (Linefeed)	(CONTROL)J	% 12
CR (Carriage Return)	(CONTROL)M	% 15
DC1 (XON)	(CONTROL)Q	% 21
DC2	(CONTROL)R	% 22
DC3 (XOFF)	(CONTROL)S	% 23
CAN (Cancel)	(CONTROL)X	% 30
EM (End-of-Medium)	(CONTROL)Y	% 31
ES (Escape)	(CONTROL) [	% 33
DEL (Rubout)		%177

In addition, when you are working at the console, (CONTROL)A cannot be defined as an EOR character.

Program Example

```
FCONTROL'PARM:=[8/0,8/"."];   <<Period is alternate character>>
FCONTROL(FNUM,25,FCONTROL'PARM);
IF <> THEN QUIT (2513);
...
IN'LENGTH:=FREAD(FNUM,INPUT'BUF,RECSIZE);
IF <
  THEN BEGIN
    FCHECK(FNUM,ERRORCODE);
    IF ERRORCODE <> 31
      THEN <<Handle Error>>
      ELSE <<Handle Alternate Terminator>>
  END;
```

Disabling and Enabling Binary Editing--FCONTROL(26) and FCONTROL(27)

Binary Editing is employed when you wish to transfer 8-bit data to and from the terminal. The port controller does not examine *any* characters in the input data stream, so record terminating characters and other control characters will not terminate the read. Reads are terminated by byte count or when the read limit timer expires. Carriage Return and Line Feed are not written to the terminal following the completion of the Read. On output to the terminal, the ENQ/ACK protocol and carriage control are disabled. If a session device is being accessed, a System Break restores Standard Editing for the device; typing :RESUME will not return the device to Binary Mode.

Syntax

FCONTROL(*filenum,controlcode,anything*);

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode Required integer by value. The integer is 27 to enable Binary Editing, and 26 to disable it.

anything   Required logical word. The dummy parameter is not modified by FCONTROL(26) or (27).

FCONTROL

Disabling and Enabling User Block Mode Handshake-- FCONTROL(28) and FCONTROL(29)

In the standard operation, MPE handles Block Mode transfers automatically; your program does not have to participate in the transfer protocol. In effect, what happens is any time a DC2 comes in, MPE strips it and echoes a DC1. There are instances, however, when you may want your program to control the Block Mode protocol. For example, you may want to be able to position the terminal's cursor after the operator presses (ENTER) (at the "top" of terminal memory, say). In that case, you would enable User Block Mode Handshake by calling FCONTROL(29). Then, the DC2 that the terminal sends when the user presses (ENTER) ((CONTROL)R) would be passed directly to your program. Before you trigger the actual data transmission with a second DC1, your program can take whatever action is appropriate. For example, it could write some cursor-positioning instructions to the terminal, perform a status request, allocate a large buffer, etc.

When you handle the Block Mode protocol, your program has to issue an additional read to receive the Block Mode data, from the terminal after the signal character has been received. Unless disabled as part of the Terminal Type, the action of doing the second read actually sends the DC1 trigger.

```
┌─────────────────┐
│      NOTE       │
└─────────────────┘
```

Data overruns may occur during Block Mode transfers. Your program must check for successful completion of each read operation and retry as required. Use of timers during Block Mode reads is strongly encouraged, since a data overrun occurring when the last character is read would otherwise cause the port to "hang". The standard Block Mode read timer does not operate when user Block Mode protocol is enabled.

Syntax

FCONTROL(*filenum,controlcode,anything*);

Parameters

filenum   Required word, integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 29 to enable the User Block Mode transfers, and 28 to disable transfers.

anything   Required logical word. The dummy parameter is not modified by FCONTROL(28) or (29).

Program Example

```
FCONTROL(FNUM,29,FCONTROL'PARM);
If <> THEN QUIT (2913);   <<Failed?>>
           .
           .
IN'LENGTH:=FREAD(FNUM,INPUT'BUF,-1);   <<Read Block Mode
                                            Signal Character>>
IF <> THEN QUIT (2);

<<Time Passes>>

IN'LENGTH:=FREAD(FNUM,INPUT'BUF,RECSIZE);   <<Read Data>>
IF <> THEN QUIT(3);
```

FCONTROL

Enabling and Disabling Output of !!! CR/LF upon Execution of CONTROL-X--FCONTROL(35) and FCONTROL(34)

In Character Mode, with Standard Editing in operation, the computer outputs **! ! !** and CR/LF to the terminal upon execution of a Cancel ([CONTROL]X). This is disabled by calling FCONTROL(34). MPE still deletes all data from the input buffer after FCONTROL(34) has been called, but no **! ! !**, Carriage Return, and Line Feed is issued.

Syntax

FCONTROL (*filenum,controlcode,anything*) ;

Parameters

filenum   Required word, integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 35 to enable **!!!**, and 34 to disable **!!!**.

anything   Required logical word. The dummy parameter is not modified by FCONTROL(34) or (35).

Defining Alternate Parity Checking and Generation Characteristics--FCONTROL(36)

When a port is initially opened, certain parity conditions exist by default. They are determined by the type of controller, how the port is configured, whether the port is opened by an operator logon or by a user program, and the Terminal Type. These default conditions can be changed programmatically by calling FCONTROL(36) and FCONTROL(24). FCONTROL(36) defines the new parity conditions and FCONTROL(24) enables them. FCONTROL(23) can be called to disable the current parity conditions.

On ATC, you can have output parity generation (by calling FCONTROL(36)) without input parity checking (by calling FCONTROL(24)). On ADCC, ATP37, and ATP you always have both and must call both FCONTROL(36) and FCONTROL(24).

FCONTROL(36) cannot be used for printers with ADCC (MPE V/E), ATP, or ATP37.

Parity checking and generation characteristics for the various Terminal Types are described in Part 4.

Syntax

```
FCONTROL(filenum,controlcode,parity'parm);
```

Parameters

filenum Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode Required integer by value. The integer is 36.

parity'parm Required logical word. Use 0, 1, 2, or 3. The results are shown in table 3.2-4.

FCONTROL

Table 3.2-5. Results of *parity'parm* -- FCONTROL(36)

Code	ATP or ATP37	ADCC	ATC
0	**Input:** Even parity checked, if enabled. **Output:** Bit 8 set to 0, if enabled.	**Input:** Even parity checked, if enabled. **Output:** Even parity generated, if enabled.	**Input:** No checking--bit 8 set to 0. **Output:** All 8 bits transmitted.
1	**Input:** Odd parity checked, if enabled. **Output:** Bit 8 set to 1, if enabled.	**Input:** Odd parity checked, if enabled. **Output:** Odd parity generated, if enabled.	**Input:** No checking--bit 8 set to 0. **Output:** Bit 8 set to 1.
2	**Input:** Even parity checked, if enabled. **Output:** Even parity generated, if enabled.	**Input:** Even parity checked, if enabled. **Output:** Even parity generated, if enabled.	**Input:** Even parity checked, if enabled. **Output:** Even parity generated if bit 8 of the character to be output is 0. Odd parity generated if bit 8 of the character to be output is 1.
3	**Input:** Odd parity checked, if enabled. **Output:** Odd parity generated, if enabled.	**Input:** Odd parity checked, if enabled. **Outpt:** Odd parity generated, if enabled.	**Input:** Odd parity checked, if enabled. **Output:** Odd parity generated, if enabled.

Allocating a Terminal--FCONTROL(37)

Call FCONTROL(37) to allocate a terminal, setting Terminal Type and speed. FCONTROL(37) is also used to restore the configured Terminal Type and speed.

```
        NOTE
```

If you are using a user-defined Terminal Type, you must call FDEVICECONTROL to do these actions. You cannot use FCONTROL(37) for user-defined types.

It is not necessary to allocate a programmatic device before it can be used, but it is good practice to do so. If your program always allocates a device after opening it, you are always certain the port is operating with the expected Terminal Type and speed.

These values also can be set individually; however by using FCONTROL(37), it allows you to set the Terminal Type and port speed in a single FCONTROL call.

Syntax

```
FCONTROL(filenum,controlcode,alloc'parm);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 37 .

alloc'parm   Required logical word. Bits (0:11) contain speed in characters per second. Bits (11:5) contain the Terminal Type. (Refer to Part 4 of this manual for a table of Terminal Types.) If *alloc'parm* is set to 0, the system configured speed and Terminal Type is used.

```
0                10 11        15
  | SPEED         |  TYPE      |
```

FCONTROL

Program Example

```
ALLOC'PARM:=%017012;  <<Set Speed to 2400 bps: bit 0/11 = 240  >>
                      <<Set Terminal Type to 10: bit 12/15 = 10>>
FCONTROL(FILENUM,37,ALLOC'PARM);
IF <> THEN QUIT(3714);
```

Setting Terminal Type--FCONTROL(38)

Calling FCONTROL(38) allows you to change the port's Terminal Type to another system-defined type. If the device is an interactive session terminal, be sure to restore the original type when done.

Syntax

```
FCONTROL(filenum,controlcode,type);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 38 .

type   Required logical word. Must contain the desired Terminal Type. (See Part 4 of this manual for the Terminal Types.)

```
┌──────────┐
│  NOTE   │
└──────────┘
```

If you are using a user-defined Terminal Type, you must call FDEVICECONTROL instead of FCONTROL.

Program Example

```
TYPE:=18;
FCONTROL(FILENUM,38,TYPE);
IF <> THEN QUIT (112);
```

FCONTROL

Determining Current Terminal Type--FCONTROL(39)

Use this FCONTROL call to obtain the current Terminal Type for the port. Normally, you will want your program to restore this Terminal Type when you are done. A value of 31 is returned if no Terminal Type was configured into the system for this terminal. A value of 0 is returned if the Terminal Type is user-defined (call FDEVICECONTROL to get the name of the Terminal Type file).

Syntax

```
FCONTROL(filenum,controlcode,type);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file on the terminal.

controlcode   Required integer by value. The integer is 39 .

type   Required logical word. The current Terminal Type number is returned in this parameter, or 0 is returned if the current type is user-defined.

┌─────────────┐
│   **NOTE**   │
└─────────────┘

Terminal Type 0 is a true Terminal Type on Series II/III systems, but there are no user-definable types on these systems.

Program Example

```
FCONTROL(FILENUM,39,TYPE);
IF <> THEN QUIT (514);  <<Error?>>
```

Determining Port Output Speed--FCONTROL(40)

Call FCONTROL(40) to obtain the port's output speed before specifically changing it or allocating the port. This allows you to restore the speed if desired. The value returned in *speed* is the speed in characters per second at which the port is configured to run or is running. A value of zero is returned if no speed was specified at system configuration time. Users of ATC ports should note that if the input speed is not the same as the output speed (split speed operation), only the output speed is returned. FCONTROL(10) needs to be called to get the input speed.

Syntax

```
FCONTROL(filenum,controlcode,speed);
```

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call to open a file on the terminal.

controlcode   Required integer by value. The integer is 40 .

speed   Required logical word. The port's current operating speed, in characters per second, is returned in this parameter.

Program Example

```
FCONTROL(FILENUM,CONTROLCODE,SPEED);
IF <> THEN QUIT (114);
```

FCONTROL

Enabling Transparent Editing Mode--FCONTROL(41)

Transparent Editing Mode allows most control characters to pass through to your program, but still allows special character terminations (Binary Mode passes all characters to the program and terminates *only* on byte-count.) Transparent Mode may, in turn, be overridden by Binary Mode (FCONTROL(27)).

Transparent Editing Mode (also called Unedited Mode) is enabled any time FCONTROL(41) is called with a parameter. Transparent Mode only applies to reads.

Syntax

FCONTROL(*filenum,controlcode,chars*);

Parameters

filenum   Required integer by value. Contains the file number returned in the FOPEN call used to open a file.

controlcode   Required integer by value. The integer is 41.

chars   Required logical word.
                   Bits (0:8) contain the Attention (Subsystem Break) character.
                   Bits (8:8) contain the End of Record Character.
                   If *chars* is set to zero, Standard Editing is restored.

Only the following input characters are recognized in Transparent Mode:

- A (CONTROL)A (Start of Header) on a logical console. This character is stripped. The HP 3000 sends an equal sign (=) and expects the next input to be a console command (for example, =REPLY, =RECALL, =SHUTDOWN).

- A user-defined End-of-Record character. This character functions like the Carriage Return in Standard Editing Mode, and is stripped when found.

- A user-defined Attention character. This character functions like the EM ((CONTROL)Y) character in Standard Editing Mode, and is ignored if Subsystem Break is not accepted. It is always stripped from the input stream.

- A user-defined alternate terminating character. The FCONTROL(41) EOR character terminates the read first, if found first in the input. The input of the FCONTROL(25) EOR character terminates the READ in "error" and the EOR character is not stripped.

- A leading DC2 (Control-R) or a DC2 and Carriage Return with Block Mode Terminal Types. This is embedded in the data, and the HP 3000 responds by stripping the DC2, flushing all previous read data, and sending a DC1 to the terminal.

When several files are open on a device at the same time (multiple FOPEN calls were issued), Transparent Editing will be in effect for all of the files if it was explicitly enabled for any one of them.

If input terminates with the defined End-of-Record or alternate EOR character, Carriage Return/Line Feed are not sent to the terminal. If input terminates by count, Carriage Return and Line Feed are sent unless FSETMODE(4) was called.

If you enable Binary Editing, Transparent Editing is automatically disabled. Transparent Editing and Binary Mode are disabled while a terminal is in a System Break or in Console Mode.

Standard Editing is restored when FCONTROL(41) is called with the *chars* parameter set to zero or when any FCLOSE call is made against the terminal.

Effects of Transparent Editing on processing of parity bits:

ATP, ATP37, and ADCC	Parity is processed the same in Transparent Mode as in Standard Mode.
ATC	On input, no parity checking takes place and all input parity bits are set to zero. Output parity generation is performed as during Standard Editing.

Program Example

```
FCONTROL(FILENUM,41,CHARS);
IF <> THEN QUIT(12);
```

FCONTROL

Aborting a Pending No-Wait I/O Request--FCONTROL(43)

Aborts the one no-wait pending against the specified file. It is not normally used for terminals (use IODONTWAIT).

Program Example

```
FCONTROL (FILENUM,43,DUMMY);  <<Abort I/O>>
IF <> THEN QUIT (423);
```

FCONTROL

PURPOSE

To add a variety of control directives to a device file.

SYNTAX

```
                        IV      LA      IV    IV    LV      LV     I
FDEVICECONTROL  (filenum,target,tcount,192,itemno,access,error);
```

PARAMETERS

filenum	Required integer by value. The file number of the open terminal.
target	Required logical array. It points to the user's data area for the data item specified.
tcount	Required integer by value. The length of a target in words (if the value is positive) or in bytes (if the value is negative). The length is one for most items, otherwise the items are arrays.
itemno	Required logical by value. The item number of the item desired (refer to table 3.2-6).
access	Required logical by value. A value from one to three, which specifies the type of access desired for the item (refer to table 3.2-6).
error	Required integer. It contains a file system error number if an error occurs. If no error occurs, the value is set to zero.

FDEVICECONTROL

There are a number of items available through FDEVICECONTROL, which are specified in table 3.2-6. The table shows you the item number, along with the type of access available for that item. The access types are Read (1), Write (2), or both Read and Write (3). The type of access is indicated in the table with an R, which indicates only the value 1 is allowed for the *access* parameter, or with R/W, which indicates all three values: 1, 2, or 3, are allowed for *access*. The table also shows you the type of variable that contains the data, such as: IA for Integer Array, I for Integer, and L for Logical.

```
NOTE
```

Byte and byte arrays are accessed through integers and integer arrays to make all accesses through word addresses. Single bytes are stored in the right half of the integer; byte arrays are stored packed beginning in the left half of the first word of the integer array.

Items listed as a logical word are set based on bit 15 of the words passed. The returned values are −1 if the value is true and 0 if the value is not true.

FDEVICECONTROL

Table 3-2.6. FDEVICECONTROL Item Number

itemno	Access	Type	Function
1	R/W	IA	Terminal Type file name
11	R/W	L	Parity checking and generation enabled
12	R/W	I	Type of parity (see table under FCONTROL(36))
15	R/W	I	Unedited mode characters. The returned value has the following format: bits (0:8) = Subsystem Break character*** bits (8:8) = special EOR character***
17*	R/W	I	Enquiry character***
18*	R/W	I	Acknowledge character***
19*	R/W	I	ENQ/ACK block size
20*	R/W	I	ACK timeout option
22**	R/W	I	Carriage Return (CR) delay (expressed in tenths of a second)
23**	R/W	I	Line Feed (LF) delay (expressed in tenths of a second)
24**	R/W	I	Form Feed (FF) delay (expressed in tenths of a second)
26	R/W	I	Device originated XON/XOFF enable 0=Disabled 1=Enabled
27	R/W	I	XOFF timer value (zero is disabled)
28	R/W	I	Block Mode types supported: 0=Neither 1=Line Block 2=Page Block 3=Both
29*	R/W	I	Block Mode alter character ***

*   Programmatic control of these parameters may not be available on future versions of the HP 3000 system. Control via user-defined Terminal Types will be available.

**   Future I/O controllers will not support this feature.

***   With MPE Version G.01.00 or later, this character must be a 7-bit character. Eight-bit special characters are *not* allowed with these versions of MPE.

FDEVICECONTROL

Table **3-2.6.** FDEVICECONTROL Item Number (cont'd)

itemno	Access	Type	Function
30*	R/W	I	Block Mode trigger character***
32	R/W	I	Read trigger character (zero is no read trigger)***
35**	R/W	I	Console attention character***
36	R/W	I	Backspace character***
37	R/W	I	Cancel line character***
39	R/W	IA	Type 1 EOR characters***
40	R/W	IA	Type 2 EOR characters***
41	R/W	IA	Subsystem Break characters***
43*	R/W	L	XON/XOFF stripped
44*	R/W	L	Subsystem Break stripped
45*	R/W	L	Console attention stripped
46*	R/W	IA	Stripped characters***
52*	R/W	L	Form Feed (FF) allowed in output data
53*	R/W	I	Form Feed (FF) replacement character***
54*	R/W	L	Line Feed (LF) wraparound enabled
55*	R/W	I	Backspace response action: 1=Nothing 2=[CONTROL]Y 3=Linefeed 4=Slash 5=Erase Character
56	R/W	I	Data bits per character (only 7 or 8 bits supported)
57	R	I	Last Subsystem Break character accepted

* Programmatic control of these parameters may not be available on future versions of the HP 3000 system. Control via user-defined Terminal Types will be available.

** Future I/O controllers will not support this feature.

*** With MPE Version G.01.00 or later, this character must be a 7-bit character. Eight-bit special characters are *not* allowed with these versions of MPE.

PURPOSE

To obtain text error message corresponding to an FCHECK error code.

SYNTAX

```
                    I          LA         I
        FERRMSG(errorcode,msgbuf,msglength) ;
```

PARAMETERS

errorcode   Required integer. Contains the error code for which a message is to be returned. It should contain an error number returned by FCHECK.

msgbuf   Required logical array. The message associated with *errorcode* is returned by FERRMSG. To contain the message string, *msgbuf* must be a maximum of 72 characters long.

msglength   Required integer. It returns the length of the *msgbuf* string. The length is returned as a positive byte count.

FFILEINFO

PURPOSE

To provide information about the characteristics of a file (its device type, foptions, aoptions, record size, etc.). Refer to the *MPE Intrinsics Reference Manual* for a complete list of the characteristics and for a description of the parameters.

SYNTAX

```
                    IV        IV         BA
       FFILEINFO(filenum,itemnumber1,itemvalue1

                    [,itemnumber2,itemvalue2]

                    [,itemnumber3,itemvalue3]

                    [,itemnumber4,itemvalue4]

                    [,itemnumber5,itemvalue5]);
```

> ### NOTE
>
> The *itemnumber/itemvalue* parameters must appear in pairs. One to five items of information can be retrieved by specifying one to five pairs.

PARAMETERS

filenum   Required integer by value. It should be the MPE file number returned by FOPEN.

itemnumber   Optional integer by value. This is the cardinal number of the item desired. Refer to table 3.2-6 for a list of item numbers that apply.

itemvalue   Optional byte array. Returns the value of the item specified by the corresponding *itemnumber*. The data type of the item value depends on the item number.

Table 3.2-7. FFILEINFO Item Numbers

itemnumber	Type	Item Name	Comments
1	BA	filename	
2	L	foptions	
3	L	aoptions	
4	I	recsize	For item numbers
5	I	devtype	1 through 19,
6	L	ldnum	refer to FGETINFO
7	L	hdaddr	for more
8	I	filecode	information.
9	D	recpt	
10	D	eof	
11	D	flimit	
12	D	logcount	
13	D	physcount	
14	I	blksize	
15	L	extsize	
16	I	numextents	
17	I	userlabels	
18	BA	creatorid	
19	D	labaddr	
20	I	blocking factor	Refer to FOPEN.
21	I	physical block size in words	
22	I	data block size in words	
23	I	offset to data in blocks (words)	
41	I	device type	
42	I	device subtype	

FGETINFO

PURPOSE

To obtain access and status information about a file.

SYNTAX

```
           IV       BA        L           L           I
FGETINFO(filenum[,filename][,foptions][,aoptions][,recsize]

          I         L         L           I          D       D
[,devtype][,ldevnum][,hdwraddr][,filecode][,recpt][,eof]

           D         D          D           I          L
[,flimit][,logcount][,physcount][,blksize][,extsize]

           I            I          BA          D
[,numextents][,userlabels][,creatorid][,labaddr]);
```

PARAMETERS

filenum   Required integer by value. The file number that was returned in the FOPEN call opening this file.

The remaining parameters are for output and are optional. Of these, the following are useful for terminals and printers.

filename   Optional logical word. A byte array 28 bytes long, in which is returned file's "actual file designator".

foptions   Optional logical word. A word returning information on seven different file characteristics: Domain, ASCII/ Binary, Actual File Designator, Record Format, Carriage Control, MPE Tape Label, Disallow File Equation, KSAM File, and Relative I/O.

aoptions Optional logical word. A word returning information on seven different file characteristics: Access Type, Multirecord, Dynamic Locking, Exclusive, Inhibit Buffering, Multi-Access Mode, No-Wait I/O, and KSAM Access. Not all of these are meaningful.

recsize Optional integer. A word returning the logical size of records in this file.

devtype Optional integer. A word returning the port's configured Device Type and Subtype. If the file is not spooled, or if the file was opened by logical device number, this word contains the Types actually configured for the device associated with this file. Bits (0:8) contain the Device Type; bits (8:8) contain the Subtype. For a listing of Device Type and Subtype definitions, refer to table 3.2-6, the *devtype* parameter under FOPEN.

ldevnum Optional logical word. A word returning the logical device number of the port (and device) associated with this file.

hdwraddr Optional logical word. A word returning the hardware address of the device. Bits (0:8) contain the Device Reference Table (DRT) number, and bits (8:8) contain the Unit number. If the device is spooled, the DRT number is "0" and the Unit number is undefined.

logcount Optional double word. A double word returning the total number of logical records passed to and from the user during the current access of the file.

physcount Optional double word. A double word returning the total number of physical I/O operations performed within the current process since the file was opened.

FOPEN

PURPOSE

To define the physical characteristics of a file and to set up access to the file.

SYNTAX

```
                      BA            LV          LV           IV
filenum:=FOPEN([formaldesignator][,foptions][,aoptions][,recsize]

              BA        BA         IV           IV           IV
        [,device][,formmsg][,userlabels][,blockfactor][,numbuffers]

              DV          IV            IV           IV
        [,filesize][,numextents][,initialloc][,filecode]);
```

If you open a file with a system-defined name, it can be opened for input or output only. The system-defined name must be specified in the default file designator field of FOPTIONS.

PARAMETERS

formaldesignator   Optional byte array. It contains a **formaldesignator** for the file. This can be a user-defined file name or a system-defined name (in which case it begins with a dollar sign ($)). The formal designator gives the user the flexibility of associating the file with different devices via the :FILE command. (See the *MPE Commands Reference Manual.*)

An advantage of using a user-defined formal designator is that the file can be back-referenced, if :FILE is enabled in FOPTION. If you use one of the system-defined files, $STDIN, $STDINX, or $STDLIST, the file can be used for either input or output (depending on how the file was opened), but not for both.

The use of a formaldesignator in programs written for asynchronous devices is recommended because of the added flexibility this provides. However, a formaldesignator is not required.

foptions   Optional logical by value. It allows you to specify different file characteristics by setting various bits within the word. Not all characteristics are relevant for terminal and printer files. Nonetheless, it is recommended that you set *foptions* to allow the file characteristics you establish to be associated with other devices (via the :FILE command) as well. The definitions of the bit positions are as follows:

Domain
(bits 14:2)

Ignored for terminals and printers. Use if you anticipate re-direction of the file to some other device. If re-direction is expected, select a domain of Old Permanent or Termporary (11). Otherwise set to 00.

ASCII/Binary
(bits 13:1)

Ignored for terminals. All files not on disc are treated as ASCII files. To enable the transfer of binary data, call FCONTROL(27). Set to one.

Default File Designator
(bits 10:3)

Select $STDIN (100), $STDINX (101), or $STDLIST (001). Use $STDLIST for printers.

Record Format
(bits 8:2)

For terminals, records are always of undefined length. Hence, this field is ignored when the file is opened on a terminal. It is recommended you specify "fixed-length" in case someone redirects the file to a tape device or disc. For terminals and printers, set to 00.

Carriage Control
(bit 7)

You must request carriage control (by setting this bit to one) if you intend to use the CCTL specification later (in FWRITE calls). If carriage control is not specified, only single-spacing will be available to this file.

Labeled Tape
(bit 6)

Meaningless with terminals. But, if you intend to allow re-direction of the file to tape, you may wish to set the bit. Normally set the bit to zero.

Disallow File Equation
(bit 5)

If this bit is set, the *foptions* you select here cannot be overridden with a :FILE command except if it is used in conjunction with another command that includes a backreference to the formal designator. Normally set to zero.

File Type
(bit 2:3)

Set to 000 (standard file).

(bits 0:2)

Reserved for MPE; should be set to 00.

FOPEN

aoptions   Optional logical by value. A one-word parameter in which you specify file access characteristics. The bit fields have the following meanings:

Access Types   Table 3.2-6 shows the acceptable choices for terminals
(12:4)   and printers.

Table 3.2-8. Access Types

Access Types	Value	Used with a Terminal	Used with a Printer
Read only	0000	OK	Returns File System Error 40: Operation Inconsistent with Access Type.
Write only (Write/Delete)	0001	OK	OK
Write (save) only	0010	OK	Executed as **Write only**.
Append only	0011	OK	Executed as **Write only**.
Read/Write	0100	OK	Executed as **Write only**.
Update	0101	OK	Executed as **Write only**.
Execute	0110	Returns File System Error 40: Operation Inconsistent with Access Type.	Returns File System Error 40: Operation Inconsistent with Access Type.

Note on Read access: If you specify read access for a terminal file, the `:DATA` command (or, in the case of a slaved card reader, a data card) must be entered before any data can be read from the device. This is true whether or not any file had been opened on the terminal already or whether or not a Session is running on the terminal. If the current file is opened before the `:DATA` command is entered, the message `IS FILE ____ ON LDEV#___?` will be displayed at the system console. If the Operator responds `NO`, the FOPEN will return with an error. If the Operator responds `YES`, the File System will look for a `:DATA` command (or card). If none has been entered at the terminal yet, the console message will be sent to the console again.

Note on Input/Output (Read/write) access: If you specify this access option, intending to read and write through this file, you cannot have specified a system-defined file name in the Default File Designator field of the *foption* parameter. If you specified `$STDIN` or `STDINX`, this file can only be used for reading from the device. If you specified `$STDLIST`, you can only use this file to write to the device. If, however, the device was already opened for reading via the `$STDIN` or `$STDINX` input file and for writing via the `$STDLIST` output file (such as would be the case with a terminal that had a Session running on it), your program can issue a single FOPEN call to allow it to read and write.

Multirecord (bit 11)	Allows a block of data (size specified in the *tcount* parameter of the read or write request) that exceeds the file's physical record size to be transmitted as several records. This option is available to terminals (Device Type 16) but not to printers (Device Type 32). Data written to printers is not broken up on record boundaries, as with terminals. Instead it is written as a single long record.
Dynamic Locking (bit 10)	Ignored for terminals and printers.
Exclusive Access (bits 8:2)	Applies to terminals but not printers. Exclusive access is available during the first FOPEN issued against a terminal. If a session is already running on a terminal, it is not possible to issue another FOPEN with "exclusive" specified.
Inhibit Buffering (bit 7)	This bit is ignored for terminals and remote spooled printers. Buffering is inhibited by default. (Inhibited buffering means that your process is assigned no system buffers.) Terminals always are treated with buffering inhibited.
Multi-access (bits 5:2)	This is ignored for terminals and printers.
No-Wait I/O (bit 4)	Terminal operation with No-Wait I/O has the standard No-Wait ramifications--no buffering, Privilege Mode required, IOWAIT or IODONTWAIT must be called after each I/O request.
File Copy (bits 3:1)	Permits any file to be treated as a standard sequential file, rather than as a file of its own type.
(bits 0:3)	Reserved for MPE. Should be set to zero.

FOPEN

recsize
Optional integer by value. It indicates the logical record size. This parameter operates with the terminal driver as described in the *MPE Intrinsics Reference Manual.*

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Since terminal and printer files are treated as ASCII files, you can specify a record size consisting of an odd number of bytes; rounding up will not occur. The *recsize* may be other than the record size configured for the terminal's port. The default value is the configured record size (40 words for terminals, 66 words for printers, normally).

device
Optional byte array. A byte array in which you can specify a particular device class or logical device number. If you intend to read and write through a single file, you must use this parameter. (That is, if you intend to FOPEN the device once, with read and write access, you must use this parameter.)

formmsg
Optional byte array. It is used primarily for printers. It contains a message that can be used for such purposes as telling the Operator what type of paper to use in the printer. When the message is sent to use in the processing is delayed until the Operator replies. This parameter is also available to terminals (Device Type 16).

userlabels
Optional integer by value. It applies to disc files only.

blockfactor
Optional integer by value. This parameter is meaningless for terminals and printers as they are always given a blocking factor of "1".

numbuffers
Optional integer by value. A one-word parameter with three bit fields: Number of Buffers, Number of Copies, and Output Priority. Number of Buffers (11:15) does not apply to terminals or printers (Type 16 and 32) as data transfers to and from them are always unbuffered. Number of Copies (4:7) and Output Priority (0:4) apply to printers (Type 32) as they would to any other spooled devices.

The remaining parameters, *filesize, numextents, initialloc,* and *file code* apply to disc files and are meaningless for terminals and printers.

PURPOSE

To read a logical record from a file on any device to the user's stack; that is, to transfer data from a device (in this case, a terminal), to the user's stack one record at a time. Condition codes are used to indicate completion status, and should be checked. Read timeouts or timers must be set prior to an FREAD, by calling FCONTROL .

SYNTAX

```
         I          IV    LA    IV
length:=FREAD(filenum,target,tcount);
```

PARAMETERS

length
Required positive integer. The length of the data transfer is returned. If *tcount* is positive, length is in words; if *tcount* is negative, length is in bytes.

filenum
Required integer by value. A word identifier supplying the number of the file to be read. It is the same number that was returned in the FOPEN call.

target
Required logical array. An array to which the record is to be transferred. By being a logical array, it avoids unwanted warning messages from the SPL compiler. This array can be equated to a byte array to facilitate data checking after input on a byte-by-byte basis.

tcount
Required integer by value. An integer specifying the maximum expected number of words or bytes to be transferred. A positive number indicates words; a negative number indicates bytes.

NOTE

Whether you specify words or bytes, the actual physical transfer is done on a byte-by-byte basis for an asynchronous device. If the number of bytes input exceeds this value, the read terminates on byte count.

FREAD

CONDITION CODES

CCE   The information was read.

CCG   The EOF was found (:EOD, :EOF:, etc).

CCL   An error occurred (parity, etc.) or a read terminated on timeout or the special EOR
character set via FCONTROL(25), so call FCHECK to find out.

PROGRAM EXAMPLE

```
LENGTH:=FREAD(FILENUM,READTARGET,TCOUNT);
IF > THEN QUIT (1);        <<EOF?>>
IF < THEN GOTO CHECK'EOR;  <<EOR or Error?>>
```

PURPOSE

To inhibit automatic carriage control and Line Feed functions at the terminal.

SYNTAX

```
                 IV         LV
   FSETMODE(filenum,modeflags);
```

PARAMETERS

filenum   Required integer by value. A word identifier supplying the number of the file to which the call applies; this number was returned in the FOPEN call.

modeflags   Required logical by value. A word whose bits may be set to denote various operations. Only bit 13 applies to terminals, therefore *modeflags* is either 004 or 000.

```
. 0                                    15
  ┌─────────────────────────────────────────┐
  │ 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 │
  └─────────────────────────────────────────┘
```

Bit (13)   Terminal Control by User:

1 = Inhibit normal terminal control by terminal driver. The result is that the driver does not automatically send out Carriage Return and Line Feed at the end of each terminal input line (*modeflags* = 4).

FSETMODE

0= Restore normal terminal control by terminal driver (*modeflags* = 0).

Normal terminal control: If the terminal operator ends a line of input by pressing (RETURN), the Echo Facility echoes the Carriage Return back to the terminal and the driver sends out a Line Feed to the terminal. If input reaches the read byte count limit (as set in the *tcount* parameter of FREAD, or in the *expectedl* parameter of READ or READX), the driver sends out a Carriage Return and a Line Feed. If the terminal operator presses (RETURN) after the driver responds to an exhausted read count, the Carriage Return is echoed, but no Line Feed is sent. If the Echo Facility is disabled and the operator presses (RETURN), Carriage Return will not be echoed back to to the terminal.

PROGRAM EXAMPLE

```
FSETMODE(FNUM,4);
IF <> THEN QUIT (14);    <<Failed?>>
```

PURPOSE

To transfer a logical record of data from the user's stack to a file on any device (in this case, either a terminal or a printer). Completion status is indicated by condition codes, which should be checked.

SYNTAX

```
                 IV       LA       IV       LV
    FWRITE(filenum,writetarget,tcount,control);
```

PARAMETERS

filenum   Required integer by value. A word identifier supplying the file number of the file to be written to.

writetarget   Required logical array. It contains the record to be written.

tcount   Required integer by value. An integer specifying the number of words or bytes to be written. If positive, signifies words; if negative, bytes.

> **NOTE**
>
> Whether or not "bytes" is specified, the physical data transfer will be on a byte-by-byte basis for an asynchronous device. If words are always specified, an "even" number of bytes are output. If you call FWRITE with a byte array, the SPL compiler outputs a warning message. To avoid the warning message, equate the logical array to a byte array and call FWRITE with the logical array after loading either the logical array or the byte array with the data. If words are written and you did not load an even number of bytes, then the last byte can print as unwanted garbage.

control   Required logical by value. It represents a carriage control if the file is transferred to a terminal or printer (or to a spooled file whose ultimate destination is a terminal or printer). This parameter is effective only with files that were opened with the carriage control option selected (in the Carriage Control *foption*). If the Carriage Control *foption* was not selected, you will always get single-spacing, regardless of what code you specify here.

FWRITE

If zero is selected, the whole record is printed with single-spacing. This results in a maximum of 132 printed characters per line.

If a one is selected, the first character of data is taken as the carriage control character. Whenever this character is seen in the data, a specific spacing action results without the character itself being printed. The various carriage control codes and their meanings are shown in the *MPE Intrinsics Reference Manual*, under FWRITE.

```
     NOTE
```

Three of the codes, %55 (for triple-spacing), %60 (for double-spacing), and %2nn (for nn-spacing), always bring about automatic page eject when used with printers connected to the terminal I/O controllers. Carriage control options are fully described in the *MPE Intrinsics Reference Manual.*

This intrinsic is completed "logically" and control is returned to the calling program when the last character of data is moved into Terminal Buffers (TBUFs). If the device has suspended output (via a flow control handshake--XON/XOFF or ENQ/ACK), as many as 500 characters of output may be in TBUFs. The exact number is controller dependent. There is no programmatic method of verifying the "physical" I/O is complete.

CONDITION CODES

CCE   The information was written.

CCG   It should not occur for terminals or printers (physical EOF).

CCL   Request denied because an error occurred. Call FCHECK for more information.

PURPOSE

To obtain any MPE message from the MPE message catalog and route it to a file or program.

SYNTAX

```
        I                    IV      IV      IV      BA      IV
msglength:=GENMESSAGE(filenum,setnum,msgnum[,buff[,buffsize]

                      LV          LV          LV          LV
                 [,parmask][,parm1][,parm2][,parm3]

                      LV          LV        IV          I
                 [,parm4][,parm5][,msgdest][,errnum]);
```

PARAMETERS

filenum   Required integer by value. A word identifier supplying the file number of the message catalog.

setnum   Required integer by value. A positive integer not greater than 62 specifying the message set number within the catalog.

msgnum   Required integer by value. A positive integer, specifying the message number within the message set.

buff   Optional byte array. A byte array to which the message is returned.

buffsize   Optional integer by value. When *buff* is specified, *buffsize* is the size, in bytes, of the array. When *buff* is not specified, *buffsize* is the length, in bytes, of the records written to the destination file.

parmask   Optional logical by value. A 16-bit logical mask indicating parameter types for *parm1*, *parm2*, *parm3*, *parm4* and *parm5*.

GENMESSAGE

parm1 *parm2* *parm3* *parm4* *parm5*	Optional logical by value. They are parameters to be inserted into the message.
msgdest	Optional integer by value. An integer value indicating where the message is to be sent. It is either zero ($STDLIST) or the file number of the destination file.
errnum	Optional integer. An integer to which is returned an error code generated by successful completion of, or an error in your call to GENMESSAGE.

PROGRAM EXAMPLE

```
MSGLEN:=GENMESSAGE(FILENUM,SETNUM,MSGNUM,BUFF,BUFFSIZE,
        PARMASK,PARM1,PARM2,PARM3,PARM4,PARM5,MSGDEST,
        ERRNUM);
```

PURPOSE

To initiate completion of a No-Wait I/O request. If I/O has not completed when this intrinsic is called, control is returned to the calling process. (Compare with IOWAIT.)

SYNTAX

```
    I       IV      LA        I           L
fnum:=(filenum[,target][,cstation][,tcount]);
```

The intrinsic returns an integer representing the file number for which completion occurred. If no completion occurred, "0" is returned.

PARAMETERS

filenum   Required integer by value. A word identifier specifying the file number for which there is a pending I/O request. If "0", the intrinsic checks for any I/O completion. The number of the file whose I/O completed is returned in fnum.

target   Optional logical array. A word pointer specifying the DB-relative address of the input buffer in the user's stack. Since terminals always operate without system buffering, it is not necessary for this parameter to follow a read.

cstation   Optional logical word. It does not apply to asynchronous terminals and printers.

tcount   Optional logical array. A word to which is returned the amount of data transferred. If an original I/O request specified bytes, this number represents bytes; otherwise it represents words. It is valid only if the original operation was a Read operation.

NOTE

FREAD completes immediately, returning bytes read when doing a NOWAIT I/O. You have to call IOWAIT or IODONTWAIT, then get the number of bytes read from *tcount*.

IODONTWAIT

PROGRAM EXAMPLE

```
    FNUM:=IODONTWAIT(FILENUM,,TCOUNT);
IF < THEN GOTO CHECK 'ERROR
     ELSE IF > THEN QUIT (1);     <<EOF?>>
IF FNUM <> 0 THEN HANDLE 'IO (FNUM);
```

IOWAIT

PURPOSE

To wait for completion of a No-Wait I/O request. If no I/O has completed, the calling process is suspended until a read or write completes.

SYNTAX

```
         I            IV        LA        I          L
fnum:=IOWAIT([,filenum][,target][,tcount][,cstation]);
```

The intrinsic returns an integer representing the file number for which completion occurred. If no completion occurred, "0" is returned, and CCL is set.

PARAMETERS

filenum Optional by value. A word identifier specifying the file number for which there is a pending I/O request. If "0", the intrinsic waits for the first completion. The number of the file whose I/O completed is returned in fnum.

target Optional logical array. A word pointer specifying the DB-relative address of the input buffer in the user's stack. Since terminals always operate without system buffering, it is not necessary for this parameter to follow a read.

tcount Optional integer. A word to which is returned the amount of data transferred. If the original I/O request specified bytes, this number represents bytes; otherwise it represents words. Notice, FREAD completes immediately and returns 0 bytes read, when NOWAIT I/O is specified. To get the actual number of bytes, you have to call IOWAIT or IODONTWAIT and get the number from *tcount*.

cstation Optional logical word. It does not apply to asynchronous terminals and printers.

PROGRAM EXAMPLE

```
FNUM:=IOWAIT(FILENUM,,TCOUNT);
IF > THEN QUIT (1);     <<EOF?>>
IF < THEN GOTO CHECK'ERROR;   <<No I/O requests?>>
```

PRINT

PURPOSE

To write an ASCII message to the $STDLIST file. This intrinsic provides a quick method of sending output to the terminal. FWRITE is recommended for permanent programs.

SYNTAX

```
         LA      IV     IV
PRINT(message,length,control);
```

PARAMETERS

message   Required logical array. A logical array containing the string to be written.

length   Required integer by value. An integer denoting the length of the string to be transmitted. If positive, the length is in words; if negative, the length is in bytes.

control   Required integer by value. An integer representing a carriage control code. (The codes are listed in the *MPE Intrinsics Reference Manual* under FWRITE.)

PROGRAM EXAMPLE

```
PRINT(MESSAGE,LENGTH,CONTROL);
IF <> THEN QUIT (412);
```

CONDITION CODES

CCE   The data was written.

CCG   The physical end-of-data was encountered (normally,it should not be seen).

CCL   An error occurred. You cannot get any more information from FCHECK.

PURPOSE

To print a display of file information on the Session or Job list device. (The information displayed is sometimes referred to as the **tombstone.**) When a Condition Code returns a < or >, you should call FCHECK to obtain the error information. PRINTFILEINFO then displays the error information.

SYNTAX

```
                IV
PRINTFILEINFO(fnum);
```

The intrinsic can be called from SPL (only) in the following format as well:

SYNTAX

```
                 IV
PRINT'FILE'INFO(fnum);
```

They both output the same type of message.

PARAMETERS

fnum   Required integer by value. A word identifier supplying the number of the file
                        about which you desire information.

PROGRAM EXAMPLE

```
PRINTFILEINFO(FNUM);
```

PTAPE

PURPOSE

To copy data from paper tapes and other media to a disc file. The input must not contain the XOFF control character.

┌─────────────┐
│   **NOTE**   │
└─────────────┘

This intrinsic can be used with devices attached to the ATC only.

SYNTAX

```
          IV        IV
PTAPE(filenum1,filenum2);
```

PARAMETERS

filenum1   Required integer by value. A word identifier specifying the file number of the user's terminal. This is the value returned by FOPEN when the terminal file was opened.

filenum2   Required integer by value. A word identifier specifying the file to which data is to be written.

PROGRAM EXAMPLE

```
PTAPE(FILENUM1,FILENUM2);
```

PURPOSE

To read an ASCII string from $STDIN. Read timers or timeouts must be set prior to calling READ by first calling FCONTROL. READ is intended as a quick method of obtaining input from the terminal for temporary programming. FREAD is recommended for permanent programs.

SYNTAX

```
     I          LA       IV
length:=READ(message,expectedl);
```

This intrinsic returns a positive value representing the length of the ASCII string that was read. If *expectedl* was positive, the length is in words; if it was negative, the length is in bytes.

message   Required logical array. The array into which the ASCII characters are read.

expectedl   Required integer by value. An integer specifying the maximum length of the array *message*. If positive, the length is in words; if negative, the length is in bytes. If the number of bytes input exceeds this value, then the read terminates on the byte-count.

Notice, there is no file number specified, so there is no formaldesignator to be back referenced. Therefore, the :FILE command cannot be used to redirect input for programs using READ. (The only way that input can be redirected is to use the $STDIN=*filename* option of the :RUN command.) Input always comes from the $STDIN file opened by the session at logon time. If any errors occur, you cannot get more information from FCHECK.

PROGRAM EXAMPLE

```
LENGTH:=READ(MESSAGE,EXPECTEDL);
```

CONDITION CODES

CCE   The information was read.

CCG   An :EOD, :EOF:, or some other EOF condition occurred.

CCL   An error occurred. Further information cannot be obtained from FCHECK.

READX

PURPOSE

To read an ASCII string from $STDINX. Read timers or timeouts must be set prior to calling READ by first calling FCONTROL. READX is intended as a quick method of obtaining input from the terminal for temporary programming. FREAD is recommended for permanent programs.

SYNTAX

```
      I          LA      IV
length:=READX(message,expectedl);
```

This intrinsic returns a positive value representing the length of the ASCII string that was read. If *expectedl* was positive, the length is in words; if it was negative, the length is in bytes.

PARAMETERS

message   Required logical array. The array into which the ASCII characters are read.

expectedl   Required integer by value. An integer specifying the maximum length of the array *message*. If positive, the length is in words; if negative, the length is in bytes. If the number of bytes input exceeds this value, then the read terminates on the byte-count.

Notice, there is no file number specified, so there is no formaldesignator to be back referenced. Therefore, the :FILE command cannot be used to redirect input for programs using READX. Input always comes from the $STDINX file opened by the session at logon time. If any errors occur, you cannot get more information from FCHECK.

PROGRAM EXAMPLE

```
LENGTH:=READX(MESSAGE,EXPECTEDL);
```

PURPOSE

To reset terminals to accept the (CONTROL)Y signal.

SYNTAX

```
RESETCONTROL;
```

After the subsystem break function has been armed by XCONTRAP and has been detected by the computer (either through the ATTENTION character in Transparent Mode, or (CONTROL)Y (EM) in Standard Mode) the RESETCONTROL intrinsic must be called to "re-prime" the computer and allow it to accept the *next* subsystem break.

Calling XCONTRAP (0, OLD'PLAB) to disarm Subsystem Break will automatically clear the "priming" set up by RESETCONTROL.

CONDITION CODES

CCE   Ready for next Subsystem Break.

CCL   Request failed because XCONTRAP was not previously called to arm Subsystem Break.

WHO

PURPOSE

To determine attributes of the user running the program. Reports on such things as capabilities, Username, Groupname, Accountname, terminal logical device number.

SYNTAX

```
         L        D          D      BA
WHO([,mode][,capability][,lattr][,usern]

      BA        BA       BA        L
[,groupn][,acctn][,homen][,termn]);

Option Variable.
```

PARAMETERS

mode	Optional logical word. A word to which information about the user's current access mode is returned.
capability	Optional double word. A double word to which the user's file access, user, and capability class attributes are returned.
lattr	Optional double word. A double word to which is returned the local attributes of the user.
usern	Optional byte array. A byte array to which the user's Username is returned.
groupn	Optional byte array. A byte array to which the user's logon Groupname is returned.
acctn	Optional byte array. A byte array to which the user's logon Accountname is returned.
homen	Optional byte array. A byte array to which the user's home Groupname is returned. If no home group was assigned, this array is filled with blanks.
termn	Optional logical word. A word to which the logical device number of the input device for the Session or Job is returned.

PROGRAM EXAMPLE

```
WHO(MODE,CAPABILITY,,,,,,TERMN);
```

PURPOSE

To enable or disable the (CONTROL)Y trap.

SYNTAX

```
              IV        I
     XCONTRAP(plabel,oldplabel);
```

PARAMETERS

plabel   Required integer by value. An integer representing an external label of the user's
                trap procedure. If plabel is "0", the software trap is disabled.

oldplabel   Required integer. A word into which the previous plabel is returned to the user's
                program. If no plabel existed previously, "0" is returned.

PROGRAM EXAMPLE

```
XCONTRAP(@CONTROL'Y'HANDLER,OLD'PLAB);
IF <>THEN QUIT(12);    <<Failed?>>
FCONTROL(IN'FILE,17,DUMMY);  <<Enable Control Y>>
IF <> THEN QUIT (13);    <<Failed?>>
    .
    .
    .
    .
XCONTRAP(0,OLD'PLAB);    <<Disarm trap>>
IF <> THEN QUIT(768);
```

PART 4

COMMUNICATIONS AND PORT CHARACTERISTICS

PORT CONTROLLER FUNCTIONS

The ATP, ATP37, ADCC, and ATC, as interfaces to the HP 3000, perform a number of communication functions. They provide physical connection points for the peripheral devices, control the flow of data, perform parity checking (thereby improving the integrity of data), as well as process the information transmitted between the peripheral and the HP 3000. Most of the controller interface functions are user-selectable on a port-by-port basis. The interfaces are defined by the user during MPE I/O system configuration and can be modified later via program action or action of the device operator.

CONNECTIONS TO THE HP 3000

Peripheral devices are attached to the HP 3000 via ports on the computer. Ports may be thought of as data paths through which a peripheral device communicates with the computer. Ports consist of hardware (a physical connection point and controlling hardware), software (a device driver) and configurable port characteristics. The hardware is contained in an asynchronous port controller (an ATP, ATP37, ADCC or ATC). Each port controller provides several terminal ports. Each terminal port may be connected to a single device, which must conform to the characteristics of the port. In some configurations, two or more devices may be attached to a single port. The additional devices are physically connected to the original and operates as its "Slave"; the existence of the additional devices is not known to the port controller. Default port characteristics are configured during HP 3000 Input/Output System configuration; they comprise Device Type, Device Subtype, and Terminal Type. There are only two Device Types supported by the asynchronous port controllers: Type 16 (terminals) and Type 32 (printers); any other device, such as a plotter or a card reader, must be configured as a terminal or printer. (See Part 6, Section 1 for additional information on port configuration).

It is important to know whether the device you are using is attached directly or through a modem. Modem connections frequently are completed by the device operator, who must dial the computer on the phone before the device can begin communicating with the computer. In addition, modem connections are more sensitive to electrical interference or interruption, either of which can halt communications with the computer and cause a loss of data.

TERMINAL TYPES

When your System Manager or Operator configures the computer (that is, defines the characteristics of the computer), he defines the characteristics of each terminal port he wishes to make available for use. The definitions of each port usually reflect the characteristics of the type of terminal or printer most likely to be connected to the port.

Hewlett-Packard uses the expression **Terminal Type** (or **Termtype**) to refer to the configured relationship between a given terminal and the software and hardware on the HP 3000.

The Terminal Type is a set of characteristics that define much of the relationship between your device and the computer (actually, the device driver on the computer). The characteristics include such things as the size of data character your device uses, flow control for inbound and outbound data, whether the device operates in Block Mode, how the computer responds to a ⌷BACKSPACE⌷ character, and the default state of parity generation and checking for 7-bit characters. It is not necessary to understand Terminal Types in order to operate your device, but it is useful to know they exist. Users of some terminals need to alter their port's Terminal Type when they initiate communication with the computer. The reason for this is that the port was configured into the HP 3000 Input/Output System with a type that is not suited to their terminal. Often, this is true for dial-up modem ports, where many different terminals may share a single port.

The HP 3000 allows the terminal operator to alter the Terminal Type of a port in order to accommodate a terminal with different protocol characteristics. There are instances when you want to override the Terminal Type that was configured for your terminal port, such as when you wish to use a different type of terminal. The Terminal Type can be changed by including the ;TERM= parameter in the :HELLO command. The new Terminal Type remains in effect until you log off by entering :BYE. This is the only way for a terminal user to change port characteristics without reconfiguring the HP 3000 Input/Output system.

The HP 3000 provides data protection by means of flow control mechanisms and parity checking. Flow control is available with many devices; its purpose is to protect the devices from data overruns. In some cases, the HP 3000 checks parity on incoming 7-bit data (the eighth bit is the parity bit); if an error is detected, the error is reported to the software that initiated the read.

Include the TERM= parameter in the :HELLO or :DATA command:

```
HELLO BARB.STONE;TERM=14

DATA BOB.LEWIS;TERM=16
```

Some devices or applications will not operate properly with some of the HP-supplied Terminal Types. By purchasing the Workstation Configurator Product (Product Number 30239A/M/R), a System Manager can define a unique Terminal Type that contains exactly the correct set of characteristics needed to match a specific device to a specific application. This product operates only with HIOTERM1 (ATP,ATP37) and HIOTERM2 (ADCC).

FLOW CONTROL

Flow control is the means by which the flow of data between the computer and the terminal device may be controlled to avoid sending data faster than the receiver can handle it. The HP 3000 port controllers are capable of using three different methods of pacing the flow of data from a computer to a peripheral device. The Enquiry/Acknowledge (ENQ/ACK) and Delay protocols are mutually exclusive and only one of these may be in effect at a time. However, the XON/XOFF protocol may be used in conjunction with either of the other two protocols.

Two additional mechanisms are used for controlling the flow of data from a peripheral device to a computer; the Read Trigger and Block Mode reads.

Enquiry/Acknowledge (ENQ/ACK)

The ENQ/ACK protocol is a flow control method that is controlled by the driver. When writing data to the terminal, the driver breaks the data into blocks. After each block has been written, the driver sends an Enquiry character to the device and waits for an Acknowledge character to come back to the computer. When the device sees the Enquiry character, it responds with the Acknowledge character if it can accept the next full block of data. If not, the device waits until it can accept the next block before it responds with an Acknowledge. For a diagram of how Enquiry/Acknowledge flow control works, refer to figure 4.1-1.
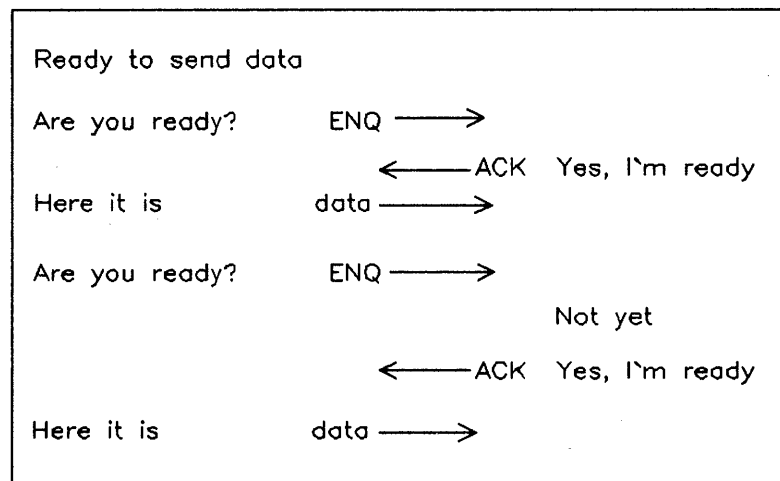
```
Ready to send data

Are you ready?        ENQ ──────>

                           <──────ACK    Yes, I'm ready
Here it is            data ──────>

Are you ready?        ENQ ──────>

                                         Not yet

                           <──────ACK    Yes, I'm ready

Here it is            data ──────>
```

Figure 4.1-1. Enquiry/Acknowledge Protocol

When the driver sends the Enquiry character, it starts a timer to limit the wait for the Acknowledge character. If the timer expires without an acknowledgement from the device, then the driver must take some action. There are three possible actions currently taken depending on the Terminal Type. The driver can send the next block of data, assuming that the device is ready; the driver can send another Enquiry character and restart the wait timer; or the driver can report to the console that the Acknowledge was not received and wait for the condition to be resolved and for the device to send the Acknowledge character before continuing to send data. This exchange of control characters is often called the ENQ/ACK handshake.

For HP Terminal Type definitions, the Enquiry character is always the ASCII ENQ character (decimal 5) and the acknowledge character is always the ASCII ACK character (decimal 6). The wait limit timer is set to 10 seconds. The block size is 80 characters.

Several drivers (and Terminal Types) can be configured to perform the ENQ/ACK protocol before starting to write. This is useful with hardcopy devices that may be offline or out of paper; it eliminates one possible way to lose data.

When the ENQ/ACK handshake is enabled, users must not include the ENQ character in the data written to the device. If the user's data contains an ENQ character, it is interpreted by the receiver as a protocol character. The receiver deletes the character and eventually transmits an ACK character. Either the ENQ character in the output data stream or the unexpected receipt of the incoming ACK character may cause errors in the operation of the driver.

Delay

The delay protocol is another flow control mechanism controlled by the driver. It is intended for devices, mainly printers, which require extra time to process certain control characters that cause physical motion to the carriage, such as Carriage Return, Linefeed, or Formfeed. Because one or another of these characters appears fairly often in normal data output, it can also be used if the device can not keep up on a continual basis but can if there are delays every so often.

Delays are inserted by the terminal driver at those points in the data where the control characters appear. Whenever the driver sends one of the carriage control characters to the device, it pauses for a length of time before continuing with the remaining data.

XON/XOFF

In contrast to the other two methods, the XON/XOFF protocol is an "active" protocol and is controlled by the terminal device. The driver sends data to the device in a continuous stream. If, and only if, the device can no longer accept data (because of being put offline, filling its buffer, running out of paper, etc.), it notifies the computer by sending an XOFF character to the driver. The driver then stops sending data to the device. When the device is able to accept data again, it sends the XON character to the driver and the driver resumes sending data to the device. For a diagram of how XON/XOFF flow control works, refer to figure 4.1-2.

```
Ready to send data

Here it is          data ──────>

                        <────── XOFF STOP!

                            I need some time

                        <───── XON I'm ready again
Here it is          data ──────>
```
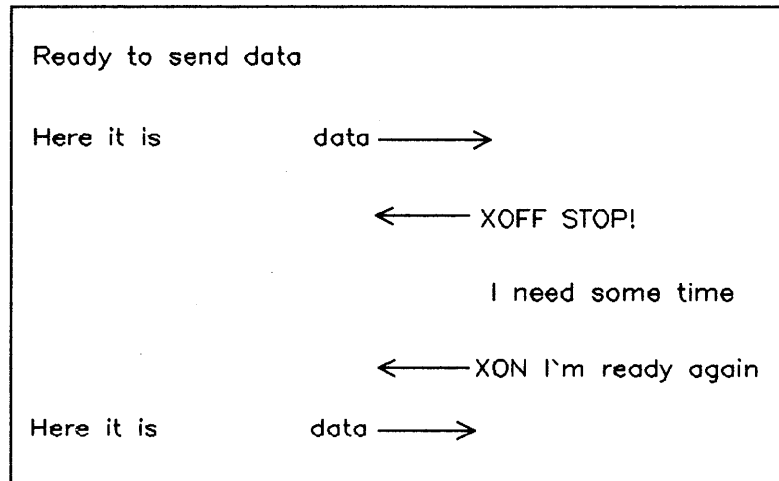
Figure 4.1-2. XON/XOFF Protocol

This protocol is the best pacing mechanism in current use. It requires the use of full duplex communication lines and of devices that can use XON/XOFF protocol and can transmit and receive simultaneously.

The XON/XOFF protocol is the preferred protocol for use with the HP 3000.

NOTE

When the XON/XOFF protocol is enabled, the two handshake characters are defined as *special* characters and are reserved for this purpose. As a result, they can not be read as data characters, except in Binary Mode.

READ TRIGGER

The read trigger character is used to tell the terminal device when it should start to send characters to the HP 3000. In other words, it is a method for preventing a device from sending input characters before the HP 3000 is ready to accept them. Once the HP 3000 sends the read trigger character, input can proceed. No further flow control mechanisms are used.

The read trigger character is generated by the driver at the beginning of each read when the driver is ready to accept data. The normal read trigger is the ASCII XON character. If the peripheral is going to send its data in Character Mode, it can begin transmitting without any further exchange of protocol characters. In this mode, the HP 3000 expects to receive data at human typing speeds and to perform the "normal" editing functions--Backspace, Delete Line, etc. If none of the editing characters are present in the input data stream, then the device may transmit data at the full line speed. If editing characters are included in data transmitted at high line speeds, data overruns on the HP 3000 are likely.

If, on the other hand, the data is to be sent in Block Mode, the device informs the computer of this by sending a DC2, and then it waits until it receives a "go-ahead" DC1 from the computer. The DC2 tells the computer to expect data at line speed, but does not specify the size of the data block to expect. However, the FREAD specifies the maximum block size, and the transmission must not exceed this. The data must not contain editing characters. If these characters are present, the result will vary from driver to driver. To prevent data overruns, some drivers must ignore these characters during Block Mode reads; in other cases, the driver tries to process the characters, forcing software interrupts that may cause data overruns under heavy system loads. For consistent operation, the data should not contain these characters.

> **NOTE**
>
> Terminal Types that allow Block Mode reads will not accept the DC2 as a data character, except during Binary reads. It is reserved for use as a protocol character. (For further information, refer to FCONTROL (28)).

The data exchange that occurs during a Character Mode read are summarized in figure 4.1-3.
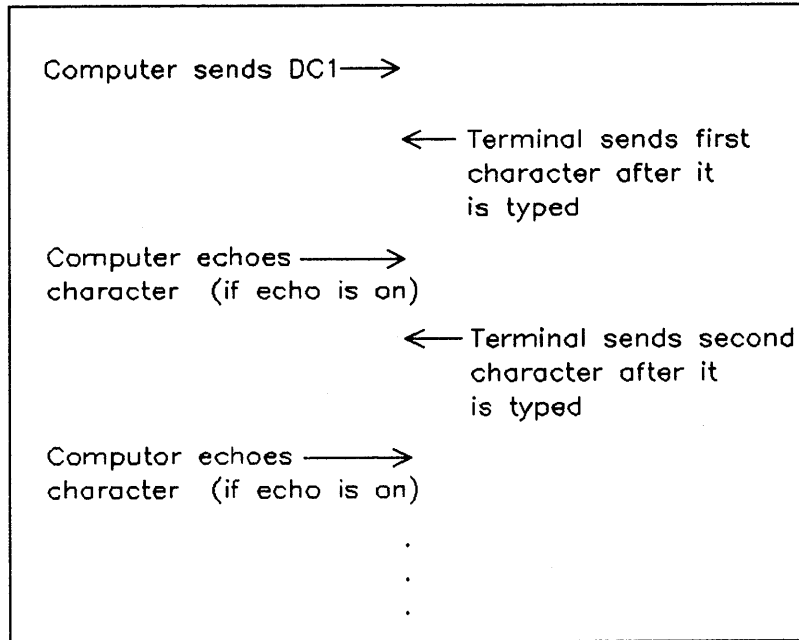
```
┌─────────────────────────────────────────────────────────┐
│                                                         │
│  Computer sends DC1──>                                  │
│                                                         │
│                     <── Terminal sends first            │
│                         character after it              │
│                         is typed                        │
│                                                         │
│  Computer echoes ──────>                                │
│  character  (if echo is on)                             │
│                                                         │
│                        <── Terminal sends second        │
│                            character after it            │
│                            is typed                     │
│                                                         │
│  Computor echoes ──────>                                │
│  character  (if echo is on)                             │
│                                                         │
│                              .                          │
│                              .                          │
│                              .                          │
│                                                         │
└─────────────────────────────────────────────────────────┘
```

Figure 4.1-3. Character Mode Read Trigger

This sequence continues until the terminal operator enters a read termination character.

The data exchanges that occur during a Page Block Mode read are summarized in figure 4.1-4.

```
┌─────────────────────────────────────────────────────────┐
│                                                         │
│                                                         │
│  Computer sends DC1 ──>                                 │
│                                                         │
│                      Terminal operator                  │
│                      enters data and then               │
│                      presses the Block                  │
│                      Mode transmission key.             │
│                    <── Terminal sends a DC2.            │
│                                                         │
│  Computer (or Program) ─>                               │
│   sends DC1                                             │
│                                                         │
│                     <──Terminal sends data              │
│                        and an RS read─                  │
│                        termination character.           │
│                                                         │
└─────────────────────────────────────────────────────────┘
```
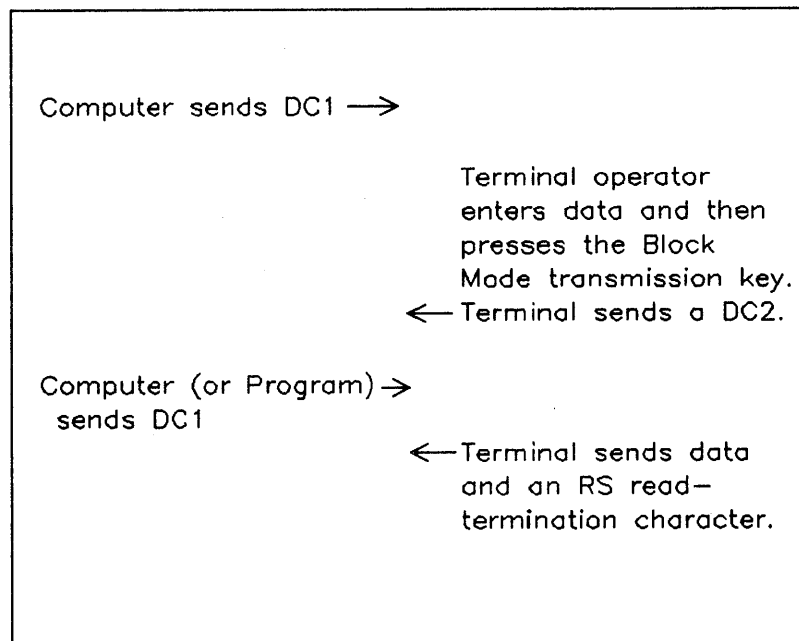
Figure 4.1-4. Block Mode Read Trigger

TERMINAL CONTROL

There are some general characteristics which effect the control of the terminal port connection.

Echo

When the terminal is in Remote Mode, in Character Mode, and Local Mode is disabled, characters typed on the keyboard are not placed in the display by the terminal. The computer must echo (or send back to the terminal) each character as it is received from the terminal for it to the display. Even though each character must travel from the terminal to the computer and back to the terminal, the effect is that as characters are typed, they appear in the display instantly. When it is desired that the characters typed not be displayed, such as when entering a password, echo may be disabled.

Echo provides a simple form of data integrity, since the data the computer received is displayed for the user.

Formfeed During Output

Some devices do not recognize and act upon the Formfeed character in a useful manner. One of the Terminal Type characteristics available specifies that each Formfeed character in the outgoing data stream be replaced with a different character. Usually this character is the Linefeed character.

Linefeed During Input

Some devices do not provide an automatic wraparound when typing characters beyond the end of a display line. Without the wraparound, typing at the end of the line places each character upon all previously typed characters in the last position of the display line. To resolve this problem the Linefeed character may be selected as a special character. Receipt of the Linefeed character causes the HP 3000 to echo the Linefeed, write a Carriage Return character to the terminal, and remove the Linefeed from the input data.

Backspace Response

When a backspace character is entered, the previous character is deleted from the input stream. There are several options available to reflect this action on the device's display. In all cases, the backspace is echoed to the device, provided echo is enabled.

The most common response, used with CRT type displays, is simply to echo the backspace character. On the display, the cursor moves back one character position and is left at the character that was deleted. This is the way HP Terminals handle backspace when configured as recommended, using Terminal Type 10.

A second option is available for a few devices which use the End-of-Medium character to move the display cursor back. With this option selected, receipt of a backspace causes the driver to send the End-of-Medium character to the device to move the cursor back one character position.

A last option is available for use with CRT displays when it is desirable that characters deleted from the input be erased from the display. With this option, the driver responds to backspace by sending the device a space and another backspace. Echoing the backspace received and sending the two additional characters results in erasing the deleted character from the display, leaving the cursor at that position. As part of this option, the driver does not echo any backspace typed when the input buffer is empty, but instead sends a bell character to the device.

Two options are available for hard copy (paper) devices. For those devices which are able to move the print head backward, an option is available that causes a line feed character to be sent to the device upon receipt of a backspace. This causes the print head to be positioned at the character deleted, but one line beneath it. As further data is input, it lines up properly, but is not overprinted such that it would be unreadable. If several consecutive backspaces are entered, a line feed is generated following only the first backspace. If more data is entered and then another backspace, another line feed is generated. This keeps the data readable using the fewest possible line feeds. This is the way Terminal Types 15 and 16 -- used with HP 2635A/B -- handle the backspace character.

For devices which cannot physically move the print head backward, an option is available in which the driver responds to each backspace by sending the device a slash character followed by the character that was deleted. This gives the user the best means of knowing how many characters have been deleted from the input line.

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Backspace response is one of the options configurable through Workstation Configurator, supported with MPE V/E or later. See the *Workstation Configurator Reference Manual* for the backspace response options.

Parity Checking and Generation

Parity is a means of verifying that data is transmitted between the terminal and computer without error. The total number of information bits transmitted in a character is eight. These bits may all be used for the character code (with 256 possible character codes available), or seven bits may be used for the character code (allowing 128 characters) and the eighth bit used as a parity bit.

If seven data bits are used, there are four possible parity settings:

- force to zero – the parity bit is always set to zero (known as None(0) or 0's).

- force to one – the parity bit is always set to one (known as None(1) or 1's)

- odd or even – the parity bit is set to either a zero or one so that the total number of one bits in the eight bit character is either odd or even depending on the type of parity enabled.

Parity generation and checking by any of the port controllers can be enabled programmatically for terminals by FCONTROL(24) . The type of parity generation and checking (odd or even) is set in a call to FCONTROL(36). Note that FCONTROL(24) and FCONTROL(36) cannot be used for printers with ADCC (MPE V/E), ATP, or ATP37. Refer to the discussion of the FCONTROL intrinsic in Part 3, Section 2 for further information. FDEVICECONTROL offers similiar facilities.

When a parity error is detected on input, the read must continue until one of the normal end-of-record conditions is satisfied. Then, the read is completed in error but no data is returned. Note that a parity error in the usual EOR character (Carriage Return) prevents a read from completing unless the read limit timer expired or an input count was satisfied. Therfore, this type of error may result in the port "hanging."

The parity generation and checking options are dependent upon the capabilities of the individual terminal I/O controller hardware and software. They are described in the following pages.

Parity-sensing is available with logon devices only. The device operator begins the logon process by pressing (RETURN). If the port is configured to do parity-sensing, it examines the parity bit in the Carriage Return character it received for speed sensing. Based on the single bit, the software can select one of two options from the set of five choices possible -- the four parity settings for 7-bit characters and 8-bit characters. Each controller reacts to the state of the parity bit somewhat differently.

When a device is FOPENed by a user program, the port's default parity conditions are in effect; again, these differ according to the controller. Note that the two default options may be the only options that work correctly with your controller unless you change the parity programmatically through FCONTROL or define a new Terminal Type with Workstation Configurator that has different parity defaults.

When an ATP, ATP37, or ADCC port is opened, it checks for even parity or 8-bit characters; if you want to use odd parity, you will have to enable odd parity generation and checking via the FCONTROL intrinsic. The ATC checks for odd or even parity; it is unusual in that it normally generates parity, but does not check it. Parity checking is handled the same for Character Mode as in Block Mode.

ATP or ATP37 (with HIOTERM1 software)

The ATP or ATP37 hardware can be set to "odd" or "even" parity, or to force the parity bit to "0" or "1",or to pass all 8 bits through. When parity is enabled, it is both generated and checked.

The default for FOPENed terminals is to pass all 8-bits through (i.e., the parity bit is not changed).

The default for log-on terminals is to sense parity. If the parity bit is "0", the controller subsequently passes all 8 data bits through in both directions for that port. If the parity bit is "1," even parity is checked and generated.

The type of parity is set by the parameter code passed by FCONTROL(36) ; it must be explicitly enabled by FCONTROL(24).

- When code 0 is selected, only input with even parity can be received without parity error. The parity bit is forced to 0 on output characters.

- When code 1 is selected, only input with odd parity can be received without parity error. The parity bit is forced to 1 on output characters.

- When code 2 is selected, only input with even parity can be received without parity error, and even parity is generated on all characters.

- When code 3 is selected, only input with odd parity can be received without parity error, and odd parity is generated on all characters.

In all cases, parity bits are set to 0 before being passed to the user's program buffer.

ATP or ATP37 (with HIOASLP0 software)

FCONTROL cannot be used with printers to set or enable parity.

ADCC (with HIOTERM0 or HIOTERM2 software)

The ADCC hardware can be set to "odd" or "even" parity, or to pass all eight bits through (i.e., the parity bit is not changed).

The default for FOPENed terminals is to pass all characters through, leaving the parity bit unchanged.

The default for log on terminals is to sense parity. If the parity bit is "0", the controller subsequently passes all 8 data bits through in both directions for that port. If the parity bit is "1", even parity is checked and generated.

The type of parity is set by the parameter code passed by FCONTROL(36); it must be explicitly enabled by FCONTROL(24).

- When code 0 is selected, only input with even parity can be received without parity error, and even parity is generated on all output characters.

- When code 1 selected, only input with odd parity can be received without parity error, and odd parity is generated on all data.

- When code 2 is selected, only input with even parity can be received without parity error, and even parity is generated on all characters.

- When code 3 is selected, only input with odd parity can be received without parity error, and odd parity is generated on all characters.

In all cases, parity bits are set to 0 before being passed to the user's program buffer.

With printers using HIOTERM0, only odd parity may be used to set or enable parity.

ADCC (with HIOASLP2)

FCONTROL cannot be used with printers to set or enable parity.

ATC (with IOTERM0 software)

The ATC hardware can be set to generate odd or even parity, to generate and check odd or even parity, to force the eight bit to "1" or to pass all 8 bits through (i.e., the parity bit is not changed).

The default for FOPENed devices is to generate odd parity. Incoming parity is not checked.

The default for log on devices is to generate but not check parity. If it receives input with odd parity, it generates odd parity; if it receives input with even parity, it generates even parity.

If the ATC is in the mode where input parity is not checked and odd or even parity is output, all incoming characters have their parity bits set to zero.

The type of parity is set by the parameter passed by FCONTROL(36) ; parity checking must be explicitly enabled by FCONTROL(24) .

- When code 0 is selected, all eight data bits are transmitted but only 7 bits of data are passed to the user's input buffer. The parity is set to zero. If parity checking is enabled, all 8 data bits are still transmitted, but input is checked for even parity.

- When code 1 is selected, 7 data bits are transmitted with the parity bit forced to one; the parity is set to "0" for incoming data, but parity is not checked. If parity checking is enabled, incoming data is checked for odd parity; transmitted data still has the parity bit forced to one.

- When code 2 is selected, 7-bit characters are used. On input, the 8th bit is set to zero; parity checking is not enabled. On output, the parity is generated - odd parity if the 8th bit of the output character is "1", even parity if the eighth bit is "0". If parity checking is enabled, received characters are checked for even parity. Output is the same as above.

- When 3 is selected, 7-bit characters are used with odd parity.

Output code 0 through 3 is shown in Part 3 Section 2. In all cases, input parity bits are forced to 0 before being passed to the user's program buffer.

```
NOTE
```

The ATC parity options will not be supported on future HP 3000 terminal I/O controllers.

PRINTER CONTROL

There are two unique characteristics that specifically affect the use of serial printers connected to a terminal port.

Initialization of Printer Control

When a printer is shared among users, each user may want to use the printer in a different way. One user may change the printer characteristics (such as margins, tabs, or print density) and affect the next user who does not want those choices of characteristics.

To prevent one user from affecting the next user, a printer must be initialized to a known state before printing the next job. When the Device Open occurs on a Type 32 device, the port controller software writes an initialization character string to the device. This string is determined by the currently active Terminal Type. Note that Terminal Types for Serial Spooled Printers (19-22, TTPCL19, TTPCL22) use this initialization string. So does the HP 2687A Printer when used with Terminal Type TTPCL18. (TTPCL19,TTPCL22, and TTPCL18 are available with MPE Version G.01.00 or later.) Terminal Type 18, for Application Printers, does not. This means that if a user changes printer characteristics, they are not reset by the system. The user's application must reset the printer characteristics when finished with the printer.

Vertical Format Control

Many line printers allow the use of vertical format control (VFC) to control the line spacing of output. VFC allows you to construct a printer to skip to predetermined lines or to a specific point on a page with typically one or two commands instead of counting and outputing a number of blank lines. The user interface often refers to this capability as "Skip to Channel X", where X is one of the predetermined points.

Up to 16 VFC channels may be supported by a device with each channel representing one or more places within the vertical page. For example, one VFC channel might be set aside for top of page, another for bottom of page, another for every third of a page, etc. Some serial printers, such as the HP 2631B and Hewlett-Packard's HP 2631B-compatible printers, allow vertical format control through a set of character sequences. HP supplies several Terminal Types that contain the character sequences to implement VFC. For further information on Vertical Format Control, refer to the *HP 3000 Console Operator's Guide* (MPE IV) or the *MPE V System Operation and Resource Management Reference Manual.*

SUPPORTING SERIAL PRINTERS

The recommended operation of Serial Spooled Printers includes the use of parity to detect transmission errors. However, it is possible to transmit 8-bit characters by using Terminal Types 20, 22, and TTPCL22. Use of these Terminal Types over modems is not supported.

Status Request Protocol

To provide timely Operator response to problems (paper out, parity errors, etc), the driver software periodically requests status from the printer. This is called a Status Request (*ESC?DC1*). If the printer responds to this request by telling the driver that it is in trouble, a message is sent to the console telling the Operator what is wrong with the printer.

TERMINAL TYPES 19, 20, AND TTPCL19. The driver software asks for the status of the printer before printer initialization, at every FOPEN to the printer, at the end of every FWRITE record, and when the printer issues an XOFF (DC3). Terminal Types 19 and TTPCL19 (both 7-bit) are recommended for remote spooled printers. TTPCL19, 19, and 20 (8-bit) are recommended for local spooled printers and non-spooled printers. (TTPCL19 is available with MPE Version G.01.00 or later.)

TERMINAL TYPES 20, 22, AND TTPCL22. The status request procedure causes a problem when you wish to embed printer control escape sequences in the data. If actual output data sequence is such that the driver's status request is transmitted in the middle of your escape sequence, a printer error may occur. To prevent this problem, the position of driver's status requests in the data stream may be altered by specifying the use of Terminal Types 21 (7-bit), 22 (8-bit), or TTPCL22 (8-bit). A status request is sent to the printer before printer initialization, at every FOPEN to the printer, and after every carriage control (Carriage Return-Linefeed or Formfeed). Since status is checked less frequently than with Terminal Types 19, TTPCL19, or 20, Operator messages to report errors may not occur as quickly as they do for Terminal Types 19,TTPCL19, or 20; however, no control escape sequences are lost. These Terminal Types are recommended for local spooled printers and non-spooled printers. Terminal Type 21 can be used for remote spooled printers, but is not recommended. (Terminal Type TTPCL22 is available with MPE Version G.01.00 or later.)

TERMINAL TYPE 18. Some application printers (such as HP 2601A) are configured using Terminal Type 18. Since Status Request Protocol is not used with this Terminal Type, the driver has no way of knowing when something has gone wrong with the printer. The application that controls the printer must read the printer's status or data may be lost. Consult the documentation of the application to see whether or not the application reads the printer's status.

TERMINAL TYPE TTPCL18. As with Terminal Type 18, TTPCL18 does not use Status Request Protocol. This Terminal Type is used with the HP 2687A printer with MPE Version G.01.00 or later.

TERMINAL TYPES SUPPORTED BY CONTROLLERS

Most Terminal Types have the same characteristics on the four hardware controllers (ATP, ATP37, ADCC, ATC) and their associated software drivers. In a few cases hardware differences exist that cannot be masked by the software. Refer to Appendix A for a list of these differences. Furthermore, the software drivers differ in that they do not support the same Terminal Types.

All ATP and ATP37 Terminal Types differ from the ATC and ADCC Terminal Types in the following ways:

- When the ATP (MPE IV) receives a read stream with an embedded Linefeed, it does not remove the Linefeed and send a Carriage Return to the device.

- If a special End-of-Read character is defined in the IOQ request, the ATP, ATP37, and ADCC (HIOTERM2) will treat such a character as an End-of-Read character even if it has another *special* meaning (eg. Backspace, Control-X, etc.).

Additionally, all ATP and ATP37 Terminal Types differ from the ATC Terminal Types as follows:

- The ATP and ATP37 do not allow reading of paper tapes.

- Split speeds are not supported by the ATP, ATP37, or ADCC.

Further differences corresponding to specific Terminal Types are shown in tables 4.1-1, 4.1-2 and 4.1-3.

Examples of devices represented by the Terminal Types are:

Terminal Types

6:	General non-HP hardcopy
9,18:	General non-HP CRT terminal 18 is also used for application printers
10:	General HP CRT terminal (HP264x, HP262x, etc.)
12:	HP 8-bit CRT terminals on ATC
13:	Telenet "pseudo-terminals"
15:	HP 2635 8-bit hardcopy terminal
16:	HP 2635 7-bit hardcopy terminal
19/20/21/22:	Serial Spooled Printers
TTPCL19, TTPCL22:	PCL Serial Spooled Printers (MPE G.01.00 or later)
TTPCL18:	HP 2687A (MPE G.01.00 or later)

Each logical device configured into the ATP or ATP37 subsystem (terminals and printers alike) must be configured with a Terminal Type.

Table 4.1-1. ATP, ATP37, and ADCC(HIOTERM2) Characteristics by Terminal Types

Characteristics	Terminal Types
Page-block mode data transfers supported.	10 12 13
Formfeed characters changed to linefeed.	
⌈ESCAPE⌉: enables echo; ⌈ESCAPE⌉; disables echo.	6 9 10 12 13 15 16 18
⌈CONTROL⌉T dumps the input buffer to the device.	

Data Flow Control Characteristics	Terminal Types
ENQ/ACK Protocol: ENQ and ACK used as the protocol characters. Blocks of 80 characters between ENQ's ENQ/ACK timeout is 10 seconds.	 10 12 15 16 10 12 15 16 10 12 15 16
ENQ/ACK Timeout Actions: Send more data. Send ENQ; restart timer. Report timeout to console.	 10 12 15 16
Delay issued after each Carriage Return, Linefeed, or Formfeed.	6 9
XON/XOFF protocol enabled.	6 9 10 12 13 15 16 18 19 20 21 22 TTPCL18 TTPCL19 TTPCL22

Action upon receipt of XOFF:
 	
Wait indefinitely.
 	
Perform serial printer status request and act upon response.
 	
Start XON/XOFF timer; notify console if it expires.
	
	6 9 10 12 13 15 16 18 TTPCL18
	
	    19 20 TTPCL19
	
	    21 22
	    TTPCL22

Before each write is completed, device status is requested to ensure that the data is received without error.	19 TTPCL19

Table 4.1-1. ATP, ATP37, and ADCC(HIOTERM2) Characteristics
by Terminal Types (cont'd)

Character Width Characteristics	Terminal Types
7-bits only.	19 21 TTPCL19
7 or 8 bits	6 9 10 13 16 18 TTPCL18
8-bits only.	12 15 20 22 TTPCL22

Read Processing Characteristics	Terminal Types
Read echo initially enabled.	6 9 10 12 15 16 18
Additional Backspace Response: None. Write and delete character. Write Line Feed. Write Space and Second Backspace. Write EM character	 9 10 12 18 6 15 16
Delete Line ([CONTROL]X) enabled.	6 9 10 12 13 15 16 18
DC1, DC3, and [CONTROL]Y removed from input data.	6 9 10 12 13 15 16 18
Linefeeds, Dels, and Nulls stripped from input data.	6 9 10 12 13 15 16 18
Reads are triggered by DC1.	6 9 10 12 13 15 16

Table 4.1-2. ADCC (HIOTERM0) Characteristics by Terminal Types*

Characteristics	Terminal Types
Page-block mode data transfers supported.	10 12 13
Formfeed characters changed to linefeed.	4
(ESCAPE): enables echo; (ESCAPE); disables echo.	4 6 9 10 12 13 15 16 18
(CONTROL)T dumps the input buffer to the device.	
Data Flow Control Characteristics	**Terminal Types**
ENQ/ACK Protocol: ENQ and ACK used as the protocol characters. Blocks of 80 characters between ENQ's ENQ/ACK timeout is 10 seconds.	10 12 15 16 10 12 15 16 10 12 15 16
ENQ/ACK Timeout Actions: Send more data. Send ENQ; restart timer. Report timeout to console.	 10 12 15 16
Delay issued after each Carriage Return, Linefeed, or Formfeed.	4 6 9
XON/XOFF protocol enabled.	4 6 9 10 12 13 15 16 18 19 20 21 22

Action upon receipt of XOFF:
 	
Wait indefinitely.
 	
Perform serial printer status request and act upon response.
 	
Start XON/XOFF timer; notify console if it expires.
	
	4 6 9 10 12 13 15 16 18
	
	      19 20
	
	       21 22

Before each write is completed, device status is requested to ensure that the data is received without error.	19

* Terminal Types 20, 21, and 22 are supported with ADCC on MPE V/P, but not on MPE IV.

Table 4.1-2. ADCC (HIOTERM0) Characteristics by Terminal Types (cont'd)*

Character Width Characteristics	Terminal Types
7-bits only.	19 21
7 or 8 bits	4 6 9 10 13 16 18
8-bits only.	12 15 20 22

Read Processing Characteristics	Terminal Types
Read echo initially enabled.	4 6 9 10 12 15 16 18
Additional Backspace Response:	
None.	9 10 12 18
Write and delete character.	
Write Line Feed.	6 15 16
Write Space and Second Backspace.	
Write EM character	4
Delete Line ([CONTROL]X) enabled.	4 6 9 10 12 13 15 16 18
DC1, DC3, and [CONTROL]Y removed from input data.	4 6 9 10 12 13 15 16 18
Linefeeds, Dels, and Nulls stripped from input data.	4 6 9 10 12 13 15 16 18
Reads are triggered by DC1.	4 6 9 10 12 13 15 16

* Terminal Types 20, 21, and 22 are supported with ADCC on MPE V/P, but not on MPE IV.

Table 4.1-3. ATC Characteristics by Terminal Types

Characteristics	Terminal Types
Page-block mode data transfers supported.	10 12 13
Formfeed characters changed to Linefeed.	0 4
⌈ESCAPE⌉: enables echo; ⌈ESCAPE⌉; disables echo.	0 - 6 9 10 12 13 15 16 18
⌈CONTROL⌉T dumps the input buffer to the device.	
⌈ESCAPE⌉A, ⌈ESCAPE⌉B, ⌈ESCAPE⌉C, ⌈ESCAPE⌉D, ⌈ESCAPE⌉E, ⌈ESCAPE⌉H, ⌈ESCAPE⌉I, and ⌈ESCAPE⌉J deleted from the input stream.	9
Data Flow Control Characteristics	**Terminal Types**
ENQ/ACK Protocol: ENQ and ACK used as the protocol characters. Blocks of 80 characters between ENQ's ENQ/ACK timeout is 10 seconds.	 10 12 15 16 10 12 15 16 10 12 15 16
ENQ/ACK Timeout Actions: Send more data. Send ENQ; restart timer. Report timeout to console.	 10 12 15 16
Delay issued after each Carriage Return, Linefeed, or Formfeed.	0 - 6 9
XON/XOFF protocol enabled.	0 - 6 9 10 12 13 15 16 18 19
Action upon receipt of XOFF: Wait indefinitely. Perform serial printer status request and act upon response. Start XON/XOFF timer; notify console if it expires.	 0 - 6 9 10 12 13 15 16 18 19

Table 4.1-3. ATC Characteristics by Terminal Types (cont'd)

Data Flow Control Characteristics	Terminal Types
Before each write is completed, device status is requested to ensure that the data is received without error.	19
Character Width Characteristics	**Terminal Types**
7-bits only.	19
7 or 8 bits	0 - 6 9 10 13 16 18
8-bits only.	12 15
Read Processing Characteristics	**Terminal Types**
Read echo initially enabled.	0 - 6 9 10 12 15 16 18 31
Additional Backspace Response:	
None.	9 10 12 18
Write and delete character.	
Write Line Feed.	5 6 15 16
Write Space and Second Backspace.	
Write EM character	4
Delete Line ((CONTROL)X) enabled.	0 - 6 9 10 12 13 15 16
DC1, DC3, and (CONTROL)Y removed from input data.	6 9 10 12 13 15 16 18
Linefeeds, Dels, and Nulls stripped from input data.	0 - 6 9 10 12 13 15 16 18
Reads are triggered by DC1.	0 - 6 9 10 12 13 15 16

PART 5

ADDITIONAL OPTIONS
IN
POINT-TO-POINT
COMMUNICATIONS

Often the connection between your workstation and the HP 3000 is more than a cable or a simple modem connection. As the possibilities in data communications increase, so do the possibilities in point-to-point connections. One of the most popular options used today is a PBX (Private Branch Exchange). Certain PBX equipment is certified for use in an HP 3000 network. Section 2 explains what a PBX is, how it works with Hewlett-Packard equipment, and how PBX systems are supported by Hewlett-Packard.

A **PBX** is a large switch which is used to make a voice or data communications link between two parties. PBX stands for Private Branch Exchange and typically refers to certain switching systems that provide both internal switching functions and access to the public telephone system. **Private** indicates that the switch is the property of a specific company/organization rather than a switch owned by the telephone company or the government. It also implies that its primary function and location is local to the company's premises rather than widely geographically distributed or remote to these premises. The term **Branch** means a subsidiary or subdivision: therefore a branch exchange refers to a smaller piece of switching equipment associated with a major piece. That *major* piece is the Central (Switching) Office (CO) of the telephone company which switches trunks that lead to/from PBX systems throughout the local area. The term **Exchange** is simply the telephone industry's way of saying switch. So, in general, a PBX serves one customer, resides at that customer's site and provides switching services as if it were a remote extension of the telephone company's central switching office.

ELEMENTS OF THE HP 3000/PBX NETWORK

When a PBX is included in an HP 3000 network, there are two distinct parts of the network: the Hewlett-Packard equipment and the equipment from the PBX vendor.

HP Equipment

- HP 3000 capable of using an ATP or ADCC asynchronous controller.

- The peripherals that you intend to connect to the HP 3000 through the PBX.

- The asynchronous cable that attaches the peripherals to the PBX equipment.

- The asynchronous cable that attaches the ATP or ADCC port on the HP 3000 to the PBX equipment.

PBX Equipment

The explanation of PBX begins by defining the following terms. See figure 5.2-1.

DCE. Data Communications Equipment. This is the term used to describe that portion of the communications link that transports information between two geographically remote locations. The equipment typically contained by the term DCE includes modems, the PBX DTE Interfaces, and the equipment used by the telephone companies that make up the telephone network.

DTE. Data Terminal Equipment. When a peripheral such as a terminal or printer is connected to a DCE it is typically described as the DTE portion of the communications link. The DTE can also be a computer that is connected to the DCE because, as with the peripherals, information can enter or exit the communications link via the device considered to be a DTE. The DTE device sends or receives digital information and is typically controlled by the RS-232-C standard signals.

PBX Mainframe. This is that portion of the PBX system including CPU, memory, line controllers and the switching matrix contained in one or more cabinets that reside in a room especially set aside for the telephone switching equipiment (may be known as the *PBX room*, or something similar). For most purposes, the PBX mainframe refers to all of the PBX system except the PBX DTE Interfaces, the lines and the trunks.

PBX DTE Interface. This is a generic term used to identify the device which provides the PBX with an RS-232-C interface to the DTE. Depending on the vendor, it may provide other functions for the PBX system which are transparent to the HP 3000 network. Also known as a data module.

Trunks. These are the telecommunications lines that link a private system to the public telecommunications network (i.e., links the PBX to the CO). This is the major communications link to the outside world.

Lines. The PBX mainframe is connected to the PBX DTE Interface via on-site transmission lines. These lines are usually sets of 2 or 3 twisted pairs. Generally, these lines are used to carry either voice, data, control, or power signals through the separate wires. Some PBX vendors digitize the voice and then multiplex the voice with the data over the same twisted pair. Therefore, depending on how voice communication is handled by the particular PBX system, there may also be a telephone connected to the same line as the PBX DTE Interface.

How the Equipment Works Together

Many companies (or hospitals, colleges, etc.) have a PBX on site, whether that site includes one or many buildings. The PBX provides a common connection to the telephone company's central switching office (CO) through trunks, as well as controls switching for all telephone calls between on-site telephones. The PBX equipment is DCE; a PBX DTE Interface is necessary to connect DTE (computers or peripherals) to lines of the PBX. An HP 3000 is connected to the PBX DTE Interface through an ATP or ADCC modem port with an asynchronous RS-232-C cable. The peripheral is also connected to the PBX DTE Interface using the same asynchronous RS-232-C standards. When a network of computers and peripherals is on site, the PBX can be used to connect any terminal to any HP 3000 in the network. A remote printer can be connected through the PBX at much greater distances than a normal direct connection -- and no modems are needed. The maximum supported distance between the HP 3000 and a peripheral depends on your particular PBX, but the maximum is usually at least 8000 feet between the two PBX DTE Interfaces. Between the PBX DTE Interface and the computer or peripheral, the RS-232-C cable can be a maximum of 50 feet.
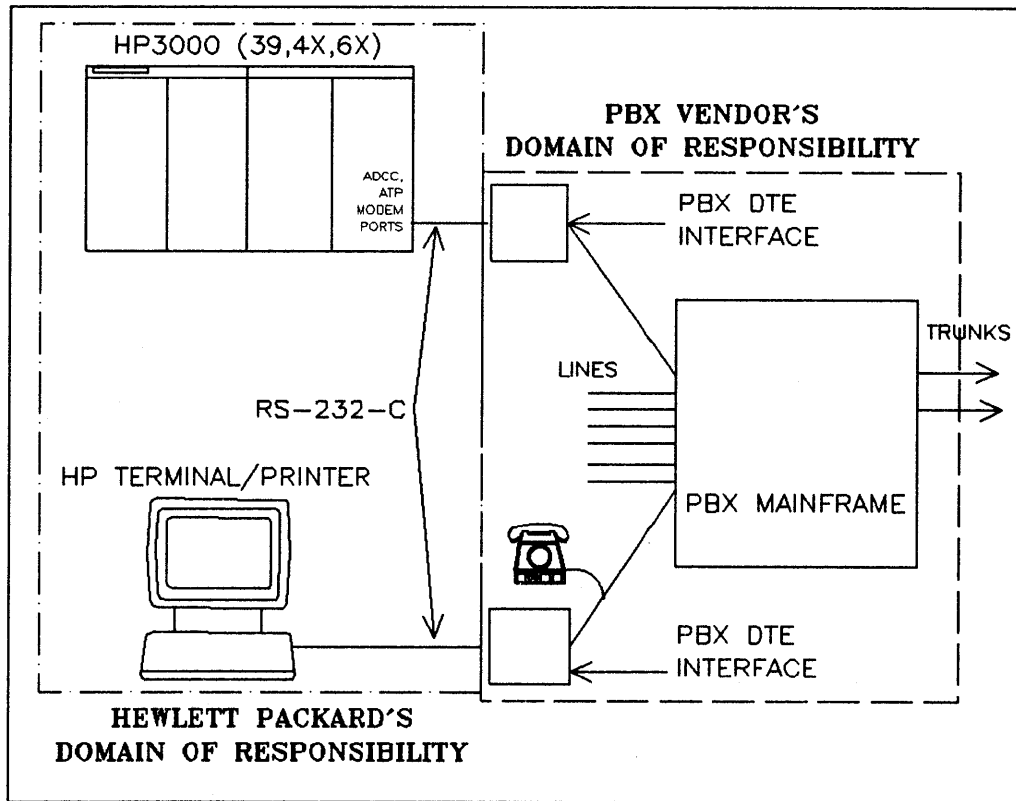
Figure 5.2-1 PBX in an HP 3000 Network

MAKING THE CONNECTION

Initiating a Call from a Terminal

Although no modems are involved, logging on to an HP 3000 through a PBX is similar to using a modem. You may call any HP 3000 on site that has a modem port that receives incoming calls. Make sure you know the phone number that you need to call before continuing with the following steps:

1. Turn on the terminal.

2. Initiate the call. Depending on the PBX model, you should either push a specific key on your terminal keyboard or the proper button on the PBX DTE Interface. See your PBX support person, or the documentation provided with your PBX, for this information.

3. The PBX CPU will send a prompt to the terminal. Type in the phone number of the HP 3000 you wish to logon to, and press (RETURN).

4. When the call goes through, wait a moment and press (RETURN). You will receive a colon prompt on the terminal. Then log on by entering a :HELLO, :(command), or :JOB command.

FOPENing a Port

When the HP 3000 opens a peripheral port programmatically, the connection through the PBX is slightly different than the one initiated from a terminal. However, the differences are transparent to the HP 3000 and its users. There are slight differences in configuring the PBX; this will be covered later. Examples of programmatic, or FOPENed, ports are data entry terminals, printers, and the monitors used with such HP 3000 products as Production Management and Materials Management.

CONFIGURING THE EQUIPMENT IN YOUR NETWORK

HP Equipment

Configuring an ATP or ADCC Port. You must always use a modem port if your network includes a PBX. Therefore configure the port exactly as you would if you were using a modem.

Configuring the Peripheral. Configure the peripheral as if you were connecting it to a modem.

PBX Equipment

See your PBX representative for guidelines on how to configure the PBX equipment in general. Special configuration changes are required for ATP or ADCC ports that are used with printers, data entry terminals, etc. (FOPENed ports). First, the PBX DTE Interface will expect the RS-232-C control signal DTR to be high, and this particular connection of devices to the 3000 will not supply this signal to the PBX DTE Interface. Therefore, the PBX DTE Interface must be configured to ignore the DTR signal (or lack of it). Secondly, it is very important to let your PBX representative know that the FOPENed ports require a **nailed** connection through the PBX. This means that the call through the PBX does *not* get switched through the network, but goes through on the same line every time. This is the only way to insure that the HP 3000 finds the proper device every time it opens the port. Note that not all PBX vendors support nailed connections.

SUPPORTED PBX SYSTEMS

The following are the PBX systems currently supported on the HP 3000. Since additional systems may have been certified since the time of this writing, please see your HP representative for a current list of supported PBX equipment. Also, if you already have a PBX which is not included in this list, ask your HP or PBX representative if your current equipment can be modified so that it can be supported by HP.

- The NTI SL-1

- The ROLM CBX Family

- The INTECOM IBX Family

- The AT&T-IS Dimension Systems 75 and 85

TROUBLESHOOTING

When a problem arises in an HP 3000 network that includes a PBX link, the most important facet of troubleshooting involves isolating the problem. Begin by following these guidelines:

1. Get a clear understanding of the symptoms of the problem.
   Undoubtedly there will be cases where a power switch is not on, a simple connection has not been made or a system might be down. A simple set of questions such as: What is happening? When did it start? and What has changed? may yield some revealing information.

2. Verify that all connections have been properly made.
   Connectors, boards, plugs, etc. all have the chance of being in the wrong place or not making good true contact with their mating equipment.

3. Verify that all hardware and software configuration settings are correct.
   Parity settings, data rate settings, etc. must all match. The HP 3000 port must be configured properly as does the port of the PBX. And do not forget the terminal and the PBX DTE Interface; their switches must also be properly set.

4. Given that all the configurable elements are properly set and that all connections are good, begin to determine what does work. Depending upon the answers given to your initial set of questions (in 1), you may take a number of different next steps. For example, if no communications can be established with the PBX then you may want to determine if each element between the terminal and the PBX is functioning properly by running the appropiate tests. Or, if the PBX responds as expected but the HP 3000 does not, then you may want to begin on the 3000 side of the PBX. Obviously, you must use your own best judgement.

Some HP 3000 Tests

The most useful tests are the diagnostics for the asynchronous controllers. There are on-line and off-line tests for both ADCC and ATP. MPE has to be functioning on your system in order for the on-line diagnostics to work. Your system has to be shut down in order to use the off-line diagnostics. Off-line diagnostics should be used by Hewlett-Packard support personnel only.

Refer to the following manuals for on-line diagnostics:

- *Advanced Terminal Processor (DSN/ATP) On-line Diagnostics Manual* (30144-90004). This manual includes diagnostic procedures for ATP with MPE IV or V/P.

- *Terminal (TERMDSM) On-line Diagnostic/Support Monitor Reference Manual* (30144-90013). This manual includes diagnostic procedures for both ATP and ADCC with MPE V/E.

PBX Tests

There will be a variety of tests available to use on your PBX equipment. They are supplied by the PBX vendor, and usually consist of three general types: a continuous self-test, a local test and a remote test. Remember that each vendor will have their own names for these tests. For detailed information and instructions on how to run each test, see your PBX support representative.

CONTINUOUS SELF-TEST. This diagnostic monitors the condition of each PBX port by periodically performing a write to the port followed by a read. Depending on the number of errors logged, the PBX CPU determines whether or not the port is functioning properly.

PBX LOCAL TEST. This test has two purposes. First, it determines if the digital side of each PBX DTE Interface is working as expected. It also can be used to check the line between the DTE (the terminal or computer) and the PBX DTE Interface.

PBX REMOTE TEST . This test also has two purposes. It checks the connection between the PBX DTE Interface and the PBX mainframe as well as determining if the PBX DTE Interface connected to the PBX mainframe is functional.

PART 6

CONNECTING AND CONFIGURING
AN ASYNCHRONOUS DEVICE

There are three facets to preparing your device for operation with the HP 3000. First, the device's port must be configured into the MPE I/O system. Second, the device must be physically attached to its asynchronous port. Third, the device's switches and/or configuration menus must be set.

This section of the manual informs you on the first facet of preparing your device for operation. It tells you how to configure the MPE I/O system for the port that will be attached to your device. Each port must be individually configured to reflect specific operating parameters of the device connected to it. You configure a port during System Initialization or by means of the SYSDUMP facility. Be sure you are familiar with the questions that come up in the INITIAL or SYSDUMP dialog when you are configuring a port. For further information on System Initialization and SYSDUMP, refer to the *MPE V System Operation and Resource Management Reference Manual* (32033-90005) or the *MPE IV System Manager/System Supervisor Reference Manual* (30000-90014).

This section contains several parts of configuration dialog:

- Beginning Dialog Questions using:

    - MPE Version G. 00. 00 or Earlier

    - MPE Version G. 01. 00 or Later

- Configuring a Terminal Port using:

    - MPE Version G. 00. 00 or Earlier

    - MPE Version G. 01. 00 or Later

- Configuring a Printer Port using:

    - MPE Version G. 00. 00 or Earlier

    - MPE Version G. 01. 00 or Later

- Configuring Necessary System Table Changes

Underlined dialog responses are mandatory. The responses to many other questions are dependent on your system configuration, so an explanation on how to respond follows each question of this type. The omission of both a response and an explanation after a question signifies that the question should be answered by simply pressing (RETURN). A single Y or N means yes or no respectively.

BEGINNING DIALOG QUESTIONS

Using MPE G.00.00 or Earlier.

ANY CHANGES? Y

SYSTEM ID = HP 32002 V.*uu.ff*?

MEMORY SIZE = *nnn.*?

I/O CONFIGURATION CHANGES? Y

LIST I/O DEVICES?

> If you respond Y to this question, a list is printed to your terminal, displaying information for devices presently configured on your system, including Logical Device Numbers and DRT Numbers. If you are adding devices to your system, refer to this list in order to see what Logical Device Numbers and DRT Numbers are already being used.

LIST CS DEVICES?

HIGHEST DRT = *nnn.*?

> *nnn* denotes the current highest hardware device number that can be assigned. Press (RETURN) if the number displayed is large enough to include the devices you are adding. Otherwise, enter a higher DRT number.

NOTE

> The next prompt (LOGICAL DEVICE #?) begins the configuration dialog for I/O devices. On the following pages, find the appropriate terminal or printer dialog guidelines for MPE G.00.00 or earlier and continue.

Using MPE G.01.00 or Later

ANY CHANGES? Y

SYSTEM ID = HP 32002 V.*uu.ff*?

MEMORY SIZE = *nnn.*?

I/O CONFIGURATION CHANGES? Y

LIST I/O DEVICES?

If you respond Y to this question, a list is printed to your terminal, displaying information for devices presently configured on your system, including Logical Device Numbers and DRT Numbers. If you are adding devices to your system, refer to this list in order to see what Logical Device Numbers and DRT Numbers are already being used.

LIST CS DEVICES?

LIST DEVICE DEFAULTS?

If you answer Y, a list of device names is displayed. This list includes values corresponding to each device that are typical dialog responses for that device. These values are called device defaults. Listed below are the defaults used for connecting a device to an asynchronous port. Table 6.1-1 shows how the device names correspond to the controllers. Table 6.1-2 explains the meaning of the list of device names displayed here:

```
DEVICE        ID    C T SUB        REC  OUTPUT       DRIVER   DEVICE
NAME          CODE  H Y TYPE       WIDTH DEV  MODE    NAME     CLASSES
                    A P     TERMINAL
                    N E     TYPE SPEED

HPLPADCC     !0010  0 32 14 19    240 66   0        S HIOASLP2  LP
HPLPATP      !000F  0 32 14 19    240 66   0        S HIOASLP0  LP
HPPCLADCC    !0010  0 32 14 ??*   960 66   0        S HIOASLP2  LP
HPPCLATP     !000F  0 32 14 ??*   960 66   0        S HIOASLP0  LP
HPTERMADCC   !0010  0 16  0 10    960 40   &  JAID  HIOTERM2   TERM
HPTERMATP    !000F  0 16  0 10    960 40   &  JAID  HIOTERM1   TERM
```

Table 6.1-1. Asynchronous Device Names

Controller	Terminal Device Name	HP 2631B Printer Device Name	PCL Printer Device Name
ADCC	HPTERMADCC	HPLPADCC	HPPCLADCC
ATP or ATP37	HPTERMATP	HPLPATP	HPPCLATP

Table 6.1-2. Explanation of Device Name Listing

Column in Device Name List	Corresponding SYSDUMP Question	Comments
DEVICE NAME	DEVICE NAME?	Refer to Table 6.1-1.
ID CODE	none	Controller ID. Used by INITIAL.
CHAN	SOFTWARE CHANNEL #?	
TYPE	TYPE?	
SUB TYPE	SUB TYPE?	
TERMINAL TYPE	TERM TYPE? or ENTER [TERM TYPE #,] [DESCRIPTOR FILENAME]?	The default for the PCL device names HPPCLADCC and HPPCLATP, represented by ??* in the listing, is Terminal Type TTPCL22.
TERMINAL SPEED	SPEED IN CHARACTERS PER SECOND?	Refer to Tables 6.1-6 and 6.1-8.
REC WIDTH	RECORD WIDTH?	
OUTPUT DEV	OUTPUT DEVICE?	The default output device for terminals is the logical device number of the terminal's port, represented in the listing by an ampersand (&).
MODE	ACCEPT JOBS/SESSIONS?	Default of Yes represented by a J in the MODE column.
	ACCEPT DATA?	Default of Yes represented by an A in the MODE column.
	INTERACTIVE?	Default of Yes represented by an I in the MODE column.
	DUPLICATIVE?	Default of Yes represented by a D in the MODE column.
	INITIALLY SPOOLED?	Default of Yes represented by an S in the MODE column.
DRIVER NAME	DRIVER NAME?	
DEVICE CLASSES	DEVICE CLASSES?	

HIGHEST DRT = *nnn* (MIN=8, MAX=*mmm*)?

> *nnn* denotes the current highest hardware device number that can be assigned. The maximum DRT number (denoted by *mmm*) is 511 for HP 3000 Series 6x and 127 for Series 3x and 4x. Press (RETURN) if the number *nnn* displayed is large enough to include the devices you are adding. Otherwise, enter a higher DRT number.

NOTE

> The next prompt (LOGICAL DEVICE #?) begins the configuration dialog for I/O devices. On the following pages, find the appropriate terminal or printer guidelines for MPE G.01.00 or later and continue.

CONFIGURING A TERMINAL PORT

It is necessary to go through only one of the following two sets of dialog questions when configuring a port for use with a terminal. Use the first if your system uses MPE Version G.00.00 or earlier. This includes MPE IV, MPE V/P, and the first release of MPE V/E. If your system is running on MPE Version G.01.00 or later, use the second set of dialog questions.

Terminal Port using MPE G.00.00 or Earlier

The following prompt begins the configuration dialog for I/O devices. After you configure one device (following the DEVICE CLASSES? prompt), this LOGICAL DEVICE #? prompt is repeated to allow for configuring additional devices.

LOGICAL DEVICE #?

> A unique number in the range 1-999 (User choice. Maximum 256 for MPE IV and V/P). MPE recognizes a device by this number.

DRT #?

> 0   Removes the device (specified by the above logical device number) from the MPE configuration. Returns dialog to LOGICAL DEVICE #? prompt.

> *nn*   To add a terminal, enter the DRT number that results from one of the following formulas:

> > ATP   For Series 6x: (IMB# * 128) + (channel# * 8)
> >   For Series 39/4x: (channel# * 8)

> > > For the ATP, the Channel number is the number set on the SIB's thumbwheel switch. For Series 6x, the first ATP is Channel number 1, the second is 4, and additional ATP's are Channel numbers greater than 4. For Series 4x, the first ADCC will be Channel 1, usually followed by the rest of the ADCCs, then the ATPs. The ATP's Device number is always 0; it is not included in the formula. (The SIB always returns Device number 0 to the IMB.) The first IMB number is 0, the second is 1, and so on.

> > ADCC   (channel# * 8) + device#

> > > For the ADCC, the channel number is determined by the thumbwheel on the ADCC MAIN (31264-60001). There are eight devices (0-7) per channel, and Channel 0 is not used. If there are both ADCCs and ATPs on a system, the ADCCs are usually given the lower Channel numbers. Therefore the highest ADCC is usually Channel 8. The lowest allowable DRT number is 8, which is dedicated to the Console.

> > ATC   The DRT is determined by switches or jumpers on the TERM DATA INTFL (TDI) (30032-60001). The eight switches are divided into MSB and LSB on the left and right, respectively, and are set in binary. A jumper which is removed or a switch that is open implies a 1. For instance, "00000111" is DRT 7. The next two DRT numbers (8 and 9), for example are reserved for up to two TERM CTRL INTFL (TCI) (30061-60001) which are used for modem support, and whose addresses are also set by switches or or jumpers. Note that while TCIs have DRT Numbers, they do not appear in an I/O Map. On the Series II/III, the lowest allowable DRT number is 4, which is reserved for the System Disc.

UNIT #?

    ATP   A unique number in the range 0-95. Unit numbers 0 through 11 correspond to ports 0 through 11 on AIB 0, unit numbers 12-23 correspond to ports 0 through 11 on AIB 1, and so on.

    ADCC   0

    ATC   A unique number in the range 0-15.

SOFTWARE CHANNEL #? 0

TYPE? 16

Device Type 16 specifies that the logical device is a terminal.

SUB TYPE?

Table 6.1-3. Supported Subtypes for Terminals with MPE G.00.00 or Earlier

Controller	Subtype
ATP	0, 1, or 9
ADCC (HIOTERM2)	0, 1, or 9. Entering 4 or 5 will result in subtypes 0 or 1 respectively.
ADCC (HIOTERM0)	Series 30/33: 0, 1, 2, 3, 4, or 5 Series 39/4x: 0, 1, 4, or 5
ATC	0, 1, 2, 3, 4, 5, 6, or 7

0   Speed-sensing, directly connected. Do not use this Subtype with modems.

1   Speed-sensing, modem connected. Use with full duplex modems only.

    ADCC and ATP requires Data Set Ready (RS-232-C "CC", CCITT 107) and Data Carrier Detect (RS-232-C "CF", CCITT 109) to be ON.

    This subtype is compatible with Bell 103, 202T, 212A and CCITT V.21 modems.

2   Speed-sensing, modem-connected. Use with half duplex modems only.

    Data Rate Select (RS-232-C "CH" and CCITT 111) is set ON.

    This Suptype is compatible with Bell 202S and CCITT V.23 modems.

3   Identical to "2", except Data Rate Select is set OFF.

    ADCC requires Data Set Ready and Data Carrier Detect to be ON.

4-7   Identical to 0-3, respectively, except speed-sensing is disabled. If you select one of these Subtypes, you must also configure a port speed.

9   Modem connected to CCITT V. 24 modems (these require monitoring of circuit 106, Clear to Send); otherwise identical to Subtype 1.

Speed-sensing means the port determines the terminal's transmission speed by clocking the first CR (Carriage Return) character you send. (You send the first CR when you press (RETURN) to initiate logon.) Before logging on, you can set your terminal to any line speed your controller can speed-sense; the controller adjusts to the terminal's line speed. A port configured with Subtype 0, 1, 2, or 3 and with a 7-bit Terminal Type also uses the first CR to determine the terminal's parity type, though odd parity is only sensed on the ATC. Also, note the console must be NONE (0's) parity, due to system software constraints.

If you configure a port with Subtype 4, 5, 6, or 7, the port is said to be **speed-specified**. A speed-specified port cannot sense the terminal's operating speed. Consequently, the terminal must be set to the port's line speed in order for you to log on. For MPE V/E, subtypes 4 and 5 are mapped into subtypes 0 and 1.

Once you log on to a speed-sensing or speed-specified port, you can change the communication speed by using the MPE :SPEED command.

NOTE

The ATP can be configured for speed-sensing only. It can speed-sense up to 19.2K bps.

```
TERM TYPE? (For MPE IV or MPE V/P)
ENTER [TERM TYPE #,][DESCRIPTOR FILENAME]? (For MPE V/E)
```

Table 6.1-4. Supported Terminal Types with MPE G.00.00 or Earlier

Controller	Terminal Types
ATP or ADCC (HIOTERM2)	6, 9, 10, 12, 13, 15, 16, 18, or 31
ADCC (HIOTERM0)	4, 6, 9, 10, 12, 13, 15, 16, 18, or 31
ATC	0, 1, 2, 3, 4, 5, 6, 9, 10, 12, 13, 15, 16, 18, or 31

See tables 4.1-1 through 4.1-3 for the characteristics of each particular Terminal Type for the ATP, ADCC, and ATC respectively.

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

ATP and ADCC (HIOTERM2) allow you to specify a user-created Terminal
Type by entering the fully qualified filename in addition to or instead of
the Terminal Type number. Refer to the *Workstation Configurator
Reference Manual* for more information.

SPEED IN CHARACTERS PER SECOND?

Refer to Section 3 of Part 6 to determine which speeds are supported with your particular terminal or
PC using a(or PC using a terminal emulator).

Table 6.1-5. Supported Speeds for Terminals with MPE G.00.00 or Earlier

Line Speed	Chars /Sec	ATP speed-sensed	ADCC (HIOTERM2) speed-sensed/ speed-specified	ADCC (HIOTERM0) speed-sensed/ speed-specified	ATC speed-sensed/ speed-specified
110	10	N	N / N	N / N	Y / Y
150	15	N	N / Y	Y / Y	Y / Y
300	30	Y	Y / Y	Y / Y	Y / Y
600	60	Y	Y / Y	N / Y	Y / Y
1200	120	Y	Y / Y	Y / Y	Y / Y
2400	240	Y	Y / Y	Y / Y	Y / Y
4800	480	Y	Y / Y	N / Y	N / N
9600	960	Y	Y / Y	N / Y	N / N
19200	1920	Y	N / N	N / N	N / N

RECORD WIDTH?

User choice. Normally 40; that is, 40 words or 80 bytes, the screen width of most terminals.

OUTPUT DEVICE?

Normally, the same Logical Device Number as chosen above.

ACCEPT JOBS/SESSIONS?

Y, if you wish to log on to this logical device. (By entering N, programmatic opening of the terminal is
still allowed.)

ACCEPT DATA?

Y or N. To use the :DATA command, it must be Yes.

INTERACTIVE?

Y or N (normally Yes). To use :HELLO or :(*command*) commands, it must be Yes.

DUPLICATIVE? Y

The controller echoes output character-by-character instead of line-by-line.

INITIALLY SPOOLED? N

(It is not a printer or a card reader.)

DRIVER NAME?

ATP   HIOTERM1

ADCC   HIOTERM0 (For MPE IV or MPE V/P)
        HIOTERM2 (For MPE V/E)

ATC   IOTERM0

DEVICE CLASSES?

Class names are optional. When class names are used, they must begin with a letter (alphabetic character) and may contain up to eight alphanumeric characters. When listing more than one class name, separate the names with commas. (The console must be unique and must be device class CONSOLE.)

NOTE

The dialog now issues the LOGICAL DEVICE #? prompt described previously. If there is another device to be configured, enter its logical device number and return to LOGICAL DEVICE #? to continue reading. Otherwise, press (RETURN) and continue through the remaining dialog.

Terminal Port using MPE G.01.00 or Later

The following prompt begins the configuration dialog for I/O devices. After you configure one device (following the DEVICE CLASSES? prompt), this LOGICAL DEVICE #? prompt is repeated to allow for configuring additional devices.

LOGICAL DEVICE #?

    A unique number in the range 1-999 (user choice). MPE recognizes a device by this number.

DEVICE NAME?

   device name Enter device name HPTERMATP or HPTERMADCC to take advantage of the device defaults. When you enter one of the device names (listed when you answer Y to the LIST DEVICE DEFAULTS? prompt), the device defaults are displayed as part of the remaining dialog questions. For example, in the Subtype prompt on the following page, 0 is the default value. If this number is the Subtype that you have chosen for the device you are configuring, you would press (RETURN) to use the default number. If that is not the Subtype that you wish to use, enter the value that you prefer and it will override the displayed default value.

   (RETURN) If you do not wish to use the device defaults, enter a (RETURN) and no defaults will be displayed with the dialog questions. For example, the Subtype prompt below would not list the default but would look like this: SUBTYPE ?

DRT #=*nn*?

   0 Removes the device (specified by the logical device number entered above) from the MPE configuration. Returns dialog to LOGICAL DEVICE #? prompt.

   nn This default is displayed only in the INITIAL dialog for devices physically connected to the system but not yet configured (and then only if you have chosen a device name above). To add a terminal with the displayed default DRT number, press (RETURN). Otherwise, enter the DRT number that results from the following formula, making sure that the number you enter is less than or equal to the current highest allowable DRT number.

        ATP   For Series 6x: (IMB# * 128) + (channel# * 8)
                  For Series 39/4x: (channel# * 8)

           For the ATP, the Channel number is the number set on the SIB's thumbwheel switch. For Series 6x, the first ATP is Channel number 1, the second is 4, and additional ATP's are Channel numbers greater than 4. For Series 4x, the first ADCC will be Channel 1, usually followed by the rest of the ADCCs, then the ATPs. The ATP's Device number is always 0; it is not included in the formula. (The SIB always returns Device number 0 to the IMB.) The first IMB number is 0, the second is 1, and so on.

        ATP37   channel# * 8

           For the ATP37, the Channel number is the number of the slot in the cabinet where the ATP37 board is placed. The first ATP37 is Channel number 1, and a maximum of 4 ATP37 boards are allowed. The ATP37's Device number is always 0; it is not included in the formula.

ADCC   (channel# * 8) + device#

For the ADCC, the channel number is determined by the thumbwheel on the ADCC MAIN (31264-60001). There are eight devices (0-7) per channel, and Channel 0 is not used. If there are both ADCCs and ATPs on a system, the ADCCs are usually given the lower Channel numbers. Therefore the highest ADCC is usually Channel 8. The lowest allowable DRT number is 8, which is dedicated to the Console.

UNIT #=*n*?

The default number that *n* signifies is displayed only in the INITIAL dialog for devices physically connected to the system but not yet configured (and then only if you have chosen the default DRT number). Press (RETURN) to use the displayed default. Otherwise, enter the proper unit number from the following options:

ATP   A unique number in the range 0-95. Unit numbers 0 through 11 correspond to ports 0 through 11 on AIB 0, unit numbers 12-23 correspond to ports 0 through 11 on AIB 1, and so on.

ATP37   0, 1, 2, 3, 4, 5, or 7. Ports 0 through 5 are direct-connect. Port 7 is a modem port that can also be direct-connect. Port 6 is not used.

ADCC   0

SOFTWARE CHANNEL = 0?

A channel number of zero is required.

TYPE = 16?

Device Type 16 specifies that the logical device is a terminal.

SUBTYPE = 0?

0   Speed-sensing, directly connected. Do not use this subtype with modems.

1   Speed-sensing, modem connected. Use with full duplex modems only. For ATP37, this Subtype can be used with unit 7 only.

Data Set Ready (RS-232-C "CC", CCITT 107) and Data Carrier Detect (RS-232-C "CF", CCITT 109) are required to be ON.

This Subtype is compatible with Bell 103, 202T, 212A and CCITT V.21 modems.

9   Modem connected to CCITT V.24 modems that require monitoring of circuit 106 (Clear to Send); otherwise identical to Subtype 1. For ATP37, this Subtype can be used with unit 7 only.

Speed-sensing means the port determines the terminal's transmission speed by clocking the first CR (Carriage Return) character you send. (You send the first CR when you press (RETURN) to initiate logon.) Before logging on, you can set your terminal to any line speed your controller can speed-sense; the controller adjusts to the terminal's line speed. A port configured with Subtype 0 or 1 and with a 7-bit Terminal Type also uses the first CR to determine the terminal's parity type. Also, note the console must be NONE (0's) parity, due to system software constraints.

Once you log on to a speed-sensing port, you can change the communication speed by using the MPE :SPEED command.

ENTER [TERM TYPE #,][DESCRIPTOR FILENAME] = 10?

Normally, for HP terminals, press (RETURN) to take advantage of the default. The supported Terminal Types are 6, 9, 10, 12, 13, 15, 16, 18, or 31. See table 4.1-1 for the characteristics of each particular Terminal Type.

```
+-----------+
|   NOTE    |
+-----------+
```

You are allowed to specify a user-created Terminal Type by entering the fully qualified filename in addition to or instead of the Terminal Type number. Refer to the *Workstation Configurator Reference Manual* for more information.

SPEED IN CHARACTERS PER SECOND = 960?

See Section 3 of Part 6 to determine which speeds are supported with your particular terminal.

Table 6.1-6. Supported Speeds for Terminals with MPE G.01.00 or Later

Line Speed	Char /Sec	ATP ATP37 speed-sensing	ADCC(HIOTERM2) speed-sensing	ADCC(HIOTERM2) speed-specified
110	10	N	N	N
150	15	N	N	Y
300	30	Y	Y	Y
600	60	Y	Y	Y
1200	120	Y	Y	Y
2400	240	Y	Y	Y
4800	480	Y	Y	Y
9600	960	Y	Y	Y
19200	1920	Y	N	N

RECORD WIDTH = 40?

40 words (80 bytes) is the screen width of most terminals.

OUTPUT DEVICE = *nn*?

Normally, the same Logical Device Number as chosen above. The default listed is the Logical Device Number for terminals and 0 for all other devices.

ACCEPT JOBS/SESSIONS = Y?

Y, if you wish to log on to this logical device. (By entering N, programmatic opening of the terminal is still allowed.)

ACCEPT DATA = Y?

Y or N. To use the :DATA command, it must be Yes.

INTERACTIVE = Y?

Y or N (normally Yes). To use :HELLO, :(*command*) or :JOB commands, it must be Yes.

DUPLICATIVE = Y?

Y is required. The controller echoes output character-by character instead of line-by-line.

INITIALLY SPOOLED = N?

N is required. Only printers or card readers are spooled.

AUTO REPLY = N?

N is required.

DRIVER NAME = *driver*?

The default driver name *driver* is required. It is HIOTERM1 for ATP or ATP37 and HIOTERM2 for ADCC.

DEVICE CLASSES = TERM?

Class names are optional. When class names are used, they must begin with a letter (alphabetic character) and may contain up to eight alphanumeric characters. When listing more than one class name, separate the names with commas. (The console must be unique and must be device class CONSOLE.)

NOTE

The dialog now issues the LOGICAL DEVICE #? prompt described previously. If there is another device to be configured, enter its logical device number and return to LOGICAL DEVICE #? to continue reading. Otherwise, press (RETURN) and continue through the remaining dialog.

CONFIGURING A PRINTER PORT

It is necessary to go through only one of the following two sets of dialog questions. Use the first if your system uses MPE Version G.00.00 or earlier. This includes MPE IV, MPE V/P, and the first release of MPE V/E. If your system is running on MPE Version G.01.00 or later, use the second set of dialog questions.

Printer Port using MPE G.00.00 or Earlier

The following prompt begins the configuration dialog for I/O devices. After you configure one device (following the DEVICE CLASSES? prompt), this LOGICAL DEVICE #? prompt is repeated to allow for configuring additional devices.

LOGICAL DEVICE #?

> A unique number in the range 1-999 (User choice. Maximum 256 for MPE IV and MPE V/P). MPE recognizes a device by this number.

DRT #?

> 0 Removes the device (specified by the above logical device number) from the MPE configuration. Returns dialog to LOGICAL DEVICE #? prompt.

> *nn* To add a printer, enter the DRT number that results from one of the following formulas:

>> ATP   For Series 6x: (IMB# * 128) + (channel# * 8)
>> For Series 39/4x: (channel# * 8)

>> For the ATP, the Channel number is the number set on the SIB's thumbwheel switch. For Series 6x, the first ATP is Channel number 1, the second is 4, and additional ATP's are Channel numbers greater than 4. For Series 4x, the first ADCC will be Channel 1, usually followed by the rest of the ADCCs, then the ATPs. The ATP's Device number is always 0; it is not included in the formula. (The SIB always returns Device number 0 to the IMB.) The first IMB number is 0, the second is 1, and so on.

>> ADCC   (channel# * 8) + device#

>> For the ADCC, the channel number is determined by the thumbwheel on the ADCC MAIN (31264-60001). There are eight devices (0-7) per channel, and Channel 0 is not used. If there are both ADCCs and ATPs on a system, the ADCCs are usually given the lower Channel numbers. Therefore the highest ADCC is usually Channel 8. The lowest allowable DRT number is 8, which is dedicated to the Console.

>> ATC   The DRT is determined by switches or jumpers on the TERM DATA INTFL (TDI) (30032-60001). The eight switches are divided into MSB and LSB on the left and right, respectively, and are set in binary. A jumper which is removed or a switch that is open implies a 1. For instance, "00000111" is DRT 7. The next two DRT numbers (8 and 9), for example are reserved for up to two TERM CTRL INTFL (TCI) (30061-60001) which are used for modem support, and whose addresses are also set by switches or or jumpers. Note that while TCIs have DRT Numbers, they do not appear in an I/O Map. On the Series II/III, the lowest allowable DRT number is 4, which is reserved for the System Disc.

UNIT #?

    ATP   A unique number in the range 0-95. Unit numbers 0 through 11 correspond to ports 0 through 11 on AIB 0, unit numbers 12-23 correspond to ports 0 through 11 on AIB 1, and so on.

    ADCC   <u>0</u>

    ATC   A unique number in the range 0-15.

SOFTWARE CHANNEL #? <u>0</u>

TYPE? <u>32</u>

Device Type 32 specifies that the logical device is a printer.

SUB TYPE?

    14   Speed-specified, directly connected. May also be used with full-duplex leased-line modems not requiring any control signals, such as 202T.

    15   Speed-specified, modem connected. Use with full-duplex modems requiring the following control signals: CC (Data Set Ready), CF (Data Carrier Detect).

NOTE

Printer ports are not speed-sensed.

ENTER TERM TYPE? (For MPE IV or MPE V/P)
ENTER [TERM TYPE #],[DESCRIPTOR FILENAME]? (For MPE V/E)

19, 20, 21, or 22. See Tables 4.1-1 through 4.1-3 for the characteristics of particular Terminal Type for ATP, ADCC, and ATC respectively.

NOTE

ATP and ADCC (HIOTERM2) allow you to specify a user-created Terminal Type by entering the fully qualified filename in addition to or instead of the terminal type number. Refer to the *Workstation Configurator Reference Manual* for more information. ATC and ADCC(HIOTERM0 with MPE IV) allow Terminal Type 19 only.

SPEED IN CHARACTERS PER SECOND?

See Section 3 of Part 6 to determine which speeds are supported with each particular printer.

Table 6.1-7. Supported Speeds for Printers with MPE G.00.00 or Earlier

Line Speed	Chars/Sec	ATP	ADCC	ATC
110	10	N	N	Y
150	15	N	Y	Y
300	30	Y	Y	Y
600	60	Y	Y	Y
1200	120	Y	Y	Y
2400	240	Y	Y	Y
4800	480	Y	Y	N
9600	960	Y	Y	N
19200	1920	Y	N	N

RECORD WIDTH?

User choice. Normally 66; that is, 66 words or 132 bytes, the standard page width of most printers using fan-fold paper. Page-fed laser printers and other printers using 8 1/2 inch by 11 inch paper should be set to 40 words (80 bytes).

OUTPUT DEVICE? O

ACCEPT JOBS/SESSIONS? N

ACCEPT DATA? N

INTERACTIVE? N

DUPLICATIVE? N

The controller echoes output line-by-line instead of character-by-character.

INITIALLY SPOOLED?

Y or N. Yes if you want the system to automatically spool the device at system startup time. No if you want to spool it yourself with :STARTSPOOL or if you want programmatic control.

DRIVER NAME?

    ATP   HIOASLP0

    ADCC   HIOTERM0 (For MPE IV or MPE V/P)
             HIOASLP2 (For MPE V/E)

    ATC   IOTERM0

DEVICE CLASSES?

Class names are optional. When class names are used, they must begin with a letter (alphabetic character) and may contain up to eight alphanumeric characters. When listing more than one class name, separate the names with commas.

> ### NOTE
>
> The dialog now issues the LOGICAL DEVICE #? prompt described previously. If there is another device to be configured, enter its logical device number and return to LOGICAL DEVICE #? to continue reading. Otherwise, press (RETURN) and continue through the remaining dialog.

Printer Port using MPE G.01.00 or Later

The following prompt begins the configuration dialog for I/O devices. After you configure one device (following the DEVICE CLASSES? prompt), this prompt is repeated to allow for configuring additional devices.

LOGICAL DEVICE #?

> A unique number in the range 1-999 (user choice). MPE recognizes a device by this number.

DEVICE NAME?

device name   Enter device name HPLPATP, HPLPADCC, HPPCLATP, or HPPCLADCC to take advantage of the device defaults. When you enter one of the device names (listed when you answer Y to the LIST DEVICE DEFAULTS? prompt), the device defaults are displayed as part of the remaining dialog questions. For example, in the Subtype prompt on the following page, 14 is the default value. If this number is the Subtype that you have chosen for the device you are configuring, you would press (RETURN) to use the default number. If that is not the Subtype that you wish to use, enter the value that you prefer and it will override the displayed default value.

(RETURN)   If you do not wish to use the device defaults, enter a (RETURN) and no defaults will be displayed with the dialog questions. For example, the subtype prompt below would not list the default but would look like this: SUBTYPE ?

DRT #=*nn*?

> 0   Removes the device (specified by the logical device number entered above) from the MPE configuration. Returns dialog to LOGICAL DEVICE #? prompt.

> *nn*   This default is displayed only in the INITIAL dialog for devices physically connected to the system but not yet configured (and then only if you have chosen a device name above). To add a printer with the displayed default DRT number, press (RETURN). Otherwise, enter the DRT number that results from the following formula, making sure that the number you enter is less than or equal to the current highest allowable DRT number.

ATP   For Series 6x: (IMB# * 128) + (channel# * 8)
For Series 39/4x: (channel# * 8)

> For the ATP, the Channel number is the number set on the SIB's thumbwheel switch. For Series 6x, the first ATP is Channel number 1, the second is 4, and additional ATP's are Channel numbers greater than 4. For Series 4x, the first ADCC will be Channel 1, usually followed by the rest of the ADCCs, then the ATPs. The ATP's Device number is always 0; it is not included in the formula. (The SIB always returns Device number 0 to the IMB.) The first IMB number is 0, the second is 1, and so on.

ATP37   channel# * 8

> For the ATP37, the Channel number is the number of the slot in the cabinet where the ATP37 board is placed. The first ATP37 is Channel number 1, and a maximum of 4 ATP37 boards are allowed. The ATP37's Device number is always 0; it is not included in the formula.

ADCC   (channel# * 8) + device#

> For the ADCC, the channel number is determined by the thumbwheel on the ADCC MAIN (31264-60001). There are eight devices (0-7) per channel, and Channel 0 is not used. If there are both ADCCs and ATPs on a system, the ADCCs are usually given the lower Channel numbers. Therefore the highest ADCC is usually Channel 8. The lowest allowable DRT number is 8, which is dedicated to the Console.

UNIT #=n?

The default number that n signifies is displayed only in the INITIAL dialog for devices physically connected to the system but not yet configured (and then only if you have chosen the default DRT number). Press (RETURN) to use the displayed default. Otherwise, enter the proper unit number from the following options:

ATP   A unique number in the range 0-95. Unit numbers 0 through 11 correspond to ports 0 through 11 on AIB 0, unit numbers 12-23 correspond to ports 0 through 11 on AIB 1, and so on.

ATP37 0, 1, 2, 3, 4, 5, or 7. Ports 0 through 5 are direct-connect. Port 7 is a modem port that can also be direct-connect. Port 6 is not used.

ADCC   0

SOFTWARE CHANNEL =0?

A channel number of zero is required.

TYPE = 32?

Device Type 32 specifies that the logical device is a printer.

SUBTYPE = 14?

14   Speed-specified, directly connected. May also be used with full duplex leased-line modems not requiring any control signals, such as 202T.

15   Speed-specified, modem connected. Use with full duplex modems requiring the following control signals: CC (Data Set Ready), CF (Data Carrier Detect). This subtype can be used with unit 7 only on ATP37.

ENTER [TERM TYPE #],[DESCRIPTOR FILENAME] = termtype?

The value of termtype depends on which device name was chosen. If you chose HPLPATP or HPLPADCC as the device name, the default is Terminal Type 19; if you chose HPPCLATP or HPPCLADCC, the default Terminal Type is TTPCL22. Refer to Section 3 of Part 6 to determine what Terminal Types are supported with and suggested for the particular printer you are configuring. Supported Terminal Types are TTPCL18, TTPCL19, TTPCL22, 18, 19, 20, 21, or 22. See Table 4.1-1 for the characteristics of each particular Terminal Type.

```
NOTE
```

You are allowed to specify a user-created Terminal Type by entering
the fully qualified filename in addition to or instead of the Terminal
Type number. Refer to the *Workstation Configurator Reference Manual*
for more information.

SPEED IN CHARACTERS PER SECOND = *nnn*?

The value of *nnn* depends on which device name was chosen. If you chose HPLPATP or HPLPADCC
as the device name, the default speed is 240 characters per second; if you chose HPPCLATP or
HPPCLADCC, the default is 960 characters per second. Refer to Section 3 of Part 6 to determine
what speeds are supported on the particular printer you are configuring. Table 6.1-8 lists the speeds
supported by the controllers.

Table 6.1-8. Supported Speeds for Printers with MPE G.01.00 or Later

Line Speed	Chars/Sec	ATP/ATP37	ADCC
110	10	N	N
150	15	N	Y
300	30	Y	Y
600	60	Y	Y
1200	120	Y	Y
2400	240	Y	Y
4800	480	Y	Y
9600	960	Y	Y
19200	1920	Y	N

```
NOTE
```

Printer ports are not speed-sensed.

RECORD WIDTH = 66?

User choice. Normally 66; that is, 66 words or 132 bytes, the standard page width of most printers
using fan-fold paper. Page-fed laser printers and other printers using 8 1/2 inch by 11 inch paper
should be set to 40 words (80 bytes).

OUTPUT DEVICE = 0?

Zero is required.

ACCEPT JOBS/SESSIONS = N?

   N is required.

ACCEPT DATA = N?

   N is required.

INTERACTIVE = N?

   N is required.

DUPLICATIVE = N?

   N is required. The controller echoes output line-by-line instead of character-by-character.

INITIALLY SPOOLED = Y?

   Y or N. Yes if you want the system to automatically spool the device at system startup time. No if you want to spool it yourself with :STARTSPOOL or if you want programmatic control.

AUTO REPLY = N?

   N is required.

DRIVER NAME = *driver*?

   The default driver name *driver* is required. It is HIOASLP0 for ATP or ATP37 and HIOASLP2 for ADCC.

DEVICE CLASSES = LP?

   Class names are optional. When class names are used, they must begin with a letter (alphabetic character) and may contain up to eight alphanumeric characters. When listing more than one class name, separate the names with commas.

NOTE

   The dialog now issues the LOGICAL DEVICE #? prompt described previously. If there is another device to be configured, enter its logical device number and return to LOGICAL DEVICE #? to continue reading. Otherwise, press (RETURN) and continue through the remaining dialog.

SYSTEM TABLE CHANGES

The last dialog prompts that need to be mentioned appear only in the SYSDUMP dialog and only if you respond Y to the SYSTEM TABLE CHANGES? prompt.

Number of Terminal Buffers

Terminal Buffers are in an extra data segment called the terminal data segment. The maximum number of TBUFs is restricted by the maximum extra data segment size, a configurable system tables value. In general, the maximum extra data segment size may be from zero to 32767 words.

Note that the SYSDUMP dialog question for TBUFs requires you to enter the number of TBUFs *per port*, not the total number of TBUFs for the terminal data segment.

TERMINAL BUFFERS PER PORT?

Table 6.1-9. Terminal Buffer Recommendations

Controller	Recommendation
ATP or ADCC (HIOTERM2)	5 per port if 50 ports or less. If greater than 50 ports, 3 per port. Software will guarantee that a minimum number of buffers are configured.
ADCC (HIOTERM0)	5 per port. The recommended minimum number of total buffers is 30.
ATP37	5 per port. Software will guarantee that a minimum number of buffers are configured.
ATC	8 per port. The recommended minimum number of total buffers is 40.

If heavy use is made of block mode I/O, or many printers are operated concurrently, or large reads (>1000 characters) are common, then 12 buffers per port should be configured on all systems.

ATP. The TBUFs are contained in one or two extra data segments. There is one terminal data segment built for units 0-47, and another built for units 48-95. The maximum number of TBUFs is determined by the configured maximum extra data segment size and the number of terminal data segments used. The following formula finds the maximum number of TBUFs per data segment of a given size:

(Maximum Extra Data Segment Size - (2023 + (# of ports * 184))) / 69

where:
2023 = fixed ATP overhead
 184 = size of an ATP Device Information Table (DIT) in the XDS
  69 = the number of words in an ATP TBUF

ATP37. The TBUFs are contained in one extra data segment called the terminal data segment. The maximum number of TBUFs is determined by the configured maximum extra data segment size. The following formula finds the maximum number of TBUFs per data segment of a given size:

(Maximum Extra Data Segment Size - (2023 + (# of ports * 184))) / 69

where:
2023 = fixed ATP37 overhead
 184 = size of an ATP37 Device Information Table (DIT) in the XDS
  69 = the number of words in an ATP37 TBUF

ADCC (HIOTERM2). The TBUFs are contained in one extra data segment called the terminal data segment. The maximum number of TBUFs is determined by the configured maximum extra data segment size. The following formula finds the maximum number of TBUFs per data segment of a given size:

(Maximum Extra Data Segment Size - (1775 + (# of ports * 210))) / 69

where:
1775 = fixed ADCC (HIOTERM2) overhead
 210 = size of an ADCC DIT contained in the XDS
  69 = the number of words in an ADCC (HIOTERM2) TBUF

If more TBUFs are configured than can fit in an extra data segment, the system builds as many as possible and prints a warning message each time the system is warmstarted or coolstarted. If more TBUFs are still needed, the configured maximum extra data segment size should be increased if possible.

ADCC (HIOTERM0) AND ATC. The maximum number of TBUFs that can be configured is 255. They are located in Bank 0.

Examples

Example 1: Your HP 3000 is running on MPE V/E, using ADCCs. Therefore, the software driver for ADCC is HIOTERM2. You have 21 terminal/printer ports configured on the ADCCs. From table 6.1-9 you see that five TBUFs per port are recommended. For the 21 ports, this brings the total number of TBUFs needed in the terminal data segment to 105. Your configured maximum extra data segment size is 9000 words. Using the formula:

$$(9000-(1775+(21*210)))/69 = \text{maximum number of TBUFs in the data segment}$$
$$2815/69 = 40.79710...$$

You can see that only 40 TBUFs are allowed in the terminal data segment although you need 105. The maximum extra data segment size needs to be increased. Use the formula again, solving for maximum extra data segment size (Max XDS):

$$(\text{Max XDS}-(1775+(21*210)))/69 = 105$$
$$(\text{Max XDS}-6185)/69 = 105$$
$$\text{Max XDS}-6185 = 7245$$
$$\text{Max XDS} = 13,430$$

The maximum extra data segment size needs to be increased to at least 13,430 words.

Example 2: You are using 53 ports on an ATP. The configured value for maximum extra data segment size is 25,000 words. From table 6.1-9 you see that 3 terminal buffers per port are recommended, making a total of 159 TBUFs. Your ports are configured with unit numbers zero through 52, and two terminal data segments will be used. Ports zero through 47 will use the first terminal data segment, and the other will be used by ports 48 through 52. There are 48 ports for the first data segment and only 5 for the second data segment; therefore if we find the necessary maximum extra data segment size necessary for the first terminal data segment, you know that it will be more than large enough for the second data segment. In the first terminal data segment, the 48 ports need a total of 144 TBUFs according to the recommended 3 per port. Solving the formula:

$$(\text{Max XDS}-(2023+(48*184)))/69=144$$
$$(\text{Max XDS}-10,855)/69=144$$
$$\text{Max XDS}-10,855=9936$$
$$\text{Max XDS}=20,791$$

You see that the maximum extra data segment size needs to be configured to at least 20,791. Since 25,000 is already the configured value, you may want to decrease the maximum extra data segment size slightly, unless there are other applications running on your HP 3000 that required extra data segments to be as large as 25,000 words.

Number of Timers

Timers are used when timed operations are executed. For example, when a timed read starts, an entry for the read is placed into the timer request list and the timer begins. The maximum length of the timer request list is equal to the maximum number of timed operations going on at one time.

TIMER REQUEST LIST = *nn*?

> This number should equal the number of ports plus ten. If *nn* is large enough, press (RETURN); otherwise, enter a larger number.

The second facet to preparing your device for operation is to physically attach the device to its asynchronous port. A device can be connected to its port directly or through a modem. This section covers the following two topics:

- Cabling used to connect your device to its port, whether the connection is direct or through a modem.

- Recommended asynchronous full duplex modems.

CABLING

Whether a device is connected directly or through a modem, the connection mode determines the kind of cabling that must be used. To directly connect an RS 232 device to the ATP, ATP37, ADCC, or the ATC, three wires are needed; one for a transmit line, one for a receive line, and one for a ground line. To directly connect an ATP or ATP37 to an RS 422 interface connection requires two wires for transmission, two for reception, and one for grounding. Modem connections require cables that conform to the Hewlett-Packard implementation of the RS-232-C, V.21 or V.23 interface standards. To ensure proper performance, be sure to consult the manuals for the equipment you are connecting via cable. Check closely the specification for the maximum cable length.

Hewlett-Packard sells cables for all supported connections. Consult the *Computer User's Catalog* for ordering information. Hewlett-Packard does not guarantee the proper operation of devices connected through custom-built cables.

Refer to Figure 6.2-1 for diagrams of the connectors designated as 1M, 2F, 3 (M and F), 4 (M and F), 5, 6 (M and F) and 7 (M and F). In the following tables, the cable part numbers shown first are to be used to order replacement cables. For your reference, the part numbers given below in parenthesis are the numbers used when ordering the cable as part of a new system installation.

EIA RS-232-C Cables

Cable Manufacturing Specifications

The specification establishes requirements for a 3 or 25 pin conductor external low voltage unshielded computer cable with overall jacket: U.L. style 2560. The maximum length for an RS-232-C specified cable is 50 feet.

Electrical

Voltage Rating   30V for Class 2 wiring systems only (220V rms test between conductors).

Mechanical

Singles   Three or twenty-five 26 (7 x 34) AWG tinned copper; tinned after stranding.
Insulation   PVC, seven-mil minimum wall thickness; rated at $+60^{\circ}$C.
Cable Lay   Twist singles for flexibility.
                             Fillers, cloth or nylon binding may be used for a smooth, round construction.
Jacket   PVC, 35-mil minimum wall thickness; rated at $+60^{\circ}$C.
Color   Jade Gray per Visual Color Std., HP Part No. 6009-0021.

1 50-pin male (for 262x terminals); 2 30-pin female (for 264x terminals); 3M and 3F male and female standard 25-pin RS-232-C connectors; 4M and 4F male and female 14-pin multipoint cable connectors; 5 (not shown) 48-pin connector; 6M and 6F male and female 3-pin connectors for HP 3000 ATP RS-232-C interface; 7M and 7F male and female 5-pin connectors for HP 3000 ATP RS-422 interface. Above connectors not to scale.

Figure 6.2-1. Diagrams of Common Cable Connectors

Table 6.2-1. HP 262x or HP 125 (Both Port 1)
(Not for HP 2382A, 2392A, 2621, 2629L)

Part Number	Length	Description
13222-60001 (13222N)	16.7 ft. (5 m)	Cable: 50-pin 1M to 25-pin 3M. Used with U. S. modems Bell 103A, 202C/D/S/T, 212A, Vadic 3400, and signal-compatible acoustic couplers. Also used with HP 1000 and HP 3000 System multiplexers.
92217A	50 ft. (15 m)	Longer 13222N cable.
13222-60002 (13222M)	16.7 ft. (5 m)	Cable: 50-pin 1M to 25-pin 3M. Used with European 103 or 202C type modems. Shielded.
92217B	50 ft. (15 m)	Longer 13222M cable.
13222-60003 (13222C)	6.6 ft. (2 m)	Cable: 50-pin 1M to 25-pin 3F. Used for standard RS-232-C communications.
92217C	50 ft. (15 m)	Longer 13222C cable.
13222-60005 (13222Y)	16.7 ft. (5 m)	Cable: 50-pin 1M to 25-pin 3M. Cable with EMP protection for terminal from lightning-induced transients.
92217E (13222X)	16.7 ft. (5 m)	Cable: 50-pin 1M to 3-pin 6M. Used as an RS-232-C interface cable for an HP 3000 ATP/ATP37.

Table 6.2-2. Modem Cables

Part Number	Length	Description
30062-60020 (30062B)	25 ft. (7.6 m)	Cable, 25-pin 3M to 25-pin 3M. Connects an HP 3000 to modem types Bell 103 and 202S.
30062-60061 (30062B, Opt. 001)	50 ft. (15 m)	Cable, 25-pin 3M to 25-pin 3M. Connects an HP 3000 to modem types Bell 103 and 202S.
5061-2403 (13232U)	5 ft. (1.5 m)	Modem Eliminator Cable: 25-pin 3F to 25-pin 3F. Bypasses modem and connects an HP 13232P cable to an HP 1000, to an HP 3000, or to another terminal. Unshielded.

**Table 6.2-3. HP 262x, 125 (Both Port 2), 2382A,
2392A, 2621, 2629L, 120, 150**

Part Number	Length	Description
13242-60001 (13242N)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. Used with HP 1000 or HP 3000 Systems, U. S. modems Bell 103A, 202C/D/S/T, 212A, and Vadic 3400 modems. Also used with acoustic couplers (signal-compatible only). Shielded.
92218A	50 ft. (15 m)	Longer 13242N cable.
13242-60002 (13242M)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. Used with European 202C-type modems. Shielded.
92218A	50 ft. (15 m)	Longer 13242M cable.
13242-60005 (13242Y)	16.7 ft. (5 m)	Cable 25-pin 3M to 25-pin 3M. Cable with EMP protection for terminal from lightning-induced transients.
92218C	50 ft. (15 m)	Longer 13242Y cable.
92218D (13242X)	16.7 ft. (5 m)	Cable: 25-pin 3M to 3-pin 6M. Used as an RS-232-C interface cable for an HP 3000 ATP/ATP37.
13242-60010 (13242G)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. Used with RS-232-C compatible serial printers such as HP 2601/2631/2635. Shielded.
13242-60011 (13242H)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3F. Used with RS-232-C compatible serial printers. Shielded.
40242-60003 (40242C)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3F. RFI-filtering extender cable used with HP 2392A, 2621B, and 2629L terminals.
40242-60004 (40242M)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. RFI-filtering modem cable used with HP 2392A, 2621B, and 2629L terminals.
40242-60005 (40242X)	16.7 ft. (5 m)	Cable: 25-pin 3M to 3-pin 6M. RFI-filtering RS-232-C interface cable used to connect HP 3000 ATP/ATP37 with HP 2392A, 2621B, and 2629L.
40242-60006 (40242G)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. RFI-filtering cable used with RS-232-C compatible serial printers.
40242-60010 (40242Y)	16.7 ft. (5 m)	Cable: 25-pin 3M to 25-pin 3M. RFI-filtering cable with EMP protection for HP 2392A, 2621B, and 2629L terminals.

Table 6.2-4. HP 264X Point-to-Point Terminals

Part Number	Length	Description
02640-60043 (13232A)	15 ft. (4.5 m)	Cable: 30-pin 2F to 25-pin 3M. Used with U. S. modems Bell 103A, 202C/D/S/T, and signal-compatible acoustic couplers. Also used with HP 1000 and HP 3000 System multiplexers.
92219A	50 ft. (15 m)	Longer 13232A cable
02640-60131 (13232N)	15 ft. (4.5 m)	Cable: 30-pin 2F to 25-pin 3M. Used with U. S. modems Bell 103A, 202C/D/S/T, 212A, Vadic 3400, and signal-compatible acoustic couplers. Also used with HP 1000 and HP 3000 System multiplexers.
92219B	50 ft. (15 m)	Longer 13232N cable.
5061-2409 (13232M)	15 ft. (4.5 m)	Cable: 30-pin 2F to 25-pin 3M. Used with European 202C-type modems.
92219C	50 ft. (15 m)	Longer 13232M cable.
02640-60059 (13232C)	5 ft. (1.5 m)	Cable: 30-pin 2F to 25-pin 3F. Used with standard asynchronous direct connect to non-HP computer.
92219D	50 ft. (15 m)	Longer 13232C cable.
02640-60128 (13232Y)	15 ft. (4.5 m)	Cable: 30-pin 2F to 25-pin 3M. Cable with EMP protection for terminal from lightning-induced transients.
92219E	50 ft. (15 m)	Longer 13232Y cable.
92219F (13232X)	16.7 ft. (5 m)	Cable: 30-pin 2F to 3-pin 6M. Used as an RS-232-C interface cable for an HP 3000 ATP/ATP37.

Table 6.2-5. RS-232-C Extension Cables.

Part Number	Length	Description
17355A	9 ft. (2.3 m)	Cable: 25-pin 3M to 25-pin 3M. Pins 1-25 wired end-to-end.
31391A (30062C)	16.7 ft. (5 m)	Cable: 25-pin 3F to 25-pin 3M.
31391B	33.4 ft. (10 m)	Longer 30062C cable.
31391C (30062C, Opt. 001)	50 ft. (15 m)	Longer 30062C cable.
30062-60012 (30062C, Opt. 002)	100 ft. (30 m)	Cable: 25-pin 3F to 25-pin 3M. Pins 1-25 wired end-to-end, unshielded.
92219G	12.5 ft. (3.8 m)	Cable: 25-pin 3M to 25-pin 3M. Pins 1-8, 11, 12, 19, 20,22, 23, 25 wired end-to-end.
30062-60018 (30062D)	25 ft. (7.6 m)	Cable: 25-pin 3F to 25-pin 3M. Hardwire extension; pins 2, 3, 7 wired end-to-end.
92215A	50 ft. (15 m)	Longer 30062D cable.
30152-60001 (30152A)	16.7 ft. (5 m)	Cable: 25-pin 3F to 3-pin 6M; the 3F is a *block* RS-232-C connector. Used as an adapter cable between an HP 3000 Series 6X ATP and an existing RS-232-C terminal cable.
30153-60001 (30153A)	50 ft. (15 m)	Cable: 3-pin 6F to 3-pin 6M. Used as an extension cable for an HP 3000 Series 6X ATP RS-232-C interface.

EIA RS-422 Cables

Cable Manufacturing Specifications

5 Pin RS422 Hardwire or Extension Cable for ATP

The specification establishes requirements for a 5 conductor shielded cable – UL styles 2464 and 1061. The maximum length for an RS-422 cable is 4000 feet.

Electrical

Voltage Rating	300V rms @80oC (1000V rms between conductors and conductors to shield).
Conductor Resistance, DC	<30 ohms/1000 ft.
Mutual Pair Capacitance	<=22 pf between wires in pair.
Stray Capacitance	<=40 pf between one wire and all others (grounded)
Pair-to-Pair Balanced Crosstalk	>=40 dB of attenuation at 150KHz between any two pairs.

Mechanical

Singles	Two twisted pairs plus one single AWG 24(7X32) tinned, stranded copper.
Insulation	PVC
Colors	One conductor of each twisted pair – white; the other conductors – blk, brn. Single conductor – red.
Cable Lay	Twist the twisted pairs around the single.
Shield (Inner)	Metallized polyester; metalization facing outward
Shield (Outer)	Braid from AWG 36 tinned copper for 85% minimum coverage.
Jacket	PVC, 35 mil minimum wall thickness.
Color	Pearl Gray cabinet per HP Visual Color Standard 6009-0108.

Table 6.2-6. HP 3000 Series 39/4x/6x ATP, RS-422 Cables

Part Number	Length	Description
30154-60001 (30154A)	100 ft. (30 m)	Cable: 5-pin 7M to 5-pin 7F. Extender cable for connecting an HP 3000 ATP and an RS-422 interface cable.
92216A (13222P)	16.7 ft. (5 m)	Cable: 50-pin 1M to 5-pin 7M. Used with HP 262x terminals. Five-wire cable for connecting terminal to an HP 3000 ATP, RS-422.
92216B (13232I)	16.7 ft. (5 m)	Cable: 30-pin 2F to 5-pin 7M. Used with HP 264x terminals. Five-wire cable for connecting terminal to an HP 3000 ATP, RS-422.
13242P	16.7 ft. (5 m)	Cable: 25-pin 7M to 5-pin 3M. Used to connect HP 262x terminals, and HP 293x, 2686 printers to HP 3000 ATP, RS-422.
40242-60007 (40242P)	16.7 ft. (5 m)	Cable: 25-pin 3M to 5-pin 7M. RFI-filtering cable for connecting an HP 2392A terminal to an HP 3000 ATP, RS-422.

MODEMS

Hewlett-Packard does not recommend the use of half duplex modems. Full duplex modems are recommended at one of the speeds shown in Table 6.2-7.

Table 6.2-7. Recommended Asynchronous Full-duplex Modems

Modem	Baud Rate Supported	Notes
BELL 103J	ATP, ATP37: 300 ADCC: 150, 300 ATC: 110, 150, 300	Dial-up, auto-answer.
BELL 202T	ATP, ATP37: 300, 600, 1200 ADCC: 300, 600, 1200 ATC: 110, 150, 300, 600, 1200	4-wire leased line. For logon at 600 baud ADCC (HIOTERM0 - MPE IV or earlier) ports must be configured Subtype 5 (speed-specified, full duplex modem port). Also, can log on at another speed and use :SPEED command to change to 600 baud.
BELL 212A	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Dial-up, auto-answer. Use at 1200 baud with HS (High Speed) switch on; other baud rates with HS switch off.
HP 13265A	ATP, ATP37: 300 ADCC: 150, 300 ATC: 110, 150, 300	Dial-up. Compatible with the Bell 103 modem.
HP 35016A	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Dial-up. Compatible with Bell 103, 212, and Racal-Vadic VA 3400 modems. At 1200 baud, the HS switch must be on. If ordering through Racal-Vadic, use model number VP3451PA.
HP 35141A (SUPPORT LINK)	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Auto-dial/auto-answer. Compatible with Bell 103 and 212 modems. If ordering through Racal-Vadic, use model number VP212HA.
HP 37212A	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Dial-up, auto-answer. Compatible with Bell 103 and 212 modems, as well as CCITT V.22 protocol.

Table 6.2-7. Recommended Asynchronous Full-duplex Modems (cont'd)

Modems	Baud Rate Supported	Notes
HP 92205A	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Hayes Smartmodem 1200. Auto-dial and/or auto-answer. Compatible with Bell 103 and 212 modems.
VA 3400	ATP, ATP37: 1200 ADCC: 1200 ATC: 1200	Dial-up or 2-wire leased line. NOT Bell compatible.
VADIC 34XX Series	ATP, ATP37: 300, 1200 ADCC: 150, 300, 1200 ATC: 110, 150, 300, 1200	Several modems available, each compatible with the VA 3400 modem. Most are compatible with either or both of Bell 103 and 212 modems.

The use of the :SPEED command with dial-up modems is not recommended.

All of these modems pass through any parity bits they receive. Refer to the appropriate modem manuals, the local telephone company, and the *Communications Handbook* for strapping information.

The most complicated aspect of preparing your device for operation with the HP 3000 can be setting its internal configuration and/or data communication switches. The following pages list supported and recommended settings for a number of HP terminals and printers. Refer to table 6.3-2 or 6.3-3 for the page number of each workstation's recommended settings.

The settings and configurations for each terminal are grouped into three categories of operation:

- Direct connection in Character Mode operation.

- Direct connection in Page Block Mode operation.

- Modem connection.

Each of these contains suggested values for device settings as well as recommended MPE I/O configuration values. Only two categories of operation are used for printers: direct connection and modem connection.

Remember that you may enter a device name during SYSDUMP or INITIAL to take advantage of device defaults (MPE G.01.00 or later only). See Section 1 of Part 6 for more information on device defaults and device names.

Keep the following in mind when using this section:

- When more than one setting is listed, the most highly recommended setting is underlined. Where none are underlined, all are equally good.

- An asterisk indicates a parameter does not affect data communications. Use your own judgment with these settings; the recommendation listed is not necessary for the device to work properly.

SWITCH OR STRAP SETTINGS

In describing switch settings and strappings, Hewlett-Packard literature uses a variety of designations for *closed* and *open*. The equivalent designations are:

1=ON=YES=ENABLED=OPEN=OUT

0=OFF=NO=DISABLED=CLOSED=IN

Do not confuse the terms ON and OFF above with switches, which are labeled ON and OFF. In fact, these settings are opposite. Refer to Table 6.3-1.

Table 6.3-1. Manual Terminology vs. Switch Labels

Manual Terminology	Label on Switch Settings	Meaning *
OPEN or ON	OFF or OPEN	Connection broken.
CLOSED or OFF	ON	Connection made.

* Also applies to jumpers.

CONFIGURATION MENU SETTINGS

Many devices are configured through the use of configuration menus instead of switches or straps. See the reference manual that was supplied with the device for an explanation on how to look at these menus, change a value in one of the fields, or save the configuration. You will find that many of the default settings in a device's configuration menus will be the value that you will want to use. Therefore, when you begin configuring the device, it is easier if you insure that all the fields in the menu are set to their defaults by pressing the DEFAULT VALUES function key. If you are using a different value than the default for any field, you will be able to select another setting through the use of the terminal's function keys. You may also enter the value yourself by simply typing the desired value in the field. On the HP 262x terminals, the ReturnDef, FldSeparator, BlkSeparator, and BlkTerminator fields in the Terminal Configuration menus contain special characters. If you are entering these values, follow these directions:

ReturnDef   (CONTROL)M

            Delete both characters with the DEL key. Enable Display Functions, type M while holding down (CONTROL), then disable Display Functions.

FldSeparator   Unit Separator (US)

            Enable Display Functions, type an underscore _ while holding down (CONTROL), then disable Display Functions.

BlkSeparator   Record Separator (RS)

            Enable Display Functions, type ^ while holding down (CONTROL), then disable Display Functions.

BlkTerminator   Record Separator (RS)

            Enable Display Functions, type ^ while holding down (CONTROL), then disable Display Functions.

USING 8-BIT DATA

The configuration guidelines in this manual are recommendations for using 7-bit data with the language USASCII. If you wish to transmit 8-bit data, you will need to configure your device slighty differently. See Eight-Bit Data Transfers in Part 3 Section 1 for an explanation of the parameters that are affected. Refer to the *Native Language Support Reference Manual* for a list of the Hewlett-Packard devices that support 8-bit data and further information on how to configure these devices.

Table 6.3-2. Page Numbers of Recommended Terminal Configurations

Terminal	Page Number	Terminal	Page Number
HP 120	6.3-5	HP 2635A	6.3-62
HP 125	6.3-5	HP 2635B	6.3-62
HP 150	6.3-9	HP 2640A	6.3-68
HP 2382A	6.3-15	HP 2640B	6.3-72
HP 2392A	6.3-22	HP 2641A	6.3-76
HP 2621A/2621P	6.3-27	HP 2642A	6.3-81
HP 2621B	6.3-30	HP 2644A	6.3-68
HP 2622A	6.3-37	HP 2645A/HP 2645K	6.3-76
HP 2623A	6.3-37	HP 2647A/HP 2647F	6.3-85
HP 2624A/HP 2624B	6.3-43	HP 2648A	6.3-85
HP 2625A	6.3-48	HP 3092A	6.3-91
HP 2526A/HP 2626W	6.3-54	HP 3093A	6.3-91
HP 2627A	6.3-37	HP 9816	6.3-92
HP 2628A	6.3-48	HP 9826	6.3-92
HP 2629L	6.3-30	HP 9836	6.3-92

Table 6.3-3. Page Numbers of Recommended Printer Configurations

Printers	Page Number
HP 2563A	6.3-97
HP 2601A	6.3-100
HP 2602A	6.3-100
HP 2631B	6.3-102
HP 2686A	6.3-109
HP 2687A	6.3-110
HP 2932A	6.3-111
HP 2933A	6.3-111
HP 2934A	6.3-111

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name: (MPE G.01.00 or Later)	ATP, ATP37	HPTERMATP
	ADCC	HPTERMADCC
Device Type:	16	
Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	10	Standard for HP CRT terminals
	18	For XON/XOFF protocol

MODE SELECTIONS

Block Mode	OFF (no asterisk in label)
Auto LF	OFF (no asterisk in label)
Remote Mode	ON (asterisk in label)
Modify Line	OFF (no asterisk in label)
Modify All	OFF (no asterisk in label)

TERMINAL CONFIGURATION

Remote To	Port 1
Straps	abcghl

DATA COMMUNICATIONS PORT #1 MENU

<u>ATP</u> or <u>ATP37</u>

Baud Rate	300, 600, 1200, 2400, 4800, 9600
Parity	<u>NONE(0)</u>, EVEN
Hndsk	Terminal Type 10: Etx
	Terminal Type 18: etX
Straps	X: lower case

                    Z: Parity=<u>NONE</u> (upper case)
                        Parity=<u>EVEN</u> (lower case)

                    Lower case Z enables parity checking.

Asterisk	DM

<u>ADCC(HIOTERM2)</u>

Baud Rate	300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ADCC(HOITERM0)</u>

Baud Rate
  Speed-sensed: 300, 1200, 2400
    (Subtype 0)
  Speed-specified: 300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)

Other settings same as ATP.

<u>ATC</u>

Baud Rate	110, 150, 300, 600, 1200, 2400
Parity	NONE(0), EVEN

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Load the BLOCK-FORMAT utility program, then programmatically make the following settings:

Block Mode	ON (ESCAPE &k1B)
D Strap	OPEN (ESCAPE &s1D)
G Strap	OPEN
H Strap	CLOSED

NOTE

Unless BLOCK-FORMAT is loaded, the concepts of Block Mode and the D strap are unknown to the HP 125. When BLOCK-FORMAT is loaded, the only display enhancement available is half-bright and inverse-video; the effective display memory size is reduced to 48 lines; and a left-cursor movement from column 0, row 0 will not position the cursor at column 79, row 23, as with other Block Mode terminals.

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype:	ATP	1
	ATP37	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

> **NOTE**
>
> Hewlett-Packard does not support the use of half duplex modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in the table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

Other configuration settings are the same as for direct connection.

HP 150

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP, ATP37
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type: 16

Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4

Terminal Type: <u>10</u> Standard for HP CRT terminals

                  18 For XON/XOFF protocol

MODE SELECTIONS

Block Mode	OFF (no asterisk in label)
Auto LF	OFF (no asterisk in label)
Remote Mode	ON (asterisk in label)
Modify Line	OFF (no asterisk in label)
Modify All	OFF (no asterisk in label)

GLOBAL CONFIGURATION

Click	On	*
Keyboard	USASCII	
Power On	Terminal	*
Op Sys Dev	HP-IB 0	*
Remote/Serial Dev	PORT1/PORT2	

TERMINAL CONFIGURATION

Bell	On	*
Cursor Type	Line	*
Tab = Spaces	No	*
RETURN Def	CR (CONTROL M)	
RETURN=ENTER	No	
PrinterCode4	Ext	*
PrinterNulls	0	*
Local Echo	Off	
Caps Lock	Off	*
Start Column	1	*
ASCII 8 Bits	No	
XmitFnctn(A)	No	
SPOW(B)	No	*
InhEolWrp(C)	No	*
Line/Page(D)	Line	
InhHndShk(G)	No	
InhDC2(H)	No	
Auto Term(J)	No	*
ClearTerm(K)	No	*
InhSlfTst(L)	No	*
Esc Xfer(N)	No	*
InhDcTest(W)	No	
Graph Compat	Off	*

CONTINUED

Field Separator   US ([CONTROL]_)

Block Terminator   RS ([CONTROL]^)

Alternate Set   Line(B)   *

Terminal ID   2623A

Transmit   All Fields   *

FULL DUPLEX HARDWIRED PORT #1 MENU

<u>ATP</u> or <u>ATP37</u>

Baud Rate   300, 600, 1200, 2400, 4800, 9600, 19200

Parity   <u>NONE</u>, EVEN

DataBits   8 with no parity
                         7 with EVEN parity

Clock   INT

Asterisk   DM

Stop Bits   1

EnqAck   Yes

TR(CD)   Hi

Check Parity   No parity: NO
                         EVEN parity: YES

SR(CH)   Lo

RecvPace   None

SRRXmit   No

RR(CF)Recv   No

XmitPace   None

SRRInvert   No

```
CS(CB)Xmit              No

DM(CC)Xmit              No
```

ADCC(HIOTERM2)

```
Baud Rate               300, 600, 1200, 2400, 4800, 9600
```

Other settings same as ATP.

ADCC(HIOTERM0)

```
Baud Rate
  Speed-sensed:         300, 1200, 2400
    (Subtype 0)
  Speed-specified:      300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)
```

Other settings same as ATP.

ATC

```
Baud Rate               110, 150, 300, 600, 1200, 2400

Parity                  NONE, ODD, EVEN

Check Parity            No parity:         NO
                        ODD or EVEN parity: YES
```

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap Settings and Block Mode may be changed programmatically.

MODE SELECTIONS

Block Mode   ON   (asterisk in label)

TERMINAL CONFIGURATION

Line/Page   Page

InhHndShk   Yes

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                  ATP37   1

                  ADCC(HIOTERM2)   1

                  ADCC(HIOTERM0)   1, 5

                  ATC   1, 5

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Hewlett-Packard does not support the use of half duplex
modems with this terminal.

FULL DUPLEX MODEM Port 1

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in the table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP, ATP37
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type:	16	
Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Types:	10 Standard for HP CRT terminals	
	18 For XON/XOFF protocol	

HP 2382A

TERMINAL CONFIGURATION MENU

FrameRate	60	*
ReturnDef	CR (CONTROL M)	
LocalEcho	OFF	
CapsLock	OFF	*
Start Col	02	*
XmitFnctn(A)	NO	
SPOW(B)	NO	*
InhEolWrp(C)	NO	*
Line/Page(D)	LINE	
InhHndShk(G)	NO	
Inh DC2(H)	NO	
FldSeparator	US (CONTROL _)	
BlkTermnator	RS (CONTROL ^)	
ShiftFunctnKeys	NO	*

CONTINUED

DATA COMM CONFIGURATION MENU

<u>ATP</u> or <u>ATP37</u>

Baud Rate	300, 600, 1200, 2400, 4800, 9600
Duplex	FULL
Parity	<u>None</u>, EVEN
ChkParity	No parity: NO EVEN parity: YES
Enq/Ack	Terminal Type 10: YES Terminal Type 18: NO
SR(CH)	LO
CS(CB)	NO
RecvPace	Terminal Type 10: NONE Terminal Type 18: XON/XOFF
XmitPace	NONE

<u>ADCC(HIOTERM2)</u>

Baud Rate   150, 300, 600, 1200, 2400, 4800, 9600
Other settings same as ATP.

<u>ADCC</u>

Baud Rate
  Speed-sensed: 150, 300, 1200, 2400
    (Subtype 0)
  Speed-specified: 150, 300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)
Other settings same as ATP.

<u>ATC</u>

Baud Rate	110, 150, 300, 600, 1200, 2400
Parity	<u>None</u>, ODD, EVEN
ChkParity	No parity: NO ODD or EVEN parity: YES

Other settings same as ATP.

CONTINUED

SWITCH SETTINGS AT BACK OF TERMINAL

At the back of the terminal are three switch blocks used for setting a number of terminal power-on operating characteristics. To set these switches, turn the terminal around so the switches face you. We will label the lefthand switch block "S1", the middle block "S2", and the righthand block "S3". Each block has eight switches. Switches are numbered 1 to 8, from left to right. Pressing a switch DOWN sets it to "0" ("closed" or "off"). Pressing a switch UP sets it to "1" ("open" or "on").
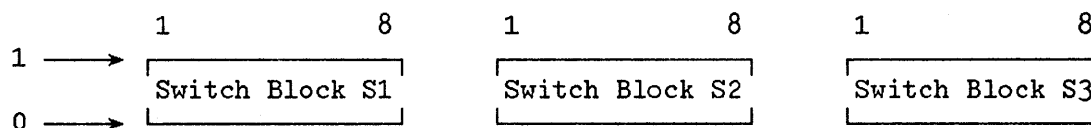
Figure 6.3-1. HP 2382A Configuration Switches--Rear of Terminal.

HP 2382A

SWITCH BLOCK S1

Switch	Function	Setting
1, 2, 3, 4	Baud rate	1 2 3 4 BPS 0 0 0 0 110* 0 0 1 0 150 0 0 1 1 300 0 1 0 0 600 0 1 0 1 1200 0 1 1 1 2400 1 0 0 0 4800 1 0 0 1 9600 * 110 bps uses two stop bits. Other rates use one bit.
5, 6, 7	Parity generation Set switches according to the list to generate the appropriate parity. Also, set switch 1 from Switch Block S2 to match this parity.	Parity 5 6 7 NONE (0) 0 0 0 EVEN 0 1 1 ODD 0 0 1
8	ENQ/ACK protocol	Terminal Type 10 1 (ON) 18 0 (OFF)

CONTINUED

SWITCH BLOCK S2

Switch	Function	Setting
1	Parity checking Set switch to setting that matches the parity generation selected by switches 5,6,7 from Switch Block S1.	<u>Parity</u> <u>NONE (0)</u> 0 (OFF) <u>EVEN</u> 1 (ON) ODD 1 (ON)
2	SR(CH)	LO 0
3	XON/XOFF Receive Pacing	<u>Terminal Type</u> 10 (OFF) 0 18 (ON) 1
4	CS(CB) Transmitting Depends on the type of modem used.	<u>0</u> NO <u>1</u> YES
5	Block Mode	0 (OFF)
6	Remote mode	1 (ON)
7	Automatic Line Feed	0 (OFF)
8	FrameRate	<u>1</u> 60Hz <u>0</u> 50Hz

HP 2382A

SWITCH BLOCK S3

Switch	Function	Setting
1	Local Echo	0 (OFF)
2	Caps lock	0 (OFF) * 1 (ON) *
3	A Strap (Function key transmission)	0 Not transmitted
4	Line mode/Page mode	0 (Line) 1 (Page)
5	G Strap (Block Mode Transfer Handshake)	0
6	H Strap (Inhibit DC2)	0
7	BlkTerm/FldSep	0 (For RS/US)
8	Shift Function Keys	0 (OFF) * 1 (ON)

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

MODE SELECTIONS

BLOCK MODE   ON (asterisk in label)

STRAP SETTINGS

D Strap   OPEN (ON)

G Strap   OPEN (ON)

H Strap   CLOSED (OFF)

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype:		
	ATP	1
	ATP37	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

```
NOTE
```

Hewlett-Packard does not support the use of half duplex modems.

DATACOMM CONFIGURATION

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in the table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

```
CS(CB) Transmitting          Yes (1)
(Switch 4 in Switch Block S2)
Depends on type of modem used
```

Other configuration settings are the same as for direct connection.

HP 2392A

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name: ATP, ATP37   HPTERMATP
  (MPE G.01.00
   or Later)   ADCC   HPTERMADCC

Device Type: 16

Subtype: ATP   0

                      ATP37   0

                      ADCC(HIOTERM2) 0

                      ADCC(HIOTERM0) 0, 4

                      ATC   0, 4

Terminal Type: <u>10</u> Standard for HP CRT terminals

                      18 For XON/XOFF protocol

MODE SELECTIONS

Block Mode   OFF (no asterisk in label)

Auto LF   OFF (no asterisk in label)

Remote Mode   ON (asterisk in label)

Modify Line   OFF (no asterisk in label)

Modify All   OFF (no asterisk in label)

TERMINAL CONFIGURATION

Datacomm/Ext Dev	Port 1/Port 2
Keyboard	USASCII
Terminal Id	2392A
Language	USASCII
Local Echo	Off
Caps Lock	Off *
Start Column	1 *
Bell	On *
XmitFnctn(A)	No
SPOW(B)	No *
InhEolWrp(C)	No *
Line/Page(D)	Line
InhHndShk(G)	No
InhDC2(H)	No
Esc Xfer(N)	No *
Field Separator	US (⌷CONTROL⌷_)
Block Terminator	RS (⌷CONTROL⌷^)
RETURN Def	CR (⌷CONTROL⌷M)

DATACOMM CONFIGURATION

ATP or ATP37

Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200
Parity/Data Bits	NONE/8, EVEN/7
EnqAck	YES
Asterisk	DM
Check Parity	No parity: NO EVEN parity: YES
SR(CH)	Lo
RecvPace	None
XmitPace	None
CS(CB)Xmit	No

ADCC(HIOTERM2)

Baud Rate	300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate	
Speed-sensed:	300, 1200, 2400
Speed-specified:	300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

ATC

Baud Rate	110, 150, 300, 600, 1200, 2400
Parity	NONE, ODD, EVEN
Check Parity	No parity: NO ODD or EVEN parity: YES

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap Settings and Block Mode may be changed programmatically.

MODE SELECTIONS

```
Block Mode          ON    (asterisk in label)
```


TERMINAL CONFIGURATION

```
Line/Page(D)        Page

InhHndShk(G)        Yes

InhDC2(H)           No
```

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype:		
	ATP	1
	ATP37	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

```
┌──────────┐
│   NOTE   │
└──────────┘
```

Hewlett-Packard does not support the use of half duplex modems.

DATACOMM CONFIGURATION

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in the table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

```
CS(CB) Transmitting          Yes (1)
(Switch 4 in Switch Block S2)
Depends on type of modem used
```

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION, CHARACTER MODE

The function (soft) keys on this terminal each transmit a fixed escape sequence which is not user-definable.

MPE I/O CONFIGURATION

Device Name: (MPE G.01.00 or Later)	ATP, ATP37	HPTERMATP
	ADCC	HPTERMADCC
Device Type:	16	
Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	10	Standard for HP CRT terminals.
	18	For use with XON/XOFF protocol instead of ENQ/ACK.

TERMINAL CONFIGURATION MENU

ATP or ATP37

Baud Rate   300, 600, 1200, 2400, 4800, 9600

Parity   NONE(0)
                   EVEN

Duplex   FULL

Straps   bcghxz (Cannot be changed programmatically.)

Handshake
  Terminal Type 10   Etx (ENQ/ACK)
  Terminal Type 18   etX (XON/XOFF)

<u>ADCC(HIOTERM2)</u>

Baud Rate   150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ADCC(HIOTERM0)</u>

Baud Rates
  Speed-sensing: 150, 300, 1200, 2400
    (Subtype 0)
  Speed-specified: 150, 300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)

Other settings same as ATP.

<u>ATC</u>

Baud Rate   150, 300, 600, 1200, 2400

Parity   <u>NONE(0)</u>
                         ODD
                         EVEN
Other settings same as ATP.

MODE SELECTIONS

REMOTE   ON   (asterisk in screen label)

LN MODE   OFF (no asterisk in label)

AUTO LF   OFF (no asterisk in label)

MODIFY   OFF (no asterisk in label)

DIRECT CONNECTION, PAGE BLOCK MODE

Not available with these terminals.

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                    ATP37   1

                    ADCC(HIOTERM2)   1

                    ADCC(HIOTERM0)   1, 5

                    ATC   1, 5

```
NOTE
```

Hewlett-Packard does not support the use of half duplex modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by the terminal, controller and modem. Refer to the rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
   (MPE G.01.00
     or Later)
	ATP, ATP37
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type: 16

Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4

Terminal Type: <u>10</u>   Standard for HP CRT terminals.

18   For use with XON/XOFF protocol
      instead of ENQ/ACK.

DATA COMM CONFIGURATION

<u>ATP</u> or <u>ATP37</u>

Baud Rate   300, 600, 1200, 2400, 4800, 9600

```
┌─ NOTE ─┐
```

The use of 4800 and 9600 is not recommended unless
the Special ROM set is installed.

Parity   <u>NONE(0)</u>
                  EVEN

Local Echo   0

CONTINUED

ADCC(HIOTERM2)

Baud Rate   150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate
  Speed-sensed: 150, 300, 1200, 2400
     (Subtype 0)
  Speed-specified: 150, 300, 600, 1200, 2400, 4800, 9600
     (Subtype 1)

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

The use of 4800 and 9600 is not recommended unless the Special ROM set is installed.

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 600, 1200, 2400

Parity   NONE(0)
                                   ODD
                                   EVEN

Other settings same as ATP.

SWITCH SETTINGS AT BACK OF TERMINAL

At the back of the terminal are three switch blocks used for setting a number of terminal power-on operating characteristics. To set these switches, turn the terminal around so the switches face you. We will label the lefthand switch block "S1", the middle block "S2", and the righthand block "S3". Each block has eight switches. Switches are numbered 1 to 8, from left to right. Pressing a switch DOWN sets it to "0" ("closed" or "off"). Pressing a switch UP sets it to "1" ("open" or "on"). Pressing the SWITCHES soft key causes the switch settings to be re-read, after power-on.

```
          1         8   1         8   1         8
Open=1 →  ┌─────────┐   ┌─────────┐   ┌─────────┐
          │ Switch Block S1 │ Switch Block S2 │ Switch Block S3 │
Closed=0→ └─────────┘   └─────────┘   └─────────┘
```
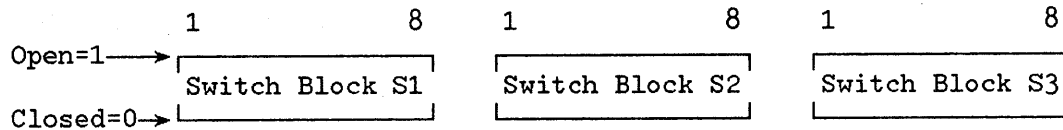
Figure 6.3-2. HP 2621B/2629L Configuration Switches—Rear of Terminal.

SWITCH BLOCK S1

Switch	Function	Setting
1, 2, 3	Baud rate	$\underline{1}$ $\underline{2}$ $\underline{3}$ BPS 0 0 0 110* 1 0 0 150 0 1 0 300 1 1 0 600 0 0 1 1200 1 0 1 2400 0 1 1 4800 1 1 1 9600 * 110 bps uses two stop bits. Other rates use one bit.
4	Local echo	$\underline{0}$ Remote Echo
5	Display enhancements (or) Primary character set (only if terminal has secondary character set option installed)	0 Underline 1 Inverse Video 0 National $\underline{1}$ ASCII
6, 7, 8	National character set	Choice depends on terminal's character set option; refer to the various International manuals.

SWITCH BLOCK S2

Switch	Function	Setting			
1, 2, 3	Parity generation and checking	<u>Parity</u>	<u>0</u>	<u>1</u>	<u>2</u>
		NONE (0)	1	0	0
		EVEN	0	0	1
		ODD	1	0	1
4	XON/XOFF protocol	<u>Terminal Type</u>			
		10	1		
		18	0		
5	Undefined	0			
6	ENQ/ACK protocol	<u>Terminal Type</u>			
		10	1		
		18	0		
7	Automatic Line Feed	0			
8	Character Mode	Character	<u>0</u>		

CONTINUED

SWITCH BLOCK S3

Switch	Function	Setting
1, 2	Record terminator	Both <u>0</u> for CR
3	X-Strap (Data Rate Select-CH-modem line)	0
4	H-Strap (Inhibit DC2)	Character Mode 0
5	G-Strap (Block Mode Transfer Handshake)	0
6	C-Strap (Cursor wrap around)	User choice 0
7	B-Strap (Space over write)	User choice 0
8	A-Strap (Function key transmission)	Not transmitted <u>0</u> Transmitted 1

DIRECT CONNECTION, PAGE BLOCK MODE

Page Block Mode is not available with these terminals.

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                    ATP37   1

                    ADCC(HIOTERM2)   1

                    ADCC(HIOTERM0)   1, 5

                    ATC   1, 5

```
┌─────────┐
│  NOTE   │
└─────────┘
```

Hewlett-Packard does not support the use of half duplex
modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by the terminal, controller, and modem. See table 6.2-7,
Recommended Asynchronous Full Duplex Modems for available rates. Other configuration
settings are the same as direct connection.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP, ATP37
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type:	16	
Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	<u>10</u> Standard for HP CRT terminals.	
	18 For use with XON/XOFF protocol.	

TERMINAL CONFIGURATION MENU

FrameRate	60	*
Language	USASCII	*
ReturnDef	CR (CONTROL M)	
LocalEcho	OFF	
CapsLock	OFF	*
StartCol	2	*
ASCII 8 bits	NO	
XmitFnctn(A)	NO	
SPOW(B)	NO	*
InhEolWrp(C)	NO	*
Line/Page(D)	LINE	

CONTINUED

```
InhHndShk(G)          NO

InhDC2(H)             NO

EscXfer(N)            NO  *  (HP 2623A, 2627A only)

Compat(P, Q)         OFF  *  (HP 2623A, 2627A only)

FldSeparator          US   ([CONTROL]_)

BlkSeparator          RS   ([CONTROL]^)
```

MODE SELECTIONS

```
REMOTE MODE           ON  (asterisk in screen label)

BLOCK MODE           OFF  (no asterisk in label)

AUTO LF              OFF  (no asterisk in label)

LINE MODIFY          OFF  (no asterisk in label)

MODIFY ALL           OFF  (no asterisk in label)
```

CONTINUED

DATA COMM CONFIGURATION MENU

<u>ATP</u> or <u>ATP37</u>

Baud Rate	300, 600, 1200, 2400, 4800, 9600
Parity	<u>NONE</u> <u>EVEN</u>
Enq/Ack	Terminal Type 10: YES Terminal Type 18: NO
Chk Parity	<u>NO</u> with no parity <u>YES</u> with "EVEN" parity
SR(CH)	LO(W)
RecvPace	Terminal Type 10: NONE Terminal Type 18: XON/XOFF
CS(CB)Xmit	NO
XmitPace	NONE

<u>ADCC(HIOTERM2)</u>

Baud Rate	150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ADCC</u>

Baud Rate	
Speed-sensing: (Subtype 0)	150, 300, 1200, 2400
Speed-specified: (Subtype 4)	150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ATC</u>

Baud Rate	150, 300, 600, 1200, 2400
Parity	NONE, ODD, EVEN
Chk Parity	<u>NO</u> with no parity <u>YES</u> with "ODD" or "EVEN" parity

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

TERMINAL CONFIGURATION

Line/Page(D)   PAGE

InhHndShk(G)   YES

InhDC2(H)   NO

MODE SELECTIONS

BLOCK MODE   ON   (asterisk in screen label)

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                     ATP37   1

                     ADCC(HIOTERM2)   1

                     ADCC(HIOTERM0)   1, 5

                     ATC   1, 5

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Hewlett-Packard does not support the use of half duplex modems.

DATA COMM CONFIGURATION MENU

Baud Rate selected must be supported by the terminal, controller and modem. Refer to rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

CS(CB)Xmit   YES   (Depends on the type of modem used.)

Other configuration settings are the same as for direct connection.

HP 2624A/HP 2624B

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP, ATP37	HPTERMATP

	ADCC	HPTERMADCC

Device Type: 16

Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4

Terminal Type:	10	Standard for HP CRT terminals
	18	For use with XON/XOFF protocol

TERMINAL CONFIGURATION MENU

BELL	ON	*
Click	OFF	*
FrameRate	60	*
Tab=Spaces	NO	
Language	USASCII	
Datacom/Printer	Port1/Port2	
	Connect data cable from computer to Port 1.	
RETURN Def	CR ([CONTROL]M)	
RETURN=ENTER	NO	
PrinterCode4	EXT	*
PrinterNulls	0	*

LocalEcho	OFF	
Caps Lock	OFF	*
Start Col	2	*
ASCII 8 Bits	NO	
XmitFntcn(A)	NO	
SPOW(B)	NO	*
InhEolWrp(C)	NO	*
Line/Page(D)	LINE	
InhHndshk(G)	NO	
InhDC2(H)	NO	
Auto Term(J)	NO	*
ClearTerm(K)	NO	*
InhSlfTst(L)	NO	*
Esc Xfer(N)	NO	*
InhDcTst(W)	NO	*
FldSeparator	US (CONTROL _)	
BlkTerminator	RS (CONTROL ^)	
ESC @	USASCII	*
A	MATH	*
B	LINE DRAWING	*
C	LARGE CHAR	*
Alternate Set	B	*
Decimal Type	US	*
Implied Dec Digits	2	*
Transmit	All Fields	*

MODE SELECTIONS

Block Mode   OFF (no asterisk in label)

Remote Mode   ON (asterisk in label)

Auto LF   OFF (no asterisk in label)

Line Modify   OFF (asterisk in label)

Modify All   OFF (asterisk in label)

FULL DUPLEX HARDWIRED PORT #1 MENU

ATP or ATP37

Baud Rate   300, 600, 1200, 2400, 4800, 9600

Parity   NONE, EVEN

DataBits   8 with no parity
                    7 with EVEN parity

BufSize   128 or user choice

CLK   INT

Asterisk   DM

StopBits   1

EnqAck   Terminal Type 10: YES
                    Terminal Type 18: NO

TR(CD)   HI

Chk Parity   With No parity: NO
                    With EVEN parity: YES

CONTINUED

SR(CH)	LO
StripNulDel	YES
RecvPace	Terminal Type 10, 12: NONE
SRRXmit	NO
RR(CF)Recv	NO
XmitPace	NONE
SRRInvert	NO
CS(CB)Xmit	NO

ADCC(HIOTERM2)

Baud Rate   150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate
  Speed-sensing: 150, 300, 1200, 2400
   (Subtype 0)
  Speed-specified: 150, 300, 600, 1200, 2400, 4800, 9600
   (Subtype 4)

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 600, 1200, 2400

Parity   NONE, EVEN, ODD

ChkParity   With No parity: NO
                   With EVEN or ODD parity: YES

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Page Block Mode can be programmatically enabled.

MODE SELECTIONS

Block Mode   ON   (asterisk in label)

TERMINAL CONFIGURATION MENU

Line/Page(D)   PAGE

InhHndShk(G)   YES

InhDC2(H)   NO

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype:	ATP	1
	ATP37	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Hewlett-Packard does not support the use of half duplex modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by the terminal, controller and modem. Refer to rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

RR(CF)Recv	YES	(Depends on the type of modem used.)
CS(CB)Xmit	YES	(Depends on the type of modem used.)

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
   or Later)
	ATP, ATP37
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type:	16	
Subtype:	ATP	0
	ATP37	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	<u>10</u> For standard HP CRT terminals	
	18 Supports XON/XOFF protocol	

MODE SELECTIONS

Block Mode	OFF (no asterisk in label)
Remote Mode	ON (asterisk in label)
Auto LF	OFF (no asterisk in label)
Line Modify	OFF (no asterisk in label)
Modify All	OFF (no asterisk in label)

TERMINAL CONFIGURATION

<u>ATP</u> or <u>ATP37</u>

Bell	On	*
Cursor Type	Line	*
Tab = Spaces	NO	*
RETURN Def	(CONTROL M)	
RETURN=ENTER	No	*
PrinterCode4	Ext	*
PrinterNulls	0	*
LocalEcho	OFF	
Caps Lock	OFF	*
Start Column	2	*
ASCII 8 Bits	NO	
XmitFnctn(A)	NO	
SPOW(B)	NO	*
InhEolWrp(C)	NO	*
Line/Page(D)	LINE	
InhHndShk(G)	NO	
Inh DC2(H)	NO	
Auto Term(J)	NO	*
ClearTerm(K)	NO	*
InhSlfTst(L)	NO	*
Esc Xfer(N)	NO	*
InhDcTst(W)	NO	

Graph Compat	Off	*
FldSeparator	US	([CONTROL]_)
BlkTerminator	RS	([CONTROL]^)
Alternate Set	B	*
Transmit	All Fields *	

FULL-DUPLEX HARDWIRED Port 1

ATP or ATP37

Baud Rate   300, 600, 1200, 2400, 4800, 9600, 19200

Parity   NONE, EVEN

DataBits   8 with no parity
                     7 with EVEN parity

Clock   INT

Asterisk   DM

StopBits   1

EnqAck   Terminal Type 10:   YES
                     Terminal Type 18:   NO

TR(CD)   HI

ChkParity   With No parity: NO
                     With EVEN parity: YES

SR(CH)   LO

RecvPace   Terminal Type 10:   NONE
                     Terminal Type 18:   XON/XOFF

CONTINUED

SRRXmit	NO
RR(CF)Recv	NO
XmitPace	NONE
SRRInvert	NO
CS(CB)Xmit	NO
DM(CC)Xmit	Yes

ADCC(HIOTERM2)

Baud Rate   150, 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate
   Speed-sensed: 150, 300, 1200, 2400
    (Subtype 0)
   Speed-specified: 150, 300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 600, 1200, 2400

Parity   NONE, EVEN, ODD

Chk Parity   With No parity: NO
                    With EVEN or ODD parity: YES

StopBits   1--with all but 110 bps
                    2--with 110 bps

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

MODE SELECTIONS

Block Mode   YES

TERMINAL CONFIGURATION Port 1

Line/Page(D)   PAGE

InhHndShk(G)   YES

Inh DC2(H)   NO

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                  ATP37   1

                  ADCC(HIOTERM2)   1

                  ADCC(HIOTERM0)   1, 5

                  ATC   1, 5

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Hewlett-Packard does not support the use of half duplex
modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

FULL DUPLEX MODEM   Port 1

RR(CF)Recv   YES   (Depends on the type of modem used.)

The other settings are the same as for FULL DUPLEX HARDWIRED Port 1 Menu, except for the SRRXmit, SRRInvert and CS(CB)Xmit fields are absent.

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type: 16

Subtype:	ATP	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4

Terminal Type:	<u>10</u> For standard HP CRT terminals
	18 Supports XON/XOFF protocol

MODE SELECTIONS

Block Mode	OFF (no asterisk in label)
Remote Mode	ON (asterisk in label)
Auto LF	OFF (no asterisk in label)
Line Modify	OFF (no asterisk in label)
Modify All	OFF (no asterisk in label)

CONTINUED

GLOBAL CONFIGURATION MENU

Bell	ON	*
Click	OFF	*
FrameRate	60	*
Tab=Spaces	NO	*
Alt Char Set Size	64	*
Language	USASCII	*
RETURN Def	CR (CONTROL M)	
RETURN=ENTER	NO	
Printer Code 4	EXT	*
PrinterNulls	0	*

WORKSPACE/WINDOW CONFIGURATION MENU

Kybd Win	1	
Port 1 Wrkspc	1	
Port 2 Wrkspc	(blank)	
Vert Border Col #	0	*
Page width	80	*
Display border:		
Horiz	YES	*
Vert	YES	*

CONTINUED

Wrkspc #	Rows	Display	Start Row	Stop Row	Side	Term Config
1	119*	YES	1	24	RIGHT	1
2	0	NO	0	0	RIGHT	2
3	0	NO	0	0	RIGHT	3
4	0	NO	0	0	RIGHT	4

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

As shown, all of memory is assigned to Workspace 1.
The number of rows may vary, depending on the setting
of Bufsize in the Data Comm menu.

TERMINAL CONFIGURATION #1

REMOTE	ON
BLOCK	OFF
MODIFY	OFF
AutoLF	OFF
LocalEcho	OFF
Caps Lock	OFF *
Start Col	2 *
ASCII 8 Bits	NO
XmitFnctn(A)	NO
SPOW(B)	NO *
InhEolWrp(C)	NO *
Line/Page(D)	LINE (or PAGE)

CONTINUED

```
InhHndShk(G)          NO

Inh DC2(H)            NO

Auto Term(J)          NO

ClearTerm(K)          NO

InhSlfTst(L)          NO *

InvertWrp(M)          NO *

Esc Xfer(N)           NO *

InhDcTst(W)           NO

FldSeparator          US   ([CONTROL] _ )

BlkTerminator         RS   ([CONTROL] ^ )

ESC )   A             Math Set
        B             LINE DRAW
        C             LARGE CHAR

Alternate Set         B  *
```

CONTINUED

FULL-DUPLEX HARDWIRED #1 MENU

<u>ATP</u> or <u>ATP37</u>

Baud Rate	300, 600, 1200, 2400, 4800, 9600
Parity	<u>NONE</u>, EVEN
DataBits	8 with no parity 7 with EVEN parity
BufSize	<u>128</u>, user's choice
XmitClkSource	INT
Asterisk	DM
StopBits	1
EnqAck	Terminal Type 10: YES Terminal Type 18: NO
RecvClkSource	INT
TR(CD)	HI
ChkParity	With No parity: NO With EVEN parity: YES
SR(CH)	LO
StripNulDel	YES
XmitClkOut	X16
ExtClkIn	X16
RecvPace	Terminal Type 10: NONE Terminal Type 18: XON/XOFF

```
SRRXmit              NO

RR(CF)Recv           NO

XmitPace             NONE

SRRInvert            NO

CS(CB)Xmit           NO
```

ADCC(HIOTERM2)

```
Baud Rate            150, 300, 600, 1200, 2400, 4800, 9600
```

Other settings same as ATP.

ADCC(HIOTERM0)

```
Baud Rate
  Speed-sensing:     150, 300, 1200, 2400
    (Subtype 0)
  Speed-specified:   150, 300, 600, 1200, 2400, 4800, 9600
    (Subtype 4)
```

Other settings same as ATP.

ATC

```
Baud Rate            110, 150, 300, 600, 1200, 2400

Parity               NONE, EVEN, ODD

Chk Parity           With No parity:          NO
                     With EVEN or ODD parity: YES

StopBits             1--with all but 110 bps
                     2--with 110 bps
```

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

MODE SELECTIONS

```
Block Mode              YES
```

TERMINAL CONFIGURATION #1 MENU

```
Line/Page(D)            PAGE

InhHndShk(G)            YES

Inh DC2(H)              NO
```

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                      ATP37   1

                      ADCC(HIOTERM2)   1

                      ADCC(HIOTERM0)   1, 5

                      ATC   1, 5

NOTE

Hewlett-Packard does not support the use of half duplex
modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

FULL DUPLEX MODEM #1 MENU

RR(CF)Recv   <u>YES</u>   (Depends on the type of modem used.)

The other settings are the same as for FULL DUPLEX HARDWIRED #1 Menu, except for the SRRXmit, SRRInvert and CS(CB)Xmit fields are absent.

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION

MPE I/O CONFIGURATION

Device Type: 16

Subtype: ATP   0

                      ADCC(HIOTERM2)   0

                      ADCC(HIOTERM0)   0, 4

                      ATC   0, 4

Terminal Type: 16   7-bit with parity
                      15   8-bit

SWITCH SETTINGS

At the top of the printer are three toggle switches that set a number of characteristics.

<u>ATP</u>

Baud Rate   300, 1200, <u>2400</u>

<u>ADCC</u>

Baud Rate   150, 300, <u>1200</u>, 2400

<u>ATC</u>

Baud Rate   110, 150, 300, <u>1200</u>, 2400

Parity   NONE

Duplex   FULL

CONTINUED

At the top of the printer is a set of switches on the Keyboard PCA. The Keyboard PCA allows the configuration of the mute character mode, default print density of the keyboard language, and default keyboard language.

At the back of the printer is a set of DIP switches. This is the Adapter PCA (02631-60234).

Inside the printer are two additional sets of switches. The first set is the Serial I/O Interface PCA (02631-60230), which is designated as S2. The second set is the Print Logic PCA (02631-60601 or 02631-60225). They can only be set by removing the entire cover. With a multi-lingual printer, the Print Logic PCA (02631-60601) contains two groups of eight switches (the left set is designated as S1, the right set is designated as S2). With a non-multi-lingual printer, the Print Logic PCA (02631-60225) contains one group of four switches designated as S1.

KEYBOARD PCA (HP 2635A)

Switch	Function	Setting
1	Non-Mute Character Mode	OPEN
2	Default Print Density (normal)	OPEN
3	(Not Used)	OPEN
4 - 8	Keyboard Language (USASCII)	OPEN OPEN OPEN OPEN OPEN

ADAPTER PCA (02631-60234)

Switch	Function	Setting
1	Enable XON/XOFF operation	OPEN
2	Disable ENQ/ACK operation	CLOSED
3, 4	SCA Normal operation	CLOSED CLOSED
5, 6	CD Normal operation	CLOSED CLOSED
7	CB Signal not required	OPEN
8	Disable Auto Modem disconnect	CLOSED

SERIAL I/O INTERFACE PCA - S2 (02631-60230)

Switch	Function	Setting			
1,2,3,4	Baud Rate *				
	9600	OPEN	OPEN	OPEN	OPEN
	4800	OPEN	OPEN	CLOSED	OPEN
	2400	OPEN	CLOSED	OPEN	OPEN
	1200	OPEN	CLOSED	CLOSED	OPEN
	600	CLOSED	OPEN	OPEN	OPEN
	300	CLOSED	OPEN	OPEN	CLOSED
	150	CLOSED	OPEN	CLOSED	OPEN
	110	CLOSED	CLOSED	OPEN	OPEN
5	Delete Characters				
	stripped	OPEN			
	passed	CLOSED			
6	Bit-8 not set to 1 for NONE parity	OPEN			
7	Received 8th Bit				
	passed	OPEN			
	reset to 0	CLOSED			
8	(Not Used)	CLOSED			

* The baud rate is only active if the front-panel is set for EXT.

PRINT LOGIC PCA (S1) – Multilingual (02631-60601)

Switch	Function	Setting
1	Page Length - 11 inch	OPEN
2	Disable Speed Test	OPEN
3,4	Escape Sequences - all accepted	OPEN OPEN
5	Normal Default Print - Density for Primary Language.	(Not Used)
6	Normal Default Print - Density for Secondary Language.	CLOSED
7	7-bit Datacomm	CLOSED

PRINT LOGIC PCA (S2) – Multilingual, cont. (02631-60601)

Switch	Function	Setting
1 - 5	Primary Language (USASCII)	(User Choice)
6 - 10	Secondary Language (USASCII)	(User Choice)

PRINT LOGIC PCA – Non-Multilingual (02631-60225)

Switch	Function	Setting
1	Page Length - 11 inch	OPEN
2	Disable Speed Test	OPEN
3, 4	Escape Sequences-restricts Reset, On-Line, Off-Line, Self-Test, Page Length, Programmable VFC, Identify Request, Primary Status, and Mode Status.	CLOSED OPEN
	Escape Sequences - all accepted.	OPEN OPEN

DIRECT CONNECTION, PAGE BLOCK MODE

Not available with these printing terminals.

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype:	ATP	1
	ATP37	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

```
NOTE
```

Hewlett-Packard does not support the use of half duplex
modems.

Baud Rate selected must be supported by the terminal, controller and modem. Refer to the
rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for
possibilities.

DIRECT CONNECTION, CHARACTER MODE

The function (soft) keys on these terminals each transmit a fixed escape sequence which is not user-definable.

MPE I/O CONFIGURATION

Device Type: 16

Subtype: ATP   0

                      ADCC(HIOTERM2)   0

                      ADCC(HIOTERM0)   0, 4

                      ATC   0, 4

Terminal Type: <u>10</u>   Standard for HP CRT terminals

KEYBOARD SWITCH SETTINGS

<u>ATP</u>

Baud Rate   300, 1200, 2400

Parity   <u>NONE</u>
                      <u>EVEN</u>

Duplex   FULL

Remote Key   ON (DOWN)

Auto LF Key   OFF (UP)

Block Mode Key   OFF (UP)

ADCC(HIOTERM2)

Baud Rate   150, 300, 1200, 2400

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rates
  Subtypes 0, 4   150, 300, 1200, 2400

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 1200, 2400

Parity   NONE
                         ODD
                         EVEN

Other settings same as ATP.

STRAPPING THE KEYBOARD INTERFACE PCA (02640-60019)

Install jumpers in all eight positions of socket W1 for Character Mode operation.

When all jumpers are in, you will be able to run Character Mode applications from your terminal.

DIRECT CONNECTION, PAGE BLOCK MODE

For Page Block Mode operation you must physically add jumper H and remove jumpers D and G from socket W1 on the Keyboard Interface PCA. The straps cannot be changed programmatically; to enter or exit Page Block Mode, you have to press the BLOCK MODE key.

Other settings are the same as for Character Mode.

VPLUS/3000 requires Page Block Mode strapping.

MODEM CONNECTION

MPE I/O CONFIGURATION – For full duplex

Subtype: ATP   1

                      ADCC(HIOTERM2)   1

                      ADCC(HIOTERM0)   1, 5

                      ATC   1, 5

KEYBOARD SWITCH SETTINGS

Baud Rate selected must be supported by the terminal controller, and the modem. See table 6.2-7, Recommended Asynchronous Full Duplex Modems, for available rates. Other configuration settings are the same as direct connections.

MPE I/O CONFIGURATION – For half duplex

```
        NOTE
```

Hewlett-Packard does not support the use of half duplex modems.

Subtype: ATP: (not available)

                      ADCC: 2, 3   (Series 30/33 only)

                      ATC: 2, 3, 6, 7

Use Subtype 2 or 6 with BELL 202S modem, and subtype 3 or 7 with European 202C modem.

KEYBOARD SWITCH SETTINGS

Baud Rate   1200

Duplex   HALF

Other configuration settings are the same as for direct connection.

HP 2640B

DIRECT CONNECTION, CHARACTER MODE

The function (soft) keys on this terminal return fixed escape sequences which are not user-definable.

MPE I/O CONFIGURATION

Device Type: 16

Subtype: ATP   0

                      ADCC(HIOTERM2) 0

                      ADCC(HIOTERM0) 0, 4

                      ATC   0, 4

Terminal Type: <u>10</u> Standard for HP CRT terminals.

KEYBOARD SWITCH SETTINGS

<u>ATP</u>

Baud Rate   300, 1200, 2400

Parity   <u>NONE</u>, EVEN

Duplex   FULL

Remote Key   ON (DOWN)

Auto LF Key   OFF (UP)
Block Mode Key   OFF (UP)

ADCC(HIOTERM2)

Baud Rate   150, 300, 1200, 2400

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate
    Subtypes 0, 4   150, 300, 1200, 2400

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 1200, 2400

Parity   NONE, ODD, EVEN

Other settings same as ATP.

STRAPPING THE KEYBOARD INTERFACE PCA (HP 2640B)

For Character Mode and Line Block Mode operation, set straps as follows:

    A: Closed
    B: Closed*
    C: Closed*
    D: Closed
    E: Closed*
    F: Open
    G: Closed
    H: Closed
    R: Closed
    S: Closed
    T: Closed
    U: Open
    V: Open
    X: Closed
    Y: Open   *
    Z: Closed

DIRECT CONNECTION, PAGE BLOCK MODE

Page Block Mode cannot be enabled programmatically. You must manually set the following key and straps as indicated:

BLOCK MODE key   ON (DOWN)

Manually set the following Keyboard PCA straps as indicated below. (The PCA straps cannot be set programmatically.)

D Strap   OPEN

G Strap   OPEN

H Strap   CLOSED

MODEM CONNECTIONS

MPE I/O CONFIGURATION – For full duplex

Subtype: ATP   1

                     ADCC(HIOTERM2)   1

                     ADCC(HIOTERM0)   1, 5

                     ATC   1, 5

KEYBOARD SWITCH SETTINGS

Baud Rate selected must be supported on the terminal, controller, and modem. See table 6.2-7, Recommended Asynchronous Full Duplex Modems, for available rates.

Other configuration settings are the same as direct connections.

MPE I/O CONFIGURATION – For half duplex

```
┌─────────────┐
│    NOTE     │
└─────────────┘
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Hewlett-Packard does not support the use of half duplex modems.

Subtype: ADCC: 2, 3   (Series 30/33 only)

                     ATC: 2, 3, 6, 7

Use Subtype 2 with BELL 202S modem.

KEYBOARD SWITCH SETTINGS

Baud Rate: 1200

Duplex: HALF

Other configuration settings are the same as for direct connection.

DIRECT-CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Type:	16	
Subtype:	ATP	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	<u>10</u>	Standard for HP CRT terminals
	12	HP 2645K, for 8-bit characters

KEYBOARD SWITCH SETTINGS

<u>ATP</u>

Baud Rate	300, 1200, 2400, 4800, 9600
Parity	FULL
Duplex	<u>NONE</u>, EVEN
REMOTE Key	ON (DOWN)
AUTO LF Key	OFF (UP)
BLOCK MODE Key	ON (DOWN)

ADCC(HIOTERM2)

Baud Rate   150, 300, 1200, 2400

Duplex   FULL, HALF

Other settings same as the ATP

ADCC(HIOTERM0)

Baud Rate
  Subtype 0   150, 300, 1200, 2400
  Subtype 4   150, 300, 1200, 2400, 4800, 9600

Duplex   FULL, HALF

Other settings same as the ATP

ATC

Baud Rate   110, 150, 300, 1200, 2400

Duplex   FULL, HALF

Parity   NONE, EVEN, ODD

Other settings same as ATP.

STRAPPING THE KEYBOARD INTERFACE PCA(HP 2647A/HP 2647F/HP 2645K)

```
A:  Closed
B:  Closed*
C:  Closed
D:  Closed
E:  Closed
F:  Closed
G:  Closed
H:  Closed
J:  Closed
K:  Closed
L:  Closed*
M:  Closed*
N:  Closed*   (Must be open if a printer is attached.)
P:  Closed+
Q:  Closed
R:  Closed
S:  Closed
T:  Closed
U:  Open
V:  Open
W:  Closed*
X:  Closed
Y:  Open
Z:  Closed
```

+ On the HP 2641A, may be opened or closed; setting does not affect data communications.

HP 2641A/HP 2645A/HP 2645K

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

KEYBOARD SWITCH SETTING

BLOCK MODE Key   ON (DOWN)

STRAP SETTINGS

    D: Open
    G: Open
    H: Closed

MODEM CONNECTION-Full Duplex

Subtype: ATP   1

                      ADCC(HIOTERM2) 1

                      ADCC(HIOTERM0) 1, 5

                      ATC   1, 5

MODEM CONNECTION-Half Duplex

NOTE

Hewlett-Packard does not encourage the use of half duplex modems.

Subtype: ADCC 2 (for BELL 202S) or 3 (Series 30/33 only)

                      ATC   2 (for 202S), 3, 6 or 7

KEYBOARD SWITCH SETTINGS

ADCC and ATC: 1200

Duplex: HALF

STRAP SETTINGS

   X: Open

HP 2642A

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Type: 16

Subtype: ATP   0

                  ADCC(HIOTERM2) 0

                  ADCC(HIOTERM0) 0, 4

                  ATC   0, 4

Terminal Type: <u>10</u> For standard HP CRT terminals

KEYBOARD SWITCH SETTINGS

<u>ATP</u>

Baud Rate   300, 1200, 2400, 4800, 9600

Parity   <u>NONE</u>, EVEN

Duplex   FULL

Remote   ON (DOWN)

Auto LF   OFF (UP)

Block Mode   OFF (UP)

<u>ADCC(HIOTERM2)</u>

Baud Rate   150, 300, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ADCC(HIOTERM0)</u>

Baud Rate
  Subtype 0   150, 300, 1200, 2400
  Subtype 4   150, 300, 1200, 2400, 4800, 9600

Other settings same as ATP.

CONTINUED

ATC

Baud Rate   110, 150, 300, 1200, 2400

Parity   NONE, EVEN, ODD

Other settings same as ATP.

STRAPPING THE KEYBOARD INTERFACE PCA (HP 2642A)

      A: Closed
      B: Closed*
      C: Closed*
      D: Closed
      E: Closed
      F: Closed
      G: Closed
      H: Closed
      J: Closed
      K: Closed
      L: Closed*
      M: Closed*
      N: Closed   (unless a printer is slaved from terminal)
      P: Closed
      Q: Closed
      R: Closed
      S: Closed
      T: Closed
      U: Open
      V: Open
      X: Closed
      Y: Open*
      Z: Closed

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

KEYBOARD SWITCH SETTING

BLOCK MODE Key   ON (DOWN)

STRAP SETTINGS

    D: Open
    G: Open
    H: Closed

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

                     ADCC(HIOTERM2)   1

                     ADCC(HIOTERM0)   1, 5

                     ATC   1, 5

```
NOTE
```

Hewlett-Packard does not support the use of half duplex modems.

TERMINAL CONFIGURATION MENU

Baud Rate selected must be supported by the terminal, controller and modem. Refer to rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

Other configuration settings are the same as for direct connection.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Type: 16

Subtype: ATP   0

                      ADCC(HIOTERM2)   0

                      ADCC(HIOTERM0)   0, 4

                      ATC   0, 4

Terminal Types: <u>10</u> Standard for HP CRT terminals.

KEYBOARD SWITCH SETTINGS

<u>ATP</u>

Baud Rate   300, 1200, 2400, 4800, 9600

Parity   <u>NONE</u>, EVEN

Duplex   FULL

REMOTE Key   ON (DOWN)

AUTO LF Key   OFF (UP)

BLOCK MODE Key   OFF (UP)

ADCC(HIOTERM2)

Baud Rate   150, 300, 1200, 2400, 4800, 9600

Duplex   FULL, HALF

Other settings same as ATP.

ADCC(HIOTERM0)

Baud Rate
  Subtype 0   150, 300, 1200, 2400
  Subtype 4   5, 300, 1200, 2400, 4800, 9600

Duplex   FULL, HALF

Other settings same as ATP.

ATC

Baud Rate   110, 150, 300, 1200, 2400

Parity   NONE, EVEN, ODD

Other settings same as ATP.

STRAPPING THE KEYBOARD INTERFACE PCA(HP 2647A/2647F/2648A)

For Character Mode operation, set straps as follows:

```
A:  Closed
B:  Closed*
C:  Closed*
D:  Closed
E:  Closed
F:  Closed
G:  Closed
H:  Closed
J:  Closed
K:  Closed
L:  Closed*
M:  Closed*
N:  Closed*
    Must be open when a printer
    is attached to the terminal.
P:  Closed
Q:  Closed
R:  Closed
S:  Closed
T:  Closed
U:  Closed
V:  Closed
W:  Closed*
X:  Closed
Y:  Closed*
Z:  Closed
```

DIRECT CONNECTION, PAGE BLOCK MODE

Strap settings and Block Mode may be changed programmatically.

BLOCK MODE key   ON (DOWN)

STRAP SETTINGS

D Strap   OPEN

G Strap   OPEN

H Strap   CLOSED

MODEM CONNECTION–Full Duplex

MPE I/O CONFIGURATION

Subtype:	ATP	1
	ADCC(HIOTERM2)	1
	ADCC(HIOTERM0)	1, 5
	ATC	1, 5

KEYBOARD SWITCH SETTINGS

Baud Rate selected must be supported on the terminal, controller and the modem. See table 6.2-7, Recommended Asynchronous Full Duplex Modems, for available rates.

Other configuration settings are the same as direct connections.

MODEM CONNECTION-Half Duplex

```
┌─────────┐
│  NOTE   │
└─────────┘
```

Hewlett-Packard does not encourage the use of half duplex modems.

MPE I/O CONFIGURATION

Subtype: ADCC   2, 3   (Series 30/33 only)

                  ATC   2, 3, 6, 7

Use Subtype 2 with BELL 202S modem.

KEYBOARD SWITCH SETTINGS

Baud Rate: 1200

Duplex: HALF

STRAP SETTINGS

S: Open   (for Australia only)
T: Open   (for Australia only)
X: Open

Other configuration settings are the same as for direct connection.

HP 3092A/HP 3093A

The HP 3092A and HP 3093A terminals are configured the same as the HP 2622A and HP 2623A terminals respectively. Refer to the configuration information for the HP 2622A/HP 2623A/2627A terminals.

The product number of the Terminal Emulator for the 9000 Series 200 computers is 98790A.

DIRECT CONNECTION, CHARACTER MODE

MPE I/O CONFIGURATION

Device Name:
  (MPE G.01.00
    or Later)
	ATP
	
	ADCC
		HPTERMATP
		
		HPTERMADCC

Device Type:	16	
Subtype:	ATP	0
	ADCC(HIOTERM2)	0
	ADCC(HIOTERM0)	0, 4
	ATC	0, 4
Terminal Type:	10 Standard for HP CRT terminals	
	18 For XON/XOFF protocol	

MODE SELECTIONS

		MENU
BLKMODE	OFF (no asterisk in label)	modes 1
AUTOLF	OFF (no asterisk in label)	modes 2
REMOTE	ON (asterisk in label)	modes
LN_MDFY	OFF (no asterisk in label)	modes 1
MOD_ALL	OFF (no asterisk in label)	modes 1

CONTINUED

TERMINAL CONFIGURATION

ReturnDef	CR (CONTROL M)
Local Echo	Off
Caps Lock	Off *
Start Column	1 *
ASCII 8 Bits	No
XmitFnctn(A)	No
SPOW(B)	No *
InhEolWrp(C)	No *
Line/Page(D)	Line
InhHndShk(G)	No
InhDC2(H)	No
Field Separator	US (CONTROL _)
Block Terminator	RS (CONTROL ^)
Term Type	HP
TermID = 2622	E
HP-IB Address	7 *
HardCopy Address	1 *
User Key Mapping	f1=k1 *
Ignore DEL Chars	YES

DATACOMM CONFIGURATION

<u>ATP</u> or <u>ATP37</u>

Baud Rate   300, 600, 1200, 2400, 4800, 9600, 19,200

Parity   <u>NONE/8</u>, EVEN/7

ChkParity   No parity: NO
                       EVEN parity: YES

Bits/Char   8 with no parity
                       7 with EVEN parity

Stop Bits   1

Protocol Handshake   Enq/Ack

Modem Handshake   mdmhk off

Phone #   User choice

<u>ADCC(HIOTERM2)</u>

Baud Rate   300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ADCC(HIOTERM0)</u>

Baud Rate
  Speed-sensed: 300, 1200, 2400
  Speed-specified: 300, 600, 1200, 2400, 4800, 9600

Other settings same as ATP.

<u>ATC</u>

Baud Rate   110, 150, 300, 600, 1200, 2400

Parity   NONE, ODD, EVEN

Check Parity   No parity: NO
                       EVEN parity: YES

Other settings same as ATP.

DIRECT CONNECTION, PAGE BLOCK MODE

Strap Settings and Block Mode may be changed programmatically.

MODE SELECTIONS

BLKMODE   ON   (asterisk in label)

TERMINAL CONFIGURATION

Line/Page(D)   Page

InhHndShk(G)   Yes

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: ATP   1

ATP37   1

ADCC(HIOTERM2) 1

ADCC(HIOTERM0) 1, 5

ATC   1, 5

```
NOTE
```

Hewlett-Packard does not support the use of half duplex modems.

DATACOMM CONFIGURATION

Modem Handshake   full__dx

Baud Rate selected must be supported by terminal, controller, and modem. Refer to rates shown above and in the table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

Other configuration settings are the same as for direct connection.

HP 2563A

DIRECT CONNECTION

MPE I/O CONFIGURATION

<u>MPE G.00.00 or Earlier</u>

Device Type: 32

Subtype: 14

Terminal Type: 19 Spooled Printer

                    22 8-bit Spooled Printer with embedded escape
                        sequences allowed

<u>MPE G.01.00 or Later</u>

Device Name: ATP, ATP37   HPPCLATP

                    ADCC   HPPCLADCC

Device Type: 32

Subtype: 14

Terminal Type: TTPCL19   Spooled Printer

                    TTPCL22   8-bit Spooled Printer with embedded
                                     escape sequences allowed.

                    TTPCL22 is the default Terminal Type used with
                    device names HPPCLATP and HPPCLADCC.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

HP 2563A

The printer's Operator Control Panel is used to set the following characteristics:

Function Number	Function	Setting
1	Primary Character Set	0 (USASCII)
2	Secondary Character Set	<u>4</u>, 5, 6 (<u>Draw</u>, Block, Math)
3	Print Density	<u>0</u>, 1 (<u>Standard</u>, High density)
4	Print Pitch	<u>10</u>, 16.7 (<u>Standard</u>, Compressed)
	L.P.I. ADJ.	6 (6 lines per inch)

Function Number	Function	Setting
20	Data Stream Handshake, removal of Null and Delete Characters	31* (XON/XOFF, Strip Null and Delete Characters. Used with Terminal Types 19 and TTPCL19.) 01 (XONXOFF, No Characters Stripped. Used with Terminal Types 22 and TTPCL22.)
21	Hardware Handshake	0 (Normal Operation)
22	Baud Rate	61 (19.2K) 51 (9600) 41 (4800) 31 (2400)
23	Parity	Terminal Type 00 (None) 22, TTPCL22 03 (Odd) 19, TTPCL19

* Numbers in this column are represented in hexadecimal.

MODEM CONNECTION

This printer is not supported over modems.

DIRECT CONNECTION

MPE I/O CONFIGURATION

MPE G.00.00 or Earlier

Device Type: 32

Subtype: 14

Terminal Type: 18   Application Printer

MPE G.01.00 or Later

Device Name: ATP, ATP37   HPLPATP

                    ADCC   HPLPADCC

                    19 is the default Terminal Type used with device
                    names HPLPATP and HPLPADCC, so substitute Terminal
                    Type 18 in the SYSDUMP/INITIAL dialog.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

Switch Settings

At the front of the printer is the Operator Control Panel, which has two sets of switches for setting a number of characteristics.

Left-hand DIP Switch

Switch	Function	Setting
1	Double Line Feed	OFF
2	UNUSED	OFF
3	Auto LF	OFF
4-8	UNUSED	OFF OFF OFF OFF OFF

CONTINUED

Right-hand DIP Switch

Switch	Function	Setting
1	Full Duplex	ON
2	Parity Enable	OFF
3,5	Baud Rate	ON ON (110) ON OFF (300) OFF ON (1200)
4	UNUSED	OFF
6	EVEN Parity (Unused if switch 2 is OFF)	OFF (ODD)
7	Paper Out Defeat	OFF (Paper out sensing enabled)
8	UNUSED	OFF

MODEM CONNECTION

This printer is not supported over modems.

HP 2631B

DIRECT CONNECTION

MPE I/O CONFIGURATION

<u>MPE G.00.00 or Earlier</u>

Device Type: 32

Subtype: 14

Terminal Type: 19 Remote Spooled Printer

                      20 8-bit Remote Spooled Printer

                      21 Remote Spooled Printer with embedded
                          escape sequences allowed

                      22 8-bit Spooled Printer with embedded
                          escape sequences allowed

<u>MPE G.01.00 or Later</u>

Device Name: ATP   HPLPATP

                      ADCC   HPLPADCC

                      19 is the default Terminal Type used with device
                      names HPLPATP and HPLPADCC.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

SWITCH SETTINGS(HP 2631B)

At the front of the printer is the Operator Control Panel, which has two sets of switches for setting a number of characteristics.

Switch	Function	Setting				
1	Duplex	OFF (FULL)				
2, 3	Parity					Terminal Type
		ON	OFF	(ODD)		19,21
		OFF	OFF	(NONE)		20,22
4, 5, 6, 7	Baud Rate	OFF	ON	OFF	OFF	(2400)
		OFF	ON	ON	OFF	(1200)
		ON	OFF	OFF	ON	(300)
		ON	OFF	ON	OFF	(150)
		ON	ON	ON	ON	(EXT) *

* When set to EXT, speed selected from the Adapter PCA switch (S2).

Switch	Function	Setting
1	LPI	OFF
2, 3	Print Pitch	OFF OFF
4	Perforated Skip	OFF
5, 6, 7, 8	Length	OFF OFF OFF OFF

At the back of the printer is a set of DIP switches. This is the Adapter PCA (02631-60234).

Inside the printer are two additional sets of switches. The first set is the Serial I/O Interface PCA (02631-60230), which is designated as S2. The second set is the Print Logic PCA (02631-60601 or 02631-60225). They can only be set by removing the entire cover. With a multi-lingual printer, the Print Logic PCA (02631-60601) contains two groups of eight switches (the left set is designated as S1, the right set is designated as S2). With a non multi-lingual printer, the Print Logic PCA (02631-60225) contains one group of four switches designated as S1.

CONTINUED

ADAPTER PCA (02631-60234)

Switch	Function	Setting
1	Enable XON/XOFF operation	OPEN
2	Disable ENQ/ACK operation	OPEN
3, 4	SCA Normal operation	CLOSED CLOSED
5, 6	CD Normal operation	CLOSED CLOSED
7	CB Signal not required	OPEN
8	Disable Auto Modem disconnect	CLOSED

CONTINUED

SERIAL I/O INTERFACE PCA – S2 (02631-60230)

Switch	Function		Setting			
1,2,3,4	Baud Rate *	2400	OPEN	CLOSED	OPEN	OPEN
		1200	OPEN	CLOSED	CLOSED	OPEN
		300	CLOSED	OPEN	OPEN	CLOSED
5	Delete Characters					
	stripped		OPEN			
	passed		CLOSED			
6	Bit-8 not set to 1		OPEN			
	for NONE parity					
7	Received 8th Bit					
	passed		OPEN			
	reset to 0		CLOSED			
8	(Not Used)		CLOSED			

* The baud rate is only active if the front panel is set for EXT.

PRINT LOGIC PCA (S1) – Multilingual (02631-60601)

Switch	Function	Setting
1	Page Length - 11 inch	OPEN
2	Disable Speed Test	OPEN
3,4	Escape Sequences - all accepted	OPEN OPEN
5	Normal Default Print - Density for Primary Language.	CLOSED
6	Normal Default Print - Density for Secondary Language.	CLOSED
7	7-bit Datacomm	CLOSED

PRINT LOGIC PCA (S2) – Multilingual, cont. (02631-60601)

Switch	Function	Setting
1 - 5	Primary Language (USASCII)	(User Choice)
6 - 10	Secondary Language (USASCII)	(User Choice)

CONTINUED

PRINT LOGIC PCA - Non Multilingual (02631-60225)

Switch	Function	Setting
1	Page Length - 11 inch	OPEN
2	Disable Speed Test	OPEN
3, 4	Escape Sequences-restricts Reset, On-Line, Off-Line, Self-Test, Page Length, Programmable VFC, Identify Request, Primary Status, and Mode Status.	CLOSED OPEN
	Escape Sequences - all accepted.	OPEN OPEN

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: 15

Terminal Type: 19   Remote Spooled Printer

                      21   Spooled Printer with embedded escape
                           sequences allowed

<div style="text-align:center">

NOTE

</div>

Hewlett-Packard does not support the use of half duplex
modems.

Baud Rate selected must be supported by the printer, controller and modem. Refer to the rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

DIRECT CONNECTION

MPE I/O CONFIGURATION

<u>MPE G.00.00 or Earlier</u>

Device Type: 32

Subtype: 14

Terminal Type: 22   8-bit Spooled Printer with embedded
                                  escape sequences allowed

<u>MPE G.01.00 or Later</u>

Device Name: ATP, ATP37   HPPCLATP

                      ADCC   HPPCLADCC

Device Type: 32

Subtype: 14

Terminal Type: TTPCL22   8-bit Spooled Printer with embedded
                                   escape sequences allowed.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

Switch Settings

To set configuration switches, see your HP Service Representative.

MODEM CONNECTION

This printer is not supported over modems.

HP 2687A

DIRECT CONNECTION

MPE I/O CONFIGURATION

MPE G.00.00 or Earlier

Device Type: 32

Subtype: 14

Terminal Type: 18   Application Printer (may be spooled)

MPE G.01.00 or Later

Device Name: ATP, ATP37   HPPCLATP

                      ADCC   HPPCLADCC

Device Type: 32

Subtype: 14

Terminal Type: TTPCL18   Spooled HP 2687A Application Printer

                      TTPCL22 is the default Terminal Type used with
                      device names HPPCLATP and HPPCLADCC, so substitute
                      Terminal Type TTPCL18 in the SYSDUMP/INITIAL dialog.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

Switch Settings

To set configuration switches, see your HP Service Representative.

MODEM CONNECTION

This printer is not supported over modems.

DIRECT CONNECTION

MPE I/O CONFIGURATION

<u>MPE G.00.00 or Earlier</u>

Device Type:	32	
Subtype:	14	
Terminal Type:	19	Remote Spooled Printer
	20	8-bit Remote Spooled Printer
	21	Remote Spooled Printer with embedded escape sequences allowed
	22	8-bit Spooled Printer with embedded escape sequences allowed

<u>MPE G.01.00 or Later</u>

Device Name:	ATP, ATP37	HPPCLATP
	ADCC	HPPCLADCC
Device Type:	32	
Subtype:	14	
Terminal Type:	TTPCL19	Remote Spooled Printer
	TTPCL22	8-bit Spooled Printer with embedded escape sequences allowed.

TTPCL22 is the default Terminal Type used with device names HPPCLATP and HPPCLADCC.

For further information on Printer Terminal Types, refer to Part 4 on Printer Control.

PRINTER SETTINGS

Printer features are configured through the use of the SETTINGS mode.

Print Settings

PRIMARY PRINT PITCH	10
SECONDARY PRINT PITCH	10
PRIMARY STYLE	Courier
SECONDARY STYLE	Cubic
PRIMARY CHARACTER SET	USASCII
SECONDARY CHARACTER SET	Line Draw

Page Settings

LINES PER INCH	6	
INCHES PER PAGE	11	*
PERFORATION SKIP	off	*
TEXT LINES PER PAGE	60	*

Margin Settings

LEFT MARGIN	0
RIGHT MARGIN	131

Other Settings

Display Functions	off
HP Terminal Mode	off
Restricted Sequences	None
CR Auto LF	off
LF, VT, & FF Auto CR	off
Support Mode	2631B

INTERFACE SETTINGS

Data Settings

BAUD RATE	1200, 2400
DATA BITS	7 for terminal types 19 or 21 8 for terminal types 20 or 22
PARITY	None, Even
PARITY CHECK	Off if parity is None On if parity is Even
STRIP NUL/DEL	On with Terminal Types 19 or 21 Off with Terminal Types 20 or 22

Control Settings

XON/XOFF	on
ENQ/ACK	off
BINARY ENQ/ACK	off
DTR/CD	High
(S)RTS/SCA	Low
CTS/CB	Ignore
RS/CH	Low

MODEM CONNECTION

MPE I/O CONFIGURATION

Subtype: 15

Terminal Type: 19 Remote Spooled Printer

                      21 Spooled Printer with embedded escape
                          sequences allowed

```
┌──────────────┐
│     NOTE     │
└──────────────┘
```

Hewlett-Packard does not support the use of half duplex
modems.

Baud Rate selected must be supported by the printer, controller and modem. Refer to the rates shown above and in table 6.2-7, Recommended Asynchronous Full Duplex Modems, for possibilities.

APPENDIX

CONTROLLER COMPARISON

Each HP 3000 environment (whether it is hardware or software) has its restrictions and advantages which must be considered when you are going from one HP 3000 environment to another. A comparison of the differences between the three asynchronous interfaces available in the HP 3000 family of computers is listed below.

Table A-1. Comparison of Asynchronous Controllers

	ATP, ATP37, or ADCC (MPE V/E)	ADCC (MPE IV or V/P)	ATC
Terminal Type	6, 9, 10, 12, 13, 15, 16, 18	4, 6, 9, 10, 12, 13, 15, 16, 18, 31	0-6, 9, 10, 12, 13, 15, 16, 18, 31
Printer Terminal Type	Serial Spooled Printers: 19, 21 (7-bit) and 20, 22 (8-bit). Also with MPE Version G.01.00 or later: TTPCL19 (7-bit), TTPCL22 (8-bit), and TTPCL18 (8-bit for HP 2687A) Application Printers: 18 (8-bit)	Serial Spooled Printers: MPE IV: 19 (7-bit). MPE V/P: 19, 21 (7-bit) and 20, 22 (8-bit). Application Printers: 18 (8-bit)	Serial Spooled Printers: 19 (7-bit) Application Printers: 18 (8-bit)
Terminal Subtypes	0, 1, 9 (eliminates all speed-specified and half duplex devices)	For Series 30/33 - 0-5. For Series 39/4X - 0, 1, 4, 5 (eliminates all half duplex devices).	0 - 7: speed-sensed and speed-specified devices supported for direct or modem connect and for both full and half duplex.
Printer Subtypes	14 (direct) and 15 (modem) for printers that support Status Request protocol.	14 (direct) and 15 (modem) for printers that support Status Request protocol.	14 (direct) and 15 (modem) for printers that support Status Request protocol.
Paper Tape Mode	Paper Tape Mode is not supported.	Paper Tape Mode is not supported.	It is supported under Terminal Type 6.

Table A-1. Comparison of Asynchronous Controllers (cont'd)

	ATP, ATP37, or ADCC (MPE V/E)	ADCC (MPE IV or V/P)	ATC
Delay Character Requirement	Terminal Type 6 provides a delay of 0.3 seconds after the CR, LF and/or FF. Terminal Type 9 provides a delay of 0.3 seconds for LF and FF, none for CR. ADCC uses the NULL character for delays.	The NULL character is used for delays (that is, the start bit is followed by seven zeros and the appropriate parity bit). See table A-2a for the number of nulls sent per CR or LF, and table A-2c for the number of nulls sent per FF.	Delays are used after CR, LF, and/or FF with the datacomm line held in the mark condition. See table A-2b for the number of nulls sent per CR or LF, and table A-2c for the number of nulls sent per FF.
Initial Speed and Parity Sensing	Performed by the hardware, up to 19200 bps (ATP) or 9600 bps (ADCC), resulting in a line speed and generation of even parity or the use of 8-bit pass-through (no parity checking).	Performed by software, up to 2400 bps, resulting in a line speed and generation of even parity or the use of 8-bit pass-through (no parity checking).	Performed by hardware, up to 2400 bps, resulting in a line speed and generation of either even or odd parity.
Parity Control	The 8th output bit can be set (via FCONTROL logic) to odd or even parity, or to none (0's, 1's or 8-bit pass-through).	The 8th output bit can be set (via FCONTROL logic) to odd or even parity, or to 8-bit pass-through.	The 8th output bit can set (via FCONTROL logic) to odd or even parity, to 8-bit pass-through, or forced to 1.
Input Character Handling (with 7-bit data)	The 8th input bit is passed through in standard and unedited modes with parity disabled. With parity enabled, it is both checked and generated.	The 8th input bit is passed through in standard and unedited modes with parity disabled. With parity enabled, it is both checked and generated.	The 8th input bit is forced to zero in standard and unedited modes with parity disabled. When parity is enabled, it can be set to either generate and check parity or generate but NOT check parity.
XON/XOFF Handshake	XON/XOFF characters are never ignored.	When a write is not posted to the driver, XON/XOFF characters are ignored.	XON/XOFF characters are never ignored.

Table A-2a. # Time Delay Characters by Speed (BPS) for ATC

TERM TYPE	2400 BPS	1200 BPS	600 BPS	300 BPS	150 BPS	110 BPS
0	0 LF 90 CR	0 LF 30 CR	0 LF 6 CR	0 LF 3 CR	0 LF 2 CR	0 LF 1 CR
1	0 LF 90 CR	0 LF 30 CR	0 LF 6 CR	0 LF 3 CR	0 LF 2 CR	0 LF 1 CR
2	0 LF 90 CR	0 LF 30 CR	0 LF 6 CR	0 LF 3 CR	0 LF 2 CR	0 LF 1 CR
3	0 LF 25 CR	0 LF 15 CR	0 LF 7 CR	0 LF 5 CR	0 LF 3 CR	0 LF 1 CR
4	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	0 LF 0 CR
5	45 LF 125 CR	7 LF 75 CR	3 LF 45 CR	1 LF 25 CR	1 LF 10 CR	1 LF 10 CR
6	45 LF 0 CR	35 LF 0 CR	20 LF 0 CR	10 LF 0 CR	5 LF 0 CR	3 LF 0 CR
9	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	4 LF 0 CR	0 LF 0 CR

Table A-2b. # Time Delay Characters by Speed(BPS) for ADCC (HIOTERM0)

TERM TYPE	9600 BPS	4800 BPS	2400 BPS	1200 BPS	600 BPS	300 BPS	150 BPS	110 BPS
4	4 LF	4 LF	4 LF	4 LF	4 LF	4 LF	4 LF	0 LF
	4 CR	4 CR	2 CR	0 CR	0 CR	0 CR	0 CR	0 CR
6	45 LF	45 LF	45 LF	35 LF	20 LF	10 LF	5 LF	3 LF
	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR
9	4 LF	4 LF	4 LF	4 LF	4 LF	4 LF	4 LF	0 LF
	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR	0 CR

Table A-2c. # Time Delay Characters per FF (Any Delay Terminal Type)

CONTROLLER	2400 BPS	1200 BPS	600 BPS	300 BPS	150 BPS	110 BPS
ATC	255	240	120	60	30	20
ADCC (HIOTERM0)	0	255	240	60	30	

Table B-1 and B-2 on the following pages list some of the more common problems encountered while operating and programming your peripheral device(s). In order to use these tables, you must first find the symptom that most closely matches the problem you are having. Then go through the possible causes of the problem, and read the recovery to find the solution.

CONTROLLER DIAGNOSTICS

Table B-1 refers to ATPDSM/TERMDSM. **ATPDSM** and **TERMDSM** are on-line diagnostic programs for the asynchronous terminal controllers. ATPDSM is the on-line diagnostic for ATP with MPE V/P or earlier. TERMDSM is the on-line diagnostic for ATP or ADCC with MPE V/E or later. Notice that there are no on-line diagnostics for the ADCC before MPE V/E or for the ATC. For problems with controllers that are unable to use ATPDSM/TERMDSM, contact your Hewlett-Packard representative.

On-line diagnostics can be very useful. (Off-line diagnostics are also available, but in order to use them, your HP 3000 has to be shut down. Off-line diagnostics should only be run by your Hewlett-Packard support representative.) Online diagnostics can be used for verification testing as well as for detailed troubleshooting. They are most valuable for handling terminal port failures. ATPDSM/TERMDSM can run diagnostics on one or more ports, abort jobs or I/O, reset one or more ports and their associated tables, display tables, dump tables to a disc file, format ATP/ADCC failure information, or identify ports considered broken by the ATP/ADCC software. For more information, refer to the *Advanced Terminal Processor (DSN/ATP) On-line Diagnostics Manual* or the *Terminal (TERMDSM) On-line Diagnostic/Support Monitor Reference Manual*.

Table B-1. Problems Operating Peripheral Devices

Symptom	Cause	Recovery
The screen is blank and the terminal does not respond.	1. The terminal is not plugged in. 2. The terminal is not powered on. 3. A terminal fuse has blown. 4. The terminal is not properly reset. 5. The terminal is malfunctioning. 6. The terminal driver software is malfunctioning.	1. Plug in the power cord. 2. Turn the power switch on. 3. Replace the fuse. 4. Do a full reset (press the RESET key twice quickly, CONTROL SHIFT RESET or CONTROL SHIFT BREAK) -or- Power the terminal off, then power it on again. 5. Contact your HP Representative. 6. Using ATPDSM/TERMDSM, dump the terminal port and reset the port. If this fails, contact your HP Representative.

The screen may not be blank, but no cursor is visible.	1. On an HP Graphics terminal, the alpha display may not be on.
	2. The microcode is being reloaded from the CPU.
	3. There is a terminal microcode error.
		1. Turn the alpha display on.
		
		2. Wait a few seconds until it's reloaded.
		3. Do a full reset (press the RESET key twice quickly).
		   -or-
		Power the terminal off, then power it on again.
		   -or-
		Contact your HP Representative.

The cursor does not travel across the full width of the screen.	The margins are indented from column 1 and/or column 80.	Reset the margins. -or- Perform a full (hard) reset of the terminal (press the RESET key twice).

Table B-1. Problems Operating Peripheral Devices (cont'd)

Symptom	Cause	Recovery
When you press (RETURN), the cursor or typing head returns to the beginning of the same line but there is no response from the computer.	1. The computer is down. 2. The terminal is not in Remote Mode. 3. The terminal is in Block Mode. 4. You may have typed (CONTROL)S, sending an XOFF to the computer. 5. The cable or phone connection between your terminal and the computer may be broken. 6. The keyboard is locked. 7. Your program may not have finished processing (possibly due to a heavy system load). 8. Your program may be in an infinite loop. 9. The computer may be in an infinite loop (also referred to as "system hung").	1. Contact your Operator. 2. Put the terminal into Remote Mode. 3. Press (ENTER) to trigger transmission. -or- Disable Block Mode, then press (RETURN). 4. Type (CONTROL)Q to re-enable output from the computer. 5. Check your terminal's data cable (at the back of the terminal and at the modem or computer). -or- Make sure your modem is still receiving a carrier signal from the remote modem (check the carrier indicator light). 6. Press RESET once. 7. Wait several minutes, in case the program has not finished processing. -or- Press (BREAK); if there is a significant lag to get a colon prompt the computer is heavily loaded. Type :RESUME to continue processing, or type :ABORT to halt the program. 8. Abort the program (by pressing (BREAK) and typing :ABORT). 9. Check with the Console Operator.
When you press (RETURN), the cursor or typing head returns to the beginning of the next line, but you get no other response from the computer.	1. AUTO LF is on and one of the conditions in the previous symptom (1-3), holds. 2. Your program may be awaiting additional input.	1. Same as 1-3 in the previous symptom. 2. Type in additional data, press (RETURN) or type in the input termination character.

Table B-1. Problems Operating Peripheral Devices (cont'd)

Symptom	Cause	Recovery
When you type, nothing appears on the screen, and the computer does not respond.	1. The keyboard cable is not connected properly to the back of your terminal.	1. Check the connection for looseness, the wrong board, or for a loose Keyboard Interface PCA.
	2. Your terminal did not reset properly.	2. Do a full reset (press RESET twice). -or- Power the terminal off and back on again.
	3. Your terminal is malfunctioning.	3. Press TEST and examine the results (consult the manual for interpretation). -or- Have the terminal serviced.
	4. Your modem is malfunctioning.	4. Make sure the modem is still receiving a carrier signal from the remote modem (check the carrier indicator light).
	5. The terminal software is malfunctioning.	5. Using ATPDSM/TERMDSM, dump the terminal port and reset the port. If this fails, contact your HP Representative.
	6. The computer is down.	6. Check with the Operator.
When you type, nothing appears on the screen, but you get the expected response from the computer.	Character Echo is turned off.	Obtain an MPE prompt (:), then type (ESCAPE) followed by a colon (:) to turn Echo on.
The terminal appears hung; you are receiving no output, and you cannot input data.	1. The computer (terminal driver) may be in an "XON wait". 2. Your program may not be ready to output data yet.	1. Type (CONTROL)Q to re-enable output to the terminal. 2. Press (BREAK) to see if you get a colon (:) prompt. If you do, the computer is still up. Type :RESUME to continue.
	3. The terminal driver software is malfunctioning.	3. Using ATPDSM/TERMDSM, dump the terminal port and reset the port. If this fails, contact your HP Representative.
	4. The computer is down.	4. Check with the Operator.

Table B-1. Problems Operating Peripheral Devices (cont'd)

Symptom	Cause	Recovery
While typing, or after pressing (RETURN), "garbage" is printed on your screen.	1. The terminal speed setting does not match the port speed setting.	1. Cycle through the terminal speeds trying them one at a time until you find the correct one. -or- If your port is configured for speed-sensing (Subtypes 0-3), log off and log on again. -or- Ask the Operator to perform an ABORTJOB command on your session in order to log you off.
	2. The modem speed does not match port and/or terminal speed.	2. If your port is configured as "speed-specified" (Subtypes 4-7), make sure the modem is operating at the port's speed. If the problem persists, cycle through the terminal speeds, trying them one at a time, until you find the correct one.
	3. The terminal parity setting does not match what the port expects.	3. Change the terminal parity setting until you find the correct one. -or- If your port is on an ATC, you may log off and log on again to "re-synchronize" the parity settings. -or- If your port is on an ATP or ADCC, your terminal was probably set for EVEN or NONE parity at logon. Change the parity and try to log on again.
	4. The Keyboard Interface PCA may be loose if your terminal is an HP 264x.	4. Press the board into place.

Table B-1. Problems Operating Peripheral Devices (cont'd)

Symptom	Cause	Recovery

When you press (RETURN), the cursor returns to the beginning of the same line and prints out data.	1. AUTO LF may be enabled at the terminal.
	2. Terminal Memory Lock may have been set at the bottom line of the screen.
	
	3. The terminal port might be in Tape Mode (ATC only).
		1. Disable AUTO LF.
		
		2. Turn off Memory Lock.
		    -or-
		    Do a full reset of the terminal (press RESET twice).
		3. Press (CONTROL)Y.

Type in a known MPE command, and get an Unknown Command Error Message.	1. Terminal has "A" strap set (called Function Key Transmission or XmitFnctn). 2. (RETURN) has been redefined. 3. The terminal is transmitting parity and the computer (Command Interpreter) does not expect parity.	1. Disable strap A (XmitFnctn = NO). 2. Use the appropriate "Carriage Return" key. 3. Disable parity on the terminal.
When you press (RETURN), you receive the message "I/O Error on Input".	The computer (Command Interpreter) expects parity, but the terminal is not sending it or is sending the wrong parity.	Change the parity setting.
On an HP 264x terminal, the cursor is in the home position, the keys are inoperative, and the TEST key does not work.	Keyboard Interface PCA is loose or defective.	Press the board into the backplane or replace the board.
Lines of typed data are duplicated (echoed) on your terminal screen.	Your port is configured as "non-duplicative" when it should be "duplicative". (The Echo Facility would not cause this problem.)	Ask your Operator to check the configuration for your port. If the port is "non-duplicative", re-configure your terminal port.

Table B-2. Problems Programming with Peripheral Devices

Symptom	Cause	Recovery
Frequently "hung" Reads.	1. For reads terminating on a byte count, your data may be overrunning the port controller, thus causing its input byte counter to be improperly adjusted. 2. For Block Mode reads, you may not have strapped the terminal correctly or enabled user handshaking.	1. See whether the control characters are embedded in the data stream. If so, disallow them. (Tell the terminal operator not to embed control characters within the data stream.) 2. Use the Read Limit Timer with your Reads. When this timer expires, the Read is terminated by the File system. −or− Use a lower terminal speed.
An unending stream of program prompts are being printed at the terminal.	An end-of-file condition is encountered at the device.	Modify the program to check the end-of-file condition before re-issuing the read.
Pressing RETURN on the terminal once causes a double Return.	1. The Terminal Type is for full duplex operation and the terminal is set up for half duplex (terminal echoes CR and controller echoes CR). 2. AUTO LF is enabled.	1. Disable the Echo Facility. 2. Switch the terminal to full duplex or disable AUTO LF.
Pressing RETURN while in the MPE Command Interpreter does not generate a LF, or it garbles the colon (:) prompt.	AUTO LF may be enabled. This line from the terminal is turning the CR LF:DC1 from the computer into garbage.	Disable the AUTO LF key on the terminal.

Table B-2. Problems Programming with Peripheral Devices (cont'd)

Symptom	Cause	Recovery
Unexpected device behavior: • Your reads are terminating earlier than what was expected. • The terminal speed is different from what was expected. • The behavior of Echo is opposite from what is expected. • The behavior of System Break is opposite from what you expected. • The behavior of Subsystem Break is opposite from what you expected. • Parity errors seem to occur on every (or nearly every) transmission. • The behavior of (CONTROL)X is opposite from what you expected. • Most control characters do not function as expected.	1. Most FCONTROL calls affect all the files opened on a device. Perhaps your program issued an FCONTROL call against another file open on this device. 2. If several programs (even being run by other users) are accessing this device, someone else's program might be using FCONTROL to change the device characteristics without informing other users.	1. Add one or more FCONTROL calls to your program to set up the device characteristics you need. 2. Find out if other programs are accessing your device. Either implement an initialization scheme for each access period or modify all programs to use the same setting.

ERROR MESSAGES

The messages listed in table C-1 occur during ATP initialization (ATPINIT). The controller (ATP) must be in control (up and running) to receive these messages.

Some of these messages are followed by a system failure, which results in a system failure message (shown in table C-4), followed by a halt. When a halt occurs, a software dump should be initiated.

Table C-1. ATP Messages

Message	Recovery
ATP MESSAGE (1) The data segment size needed for DRT *nn* is *mm* words too large. The number of terminal buffers and/or the number of units must be reduced for the DRT.	Run SYSDUMP and reduce the number of terminal buffers. Then restart initialization procedures.
ATP MESSAGE (2) No disc space available for the data segment for the DRT *nn*. Hence, all units for this DRT will be inoperative.	Purge unnecessary files. Attempt a Recover Lost Disc Space operation by doing a COOLSTART or by using the COND (condense) command in the VINIT subsystem. If this fails, something is probably wrong with the disc or there is simply not enough disc space left. Contact your HP Representative.
ATP MESSAGE (3) No memory available for the data segment for the DRT *nn*. Hence, all units for this DRT will be inoperative.	Verify that the AVAILABLE MEMORY specifies at least 512 kb. If not, there is serious system fault. Contact your HP Representative.
ATP MESSAGE (4) Can't lock the data segment for the DRT *nn* in memory. Hence, all units for this DRT will be inoperative.	Attempt a COLDSTART. If the problem persists, contact your HP Representative.
ATP MESSAGE (5) Due to an error reported earlier, the console can not be set to the proper state. Hence, it is not possible to continue.	Attempt a COLDSTART. If the problem persists, contact your HP Representative. Note, this is followed by S.F. #703. See table C-3 for the recovery to be taken.
ATP MESSAGE (6) Cannot load the ATP software. Hence, it is not possible to continue.	The ATP driver may be missing. Perform an UPDATE with the latest Installation Tape (IT).
ATP MESSAGE (7) Channel for DRT *nn* is not responding. Hence, all units for this DRT will be inoperative.	The Synchronous Interface Board (SIB) is not responding. Contact your HP Representative for assistance.

Table C-1. ATP Messages (cont'd)

Message	Recovery
ATP MESSAGE (8) Inconsistent internal tables. Hence, it is not possible to continue.	Attempt a reload as it is suspected that MPE was not loaded properly. If the problem continues, contact your HP Representative for assistance.
ATP MESSAGE (9) Unexpected hardware error on channel for DRT *nn*. This situation could cause problems in the future.	Possible ATP problem. Contact your HP Representative for assistance. NOTE: The ATP subsystem is still considered operational.
ATP MESSAGE (10) Asynchronous Interface Board (AIB) *nn* for DRT *mm* does not respond. Hence, units *pp* thru *qq* will be inoperative.	The AIB indicated a hardware problem. Contact your HP Representative for assistance. NOTE: The units should be marked BROKEN and UNFIXABLE when you execute the BROKEN command in ATPDSM/TERMDSM. If they are just marked BROKEN, then attempt a reset of the ports using the RESET command.
ATP MESSAGE (11) Unable to set the console to the proper state. Hence, it is not possible to continue.	The system is attempting to come up for the first time or it is attempting to recover from a Power Failure. Verify that the console is operational. If it is, then you should attempt a COOLSTART. If the problem persists, contact your HP Representative for assistance.
ATP MESSAGE (12) No data segment is available for DRT *nn*. Hence, all units for this DRT will be inoperative.	There is a possible problem when loading MPE, therefore, a COLDLOAD, or RELOAD must be performed. If the problem persists, contact your HP Representative for assistance.
ATP MESSAGE (14) Unable to access the system configuration file. Hence, the default number of terminal buffers per port (*nn*) will be used for the data segment for the DRT *mm*.	This situation could cause problems elsewhere in the system operations. If you receive this message when the next system is loaded, you should have it investigated by your HP Representative.
ATP MESSAGE (15) Invalid speed (in characters per second) specified for unit *nn* (DRT *mm*). Hence, the default speed (*pp*) will be used.	Verify I/O configuration for the proper speed specification. If it is not correct, start the system with a COOLSTART and correct the speed.
ATP MESSAGE (16) Unable to set unit *nn* (DRT *mm*) to the proper state. Hence, this unit will be inoperative.	Possible ATP hardware problem. Contact your HP Representative for assistance.

Table C-1. ATP Messages (cont'd)

Message	Recovery
ATP MESSAGE (17) Unit *nn* for the DRT *mm* exceeds the highest allowable unit number *pp*. Hence, this unit will be inoperative.	The highest allowable UNIT # is 95. Verify the I/O configuration.
ATP MESSAGE (18) Subtype *n* aspecified for the unit *mm* (DRT *pp*) is invalid. Hence, the default term type (*qq*) will be used.	The valid substypes for the ATP subsystem are 0, 1, 9, 14, and 15. Verify that the I/O configuration is correct for this unit.
ATP MESSAGE (19) Term types *nn* specified for unit *mm* (DRT *pp*) is invalid. Hence, the default term type (*qq*) will be used.	The valid port protocol (terminal) types for ATP are 4, 5, 6, 9, 10, 12, 13, 15, 16, 18, 19, 20, 21, 22, and 23. Verify that the I/O configuration is correct for this unit.
ATP MESSAGE (20) Logical device *nn* specifies a previously defined physical unit. Hence, this logical device will be inoperative.	This situation could cause problems in the future. Verify the I/O configuration for errors.
ATP MESSAGE (21) Unable to perform I/O to the console. Hence, it is not possible to continue.	Verify that the console is operational. If so, then there is a problem with MPE. Perform a COLDSTART to clear the problem. If the console is bad, contact your HP Representative for assistance.
ATP MESSAGE (22) Device type for logical device *nn* and its assigned driver do not match (*mm* versus *pp*). Hence, it is not possible to continue.	There is a problem outside of the ATP that could involve memory hardware. This message will be followed by a S.F #710. Perform a software dump then attempt a COLDSTART. If the problem persists, contact your HP Representative for assistance.
ATP MESSAGE (23) Logical device *nn* specifies device type *mm*, however, the driver configured does not support devices of this type. Hence, this unit will be inoperative.	ATP subsystem has 2 driver names. HIOTERM1 for device type 16. HIOASLP0 for device type 32. Verify the I/O configuration for this LDEV.
ATP MESSAGE (24) The number of terminal buffers for DRT *nn* have been increased to the minimum number *mm* allowed for the *pp* units.	The algorithm in the ATP initiation procedure requires a minimum number of TBUF's to be allocated. To correct this, increase the number of terminal buffers per port via SYSDUMP.
ATP MESSAGE (25) The junction panel for Asynchronous Interface Board (AIB) *nn* for DRT *mm* does not respond. Hence, every modem unit on this AIB will be inoperative.	It is possible to have these units operational by changing the subtype from 1 to 0 (direct connect). Otherwise, there is a hardware problem on the modem mother board. Call your HP Representative for assistance.

Table C-1. ATP Messages (cont'd)

Message	Recovery
ATP MESSAGE (25) The junction panel for Asynchronous Interface Board (AIB) *nn* for DRT *mm* does not respond. Hence, every direct connect unit on this AIB may not respond.	Units are probably still functional because only the MSC chip is suspected as being bad. MSC is required for modem connections. However,the board should be checked out. Contact your HP Representative for assistance.
ATP MESSAGE (26) The junction panel for Asynchronous Interface Board (AIB) *nn* for DRT *mm* does not support modem units. Hence, every modem unit on this AIB will be inoperative.	It is possible that an AIB was configured with the wrong subtype for a direct connect mother board. Verify that all modem units are configured for the correct AIB/mother board combination.
ATP MESSAGE (27) Self test failed on the Modem Controller Chip (MCC) for unit *nn* for DRT *mm*. Consequently, the state of the junction panel is not known. Hence, this direct connect unit may not respond.	Modem control is not required for direct connect units. Therefore, the system only considers this a warning. However, if this message repeats for units on the same Asynchronous Interface Board (AIB), there is probably a bad MCC chip on this AIB and the board should be repaired. Contact your HP Representative for assistance.
ATP MESSAGE (27) Self test failed on the Modem Controller Chip (MCC) on Asynchronous Interface Board (AIB) *nn* for DRT *mm*. Hence, every modem unit on this AIB will be inoperative.	Possible hardware problem on this AIB. To get the units operable, reconfigure these units as subtype 0 then contact your HP Representative for assistance in repairing the AIB.
ATP MESSAGE (27) Self test failed on the Modem Controller Chip (MCC) for unit *nn* for DRT *mm*. Hence, this modem unit will be inoperative.	Run ATPDSM diagnostics against the entire AIB board to see if all units fail. If so, the AIB board is bad for modem ports. It could still be reconfigured for direct connect. Contact your HP Representative for board repair.
ATP MESSAGE (28) Self test failed on the Modem Scanner Chip (MSC) for unit *nn* for DRT *mm*. Hence, this modem unit will be inoperative.	ATP hardware problems on the Modem Mother board. Contact your HP Representative for assistance.
ATP MESSAGE (28) Self test failed on the Modem Scanner Chip (MSC) on the junction panel for Asynchronous Interface Board (AIB) *nn* for DRT *mm*. Hence, every modem unit on this AIB will be inoperative.	ATP hardware problems on the Modem Mother board. Contact your HP Representative for assistance.

Table C-1. ATP Messages (cont'd)

Message	Recovery
ATP MESSAGE (29) The Port Controller Chips (PCCs) for each modem unit on Asynchronous Interface Board (AIB) *nn* for DRT *mm* are incompatible with the Modem Controller Chip (MCC) on this AIB. Hence, every modem unit on this AIB will be inoperative.	There are 2 possible revision levels for 6801 chips on AIB's. They can not be mixed on the same board. The AIB is inoperative. Contact your HP Representative for board repair.
ATP MESSAGE (30) Self test failed to complete on the Port Controller Chip (PCC) for unit *nn* for DRT *mm*. Hence, this unit will be inoperative.	There is probably a bad PCC chip for this unit. Contact your HP Representative for help in repairing the AIB board.
ATP MESSAGE (30) Self test failed to complete on the Port Controller Chip (PCC), Modem Controller Chip (MCC), and junction panel for unit *nn* for DRT *mm*. Hence, this modem unit will be inoperative.	There may be a problem outside of the ATP subsystem. However, to further verify this unit, reconfigure it as a direct connect port and repeat the test. If the problem persists, contact your HP Representative for assistance.
ATP MESSAGE (30) Self test failed to complete on the Port Controller Chip (PCC), Modem Controller Chip (MCC), and the junction panel for unit *nn* for DRT *mm*. Hence, this direct connect unit may not respond.	Verify that the other units on the AIB, which this unit is on, are operational. If so, there is probably a bad PCC for this unit. Contact your HP Representative for assistance.
ATP MESSAGE (31) Self test failed on the Port Controller Chip (PCC) for unit *nn* for DRT *mm*. Hence, this unit will be inoperative.	This port is permanently disabled. However, the remainder of the ports should be operational. The AIB board must be repaired with a good PCC chip. Contact your HP Representative for assistance.
ATP MESSAGE (32) The junction panel for unit *nn* for DRT *mm* does not support modem units. Hence, this modem unit will be inoperative.	The AIB unit specified is probably physically hooked up to a direct connect mother board. Either reconfigure for a direct connect, or connect the AIB to a modem port.
ATP MESSAGE (33) The Port Controller Chip (PCC) and Modem Controller Chip (MCC) for unit *nn* for DRT *mm* are not compatible. Hence, this modem unit will be inoperative.	The AIB has different revisions of the 6801 chip on it. These chips must all be the same. Contact your HP Representative.
ATP MESSAGE (34) The console will not be set inoperative. This situation could cause problems in the future.	Ambiguous test results occured during the ATP subsystem initialization. Contact your HP Representative for assistance; the ATP hardware should be verified.

Table C-1. ATP Messages (cont'd)

Message	Recovery
(Unnumbered Messages) In order to continue, the total number of terminal buffers for this DRT (terminal buffers per unit time configured for the DRT) has been reduced from nn to mm terminal buffers. For your future information, each configured unit requires pp words, each terminal buffer requires qq words, and at least rr terminal buffers are required for the tt units configured.	The size of the extra data segment, required by the ATP subsystem, was too small to contain all the terminal buffers asked for. Therefore, the initialization procedure has reduced the number until all the buffers fit in the configured maximum extra data segment size. To avoid this message, either reduce the number of terminal buffers required, the number of units configured, or increase the maximum data segment size.

The messages listed in table C-2 occur during ATP37 initialization (TICINIT). The controller (ATP37) must be in control (up and running) to receive these messages.

Some of these messages are followed by a system failure, which results in a system failure message (shown in table C-4), followed by a halt. When a halt occurs, a software dump should be initiated.

Table C-2. ATP37 Messages

Message	Meaning	Action
ATP MESSAGE(1) A data segment is not available for the ATP terminal data segment. Hence, all ATP devices on DRT nn will be inoperative.	The driver's attempt to acquire memory for the data segment has failed.	Configure more memory. If you do not have the hardware needed to provide more memory, contact your HP Representative.
ATP MESSAGE(2) No disc space is available for the ATP terminal data segment. Hence, all ATP devices on DRT nn will be inoperative.	There is a shortage of virtual disc space.	Attempt a Recover Lost Disc Space Operation. If this fails, something is probably wrong with the disc. Contact your HP Representative.
ATP MESSAGE(3) Memory is not available for the ATP terminal data segment. Hence, all ATP devices on DRT nn will be inoperative.	The driver's attempt to freeze the data segment has failed. This could be caused by a shortage of memory or a software problem.	Configure more memory. If this does not solve the problem, perform a memory dump and contact your HP Representative.
ATP MESSAGE(4) Can't lock the ATP terminal data segment. Hence, all ATP devices on DRT nn will be inoperative.	The data segment has been frozen successfully but cannot be locked for similar reasons as in Message 3.	Configure more memory. If this does not solve the problem, contact your HP Representative.
ATP MESSAGE(5) Due to an error reported earlier the console cannot be set to the proper state. Hence, it is not possible to continue.	The driver is unable to build the data segment for the console. This should always be followed by System Failure #705. This can be either a software or hardware problem.	Perform a memory dump and contact your HP Representative.
ATP MESSAGE(6) The minimum ATP terminal data needed is larger than the maximum allowable data segment. Hence, all ATP devices on DRT nn will be inoperative.	The data segment size needed is larger than the the largest available data segment.	Configure more memory. If the hardware is not able to provide the extra memory, contact your HP Representative.

Table C-2. ATP37 Messages (cont'd)

Message	Meaning	Action
ATP MESSAGE(7) The ATP terminal data segment needed is larger than the maximum allowable data segment. The total number of tbufs has been reduced from *nn* to *mm*. The ATP devices on DRT *pp* may not operate correctly.	Due to a shortage of memory, the number of Terminal Buffers (TBUFs) per port has to be smaller than the number of TBUFs configured.	You may continue if the new number of TBUFs is sufficient. If for performance reasons, you need the number of TBUFs per port to be larger than *mm*, you should configure more memory.
ATP MESSAGE(8) The number of ATP terminal buffers for DRT *nn* has been increased to a minimum of *mm*.	There is more available memory than expected, so in order to provide better performance, the number of TBUFs per port has been increased.	None.
ATP MESSAGE(9) Invalid speed for ldev *nn*. Hence, the default speed 240 will be used.	An unsupported speed was configured, so the default speed of 2400 bps will be used.	You may continue if 2400 bps is an acceptable speed for this ldev. If you wish to use another supported speed besides 2400, you will have to reconfigure the port for this ldev.
ATP MESSAGE(10) Invalid subtype for ldev *nn*. Hence, the default subtype 0 will be used.	An unsupported subtype was configured, so the default subtype 0 will be used for this ldev.	You may continue if subtype 0 is acceptable for this ldev. If you wish to use another subtype supported by ATP37, you will have to reconfigure the port for this ldev.
ATP MESSAGE(11) More than 7 ATP devices are configured for DRT *nn*. Hence, all those devices will be inoperative.	More than seven ports are configured for one DRT number.	Change the DRT numbers for units 7 and higher to match the proper ATP37 board.
ATP MESSAGE(12) It was not possible to set the console to the proper state. Hence, it is not possible to continue.	The driver's attempt to open the console failed. This should be followed by System Failure 704.	Perform a memory dump and contact your HP Representative.
ATP MESSAGE(13) It was not possible to set ldev *nn* to the correct state. Hence, this ldev will be inoperative.	The self-test on the port for this Logical Device has failed.	The offline diagnostics need to be run on the port. Contact your HP Representative.

Table C-2. ATP37 Messages (cont'd)

Message	Meaning	Action
ATP MESSAGE(14) Incorrect driver configured for ldev *nn*. Hence, it is not possible to continue.	Something other than HIOTERM1 was configured as the software driver.	Configure the correct software driver (HIOTERM1).
ATP MESSAGE(15) File *termtypefile* for DRT *nn* is invalid. Hence, the default termtype *mm* will be used.	The Terminal Type file name configured is wrong. The file name configured does not exist or is not a Terminal Type file. The default terminal type *nn* will now be used with this DRT number.	You may continue if the default Terminal Type is acceptable. If you wish to use a Terminal Type file, you must reconfigure this DRT number.
ATP MESSAGE(16) Termtype *nn* specified for DRT *mm* is invalid. Hence, the default code segment data will be used.	An unsupported Terminal Type has been configured for this DRT number.	Reconfigure this DRT number using a supported Terminal Type.
ATP MESSAGE(17) The code segment data has been corrupted.	The driver's attempt to read the Terminal Type file name was not successful. Therefore it is assumed that the code segment is bad.	The system will attempt to obtain the information from the disc copy of the code segment. If the code segment on disc is also bad, this message will be followed by System Failure 717. If this happens, perform a memory dump and contact your HP Representative.
ATP MESSAGE(18) Unit 7 on DRT *nn* is not available. Hence, ldev *mm* will be inoperative.	A test on the modem port failed. There are possible hardware problems.	The offline diagnostics need to be run on this port. Contact your HP Representative.
ATP MESSAGE(19) Unable to perform I/O to unit *n* on DRT *mm*. Hence, this ATP device will be inoperative.	A self-test has failed on these units. There are possible hardware problems.	The offline diagnostics need to be run on these units. Contact your HP Representative.
ATP MESSAGE(20) Selftest for unit *n* on DRT *mm* failed. Hence, this ATP device will be inoperative.	A self-test failed on these units. This should be followed by ATP Failure Error Code 6200.	Perform a memory dump on the port using TERMDSM. The device will be inoperative (marked BROKEN and UNFIXABLE). Contact your HP Representative.

Table C-2. ATP37 Messages (cont'd)

Message	Meaning	Action
ATP MESSAGE(21) The ATP on DRT *nn* is not responding. Hence, all devices on this DRT will be inoperative.	The ATP37 board is not responding.	The offline diagnostics need to be run. Contact your HP Representative.
ATP MESSAGE(22) Hardware error detected on channel for DRT *nn*. Hence, all units for this DRT will be inoperative.	Hardware problem.	The offline diagnostics need to be run. Contact your HP Representative.

The messages listed in table C-3 occur during ADCC initialization (ADCCINIT). ADCC must be in control (up and running) to receive these messages.

Some of these messages are followed by a system failure, which results in a system failure message (shown in table C-4), followed by a halt. When a halt occurs, a software dump should be initiated.

Table C-3. ADCC Messages

Message	Recovery
ADCC MESSAGE (1) A data segment is not available for the ADCC terminal data segment. Hence, all ADCC devices will be inoperative.	There is a possible problem when loading MPE, therefore, a COLDLOAD, or RELOAD must be performed. If the problem persists, contact your HP Representative for assistance.
ADCC MESSAGE (2) No disc space is available for the ADCC terminal data segment. Hence, all ADCC devices will be inoperative.	Purge unnecessary files. Attempt a Recover Lost Disc Space operation by doing a COOLSTART or by using the COND (condense) command in the VINIT subsystem. If this fails, something is probably wrong with the disc or there is simply not enough disc space left. Contact your HP Representative.
ADCC MESSAGE (3) Memory is not available for the ADCC terminal data segment. Hence, all ADCC devices will be inoperative.	Verify that the AVAILABLE MEMORY specifies at least 512 kb. If not, there is a serious system fault. Contact your HP Representative.
ADCC MESSAGE (4) Can't lock the ADCC terminal data segment. Hence, all ADCC devices will be inoperative.	Attempt a COLDSTART. If the problem persists, call your local HP office. Note, this is followed by S.F. #703. See table C-3 for the recovery to be taken.
ADCC MESSAGE (5) Due to an error reported earlier the console cannot be set to the proper state. Hence, it is not possible to continue.	The system is attempting to come up for the first time or it is attempting to recover from a Power Failure. Verify that the console is operational. If it is, then you should attempt a COOLSTART. If the problem persists, contact your HP Representative for assistance.
ADCC MESSAGE (6) The minimum ADCC terminal data needed is larger than the maximum allowable data segment. Hence, all ADCC devices will be inoperative.	Increase maximum data segment size.
ADCC MESSAGE (7) The ADCC terminal data segment needed is larger than the maximum allowable data segment. The total number of tbufs has been reduced from *nn* to *mm*. The ADCC devices may not operate correctly.	Run SYSDUMP and reduce the number of terminal buffers. Then restart the initialization procedures.

Table C-3. ADCC Messages (cont'd)

Message	Recovery
ADCC MESSAGE (8) The number of ADCC terminal buffers has been increased to the minimum *nn* per ADCC device.	The algorithm in the ATP initiation procedure requires a minimum number of TBUFs to be allocated. To correct this, increase the number of terminal buffers per port via SYSDUMP.
ADCC MESSAGE (9) Invalid speed for ldev *nn*. Hence, then default speed *mm* will be used.	Verify I/O configuration for the proper specification. If it is not correct, start the system with a COOLSTART and correct the speed.
ADCC MESSAGE (10) Invalid subtype for ldev *nn*. Hence, the default subtype *mm* will be used.	The valid subtypes for the ATP subsystem are 0,1,9,14 and 15. Verify the I/O configuration is correct for this unit.
ADCC MESSAGE (11) More than 64 ADCC devices are configured. Hence , all those devices will be inoperative.	Do not configure more than the maximum supported devices.
ADCC MESSAGE (12) It was not possible to set the console to the proper state. Hence, it is not possible to continue.	The system is attempting to come up for the first time or it is attempting to recover from a Power Failure. Verify that the console is operational. If it is, then you should attempt a COOLSTART. If the problem persists, contact your HP Representative for assistance.
ADCC MESSAGE (13) It was not possible to set ldev *nn* to the correct state. Hence, this ldev will be inoperative.	This should never occur. Perform a memory dump and contact your HP Representative.
ADCC MESSAGE (14) Incorrect driver configured for ldev *nn*. Hence, it is not possible to continue.	Verify I/O configuration.
ADCC MESSAGE (15) File *nn* for DRT *mm* is invalid. Hence, then default termtype *pp* will be used.	Check user defined Terminal Type file or perform update.
ADCC MESSAGE (16) Termtype *nn* specified for DRT *mm* is invalid. Hence, the default code segment data will be used.	Check user defined Terminal Type file or perform update.
ADCC MESSAGE (17) The code segment data base has been corrupted.	Check user defined Terminal Type file or perform update.

The following System Failures are those which are related to point-to-point communications or those that may occur during operations such as the initialization of an asynchronous controller.

Table C-4. Selected System Failures

System Failure	Cause	Recovery
#700	Initialize or power fail can not recover, because DB is not SYSDB.	Perform a memory dump of the system. Contact your HP Representative.
#701	The terminal subsystem cannot run on this system.	This should never happen unless an IMB Master Installation Tape (MIT) is loaded on an HP 3000 Series II/III system.
#703	The console I/O tables cannot be initialized.	Verify that the console has been configured correctly; otherwise perform a memory dump and contact your HP Representative.
#704	The console cannot be allocated (that is, the console initialized but the I/O function to the console has failed).	Perform a memory dump and contact your HP Representative.
#705	An attempt was made to build the terminal data segment, and it failed.	Reboot the system. If the situation continues, perform a memory dump then call your HP Representative for assistance.
#706	The terminal software could not be loaded, frozen and locked in memory.	Verify that all the required terminal segments are present. If not, perform an UPDATE. If all the segments are present, perform a memory dump and attempt a RELOAD. Contact your HP Representative.
#708	LDT could not be locked and frozen in memory.	Reduce the # of terminal ports configured and/or reduce the system resources (i.e., # of CST's,DST's,TBUF) or perform a memory dump and contact your HP Representative.
#709	Invalid entry in LPDT.	Perform a memory dump and contact your HP Representative.

Table C-4. Selected System Failures (cont'd)

System Failure	Cause	Recovery
#710	Information in the I/O Tables for a particular LDEV is inconsistent.	Verify that the Device Type is appropriate for the driver configured. If it is ok, perform a memory dump, then attempt a RELOAD. If it still fails, start hardware troubleshooting outside of the terminal subsystem (that is, memory or CPU).
#711	There's a bad TBUF link pointer in the returned TBUFs.	Perform a memory dump and contact your HP Representative.
#712	There's a bad TBUF head pointer to free list.	Perform a memory dump and contact your HP Representative.
#713	ATTACHIO returned an error on an I/O request for the console during system initialization.	Perform a memory dump and attempt a RELOAD. Contact your HP Representative.
#714	A terminal hardware error was detected by the terminal subsystem.	Begin troubleshooting via off-line diagnostics.
#715	An terminal failure occured on the console.	Perform a memory dump and contact your HP Representative after verifying that the console is alright.
#716	An I/O Instruction failure occured.	Troubleshoot the hardware outside of the terminal subsystem first.
#717	The disc copy of IMANAGER was corrupt; therefore the terminal type information could not be accessed.	Perform a memory dump, then UPDATE or COLDLOAD from tape.
#719	Corrupt data stack.	Perform a memory dump and contact your HP Representative.
#720	Invalid MPE tables.	This should never happen. Perform a memory dump and contact your HP Representative.
#721	The wrong driver specified for the wrong controller.	Check the the driver name to match the controller. Perform a memory dump.

	APPENDIX
# ATP CABLE ASSEMBLY	**D**

INTRODUCTION

These instructions allow users of the Advanced Terminal Processor (ATP) to construct their own cable assemblies. Recommended tools, parts ordering information, pin diagrams, assembly procedures, and testing information are included. The following cable assemblies are covered:

- Three-pin male ATP to 25-pin female RS-232-C adapter cable

- Three-pin male to three-pin female RS-232-C extension cable

- Five-pin male to five-pin female RS-422 extension cable

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NOTE
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Customer manufactured cables are not covered under
standard Hewlett-Packard (HP) support agreements.

ORDERING INFORMATION

Connector kits, bulk cable, and a special crimping tool are available from Hewlett-Packard. Ordering directly from HP insures that you receive quality parts which meet the electrical and mechanical specifications required for consistent, reliable operation and satisfactory performance. Specifications for the bulk cable are also provided.

Hewlett-Packard Parts

To order supplies from HP:

- Contact your local HP sales office.

- Call toll-free: 800-538-8787. (California, Hawaii, and Alaska call 408-738-4133 collect.)

- Contact the supplying division:

HEWLETT-PACKARD
Computer Supplies Operation
P.O. Box 60008
Sunnyvale, CA 94088

A *Computer Users' Catalog* (5953-2450) is available. It describes and gives ordering information for connector kits, bulk cable, complete cable assemblies, and other computer supplies.

<div align="center">

NOTE

</div>

Throughout these instructions, "male" and "female" refer
to the *contacts* of the connector, NOT the *shell*.

Connector Kits　　　　The following are available:

92224A　　　　Kit of four each, 3-pin male connectors for the ATP RS-232-C interface.

92224B　　　　Kit of four each, 3-pin female connectors for the ATP RS-232-C interface.

92225A　　　　Kit of four each, 5-pin male connectors for the ATP RS-422 interface.

92225B　　　　Kit of four each, 5-pin female connectors for the ATP RS-422 interface.

92178D　　　　Kit of four each, 25-pin female, RS-232-C connectors.

1251-3250　　　　Spare male contact pins for any of the above.

1251-3252　　　　Spare female contact sockets for any of the above.

Bulk Cable　　　　The following 24 gauge shielded and jacketed cables are available in lengths of 30 to 4000 meters:

92179C　　　　3-wire for ATP RS-232-C interfaces.

92179D　　　　5-wire for ATP RS-422 interfaces.

Tool　　　　The following special tool is available from HP:

92229A　　　　Recommended for crimping the cable's braided shield to the RF can of the ATP connectors.

Shielded Cable Specifications

Figures D-1 and D-2 show the specifications for 3-conductor and 5-conductor shielded and jacketed cable.

Third Party Compliance

U.L. Style 2464
U.L. Style 1061 VW-1, individual conductors
CSA AWM-SR PVC, individual conductors

Electrical

Voltage rating: 300V at 80 degrees C (1000V rms test between conductors and conductors to shield)

Mechanical

Singles	Three, 24 (7x32) AWG tinned copper
Insulation	PVC, 0.009 inches minimum average wall thickness
Colors	Blue, gray, and white
Cable Lay	Twist singles in above sequence for flexibility
Shield (inner)	Metallized polyester, metallization facing out
Shield (outer)	Braid from 36 AWG tinned copper for 85% minimum coverage
Jacket	PVC, 30 mil minimum wall thickness rated at 80 degrees C

SINGLES .045   JACKET .200 MAX

.024

SHIELD .120

FOIL SHIELD .095

ALL DIMENSIONS ARE IN INCHES, TOLERANCES: ± .005
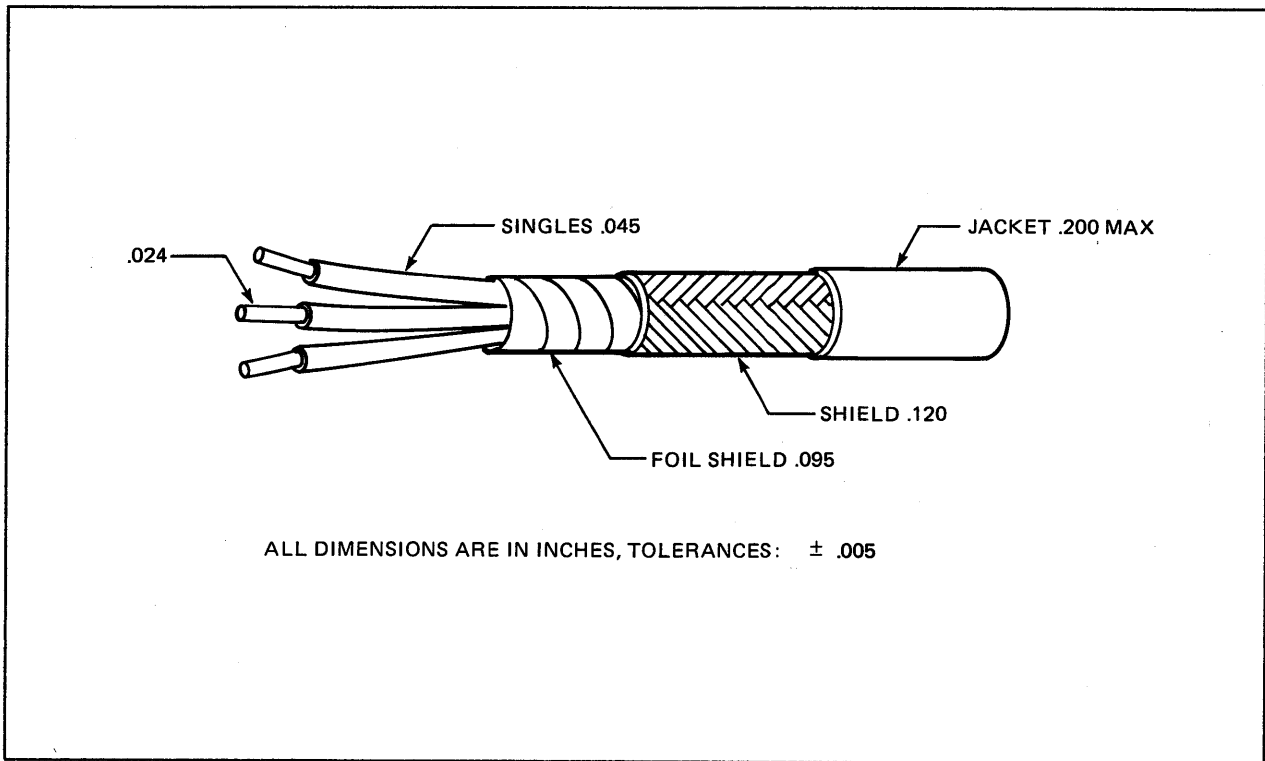
Figure D-1. Three-conductor Shielded and Jacketed Cable

Third Party Compliance

U.L. Style 2464 and 1061

Electrical

Conductor Resistance, DC	<30 ohms/1000 ft.
Mutual Pair Capacitance	<=22pF/ft. between paired wires.
Stray Capacitance	<=40pF/ft. between one wire and all others in the cable with all others grounded.
Pair-to-Pair Balanced Crosstalk	>=40dB of attenuation at 150 kHz between one pair of wires and any other pair.
Voltage Rating	300V rms at 80 degrees C (1000V rms test between conductors and conductors to shield).

Mechanical

Singles	Two twisted pairs plus one single AWG 24 (7x32) tinned, stranded copper (tinned after stranding).
Insulation	Polyvinyl chloride per U.L. 1061
Colors	One conductor of each twisted pair is white, the other black or brown. The single conductor is red.
Cable Lay	Twist the twisted pairs around the single for maximum flexibility.
Shield (inner)	Metallized polyester; metal facing outward.
Shield (outer)	Braid from AWG 36 tinned copper for 85% minimum coverage.
Jacket	Polyvinyl chloride, 0.035 in. minimum wall thickness.

ALL DIMENSIONS ARE IN INCHES, TOLERANCES; ± .005
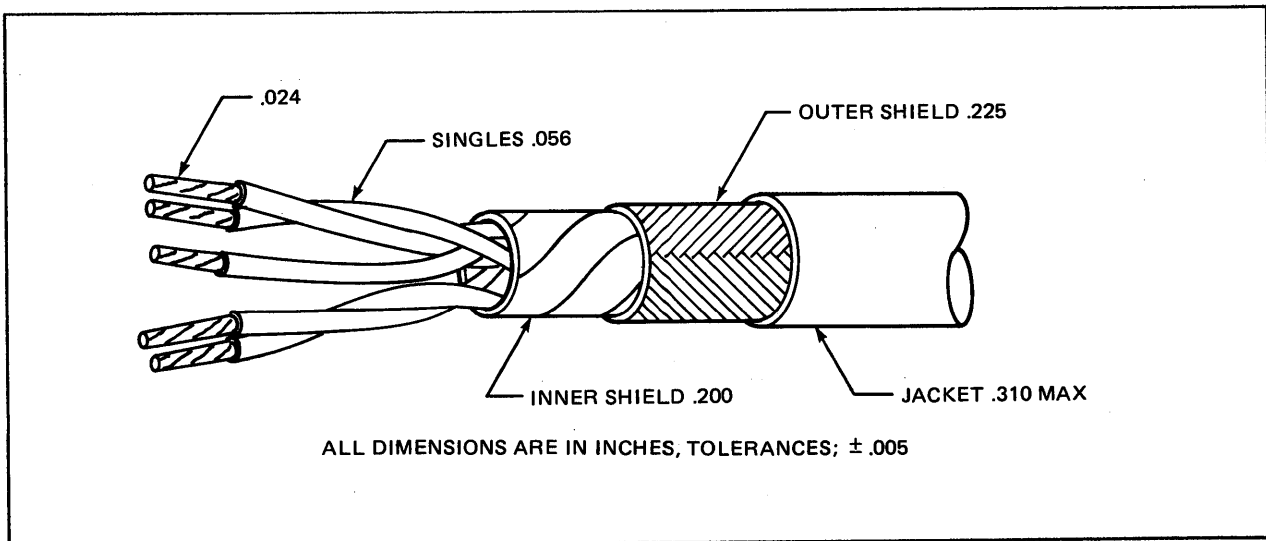
Figure D-2. **Five-conductor Shielded and Jacketed Cable**

REQUIRED TOOLS

The following tools are required to assemble an ATP cable:

- Small, sharp knife – To strip insulation jacket.

- Diagonal wire cutters – To cut the braid and foil.

- Wire strippers (24 gauge) – To strip conductors.

- Contact crimp tool – To attach contacts to conductors.

    ITT Cannon M22520/1-01 with TH185 locator
    Buchanan #615717 with locator #614958
    or equivalent crimp tool

- Pin/socket insertion/extraction tool – To install/remove contacts.

    ITT Cannon # CIET-2-HDB
    or equivalent tool

- Shield crimp tool – To attach the braid to the RF can.

    HP92229A
    ITT Cannon CCT-HX4-438S
    Thomas and Betts #WT-219
    or equivalent crimp tool

NOTE

Both the contact-to-conductor connection and the braid-to-RF-can connection can be soldered if the recommended crimping tool is unavailable. However, crimping is preferable. Use a soldering iron of approximately 50 watts and resin core solder.

- Heat gun or hair dryer – To shrink tubing over the shield pigtail.

- Small Pozi-drive screwdriver – To assemble the connector shells.

- Small flat-blade screwdriver – To assemble the connector shells.

PIN DIAGRAMS

Figures D-3 through D-5 show the electrical connections for each cable.
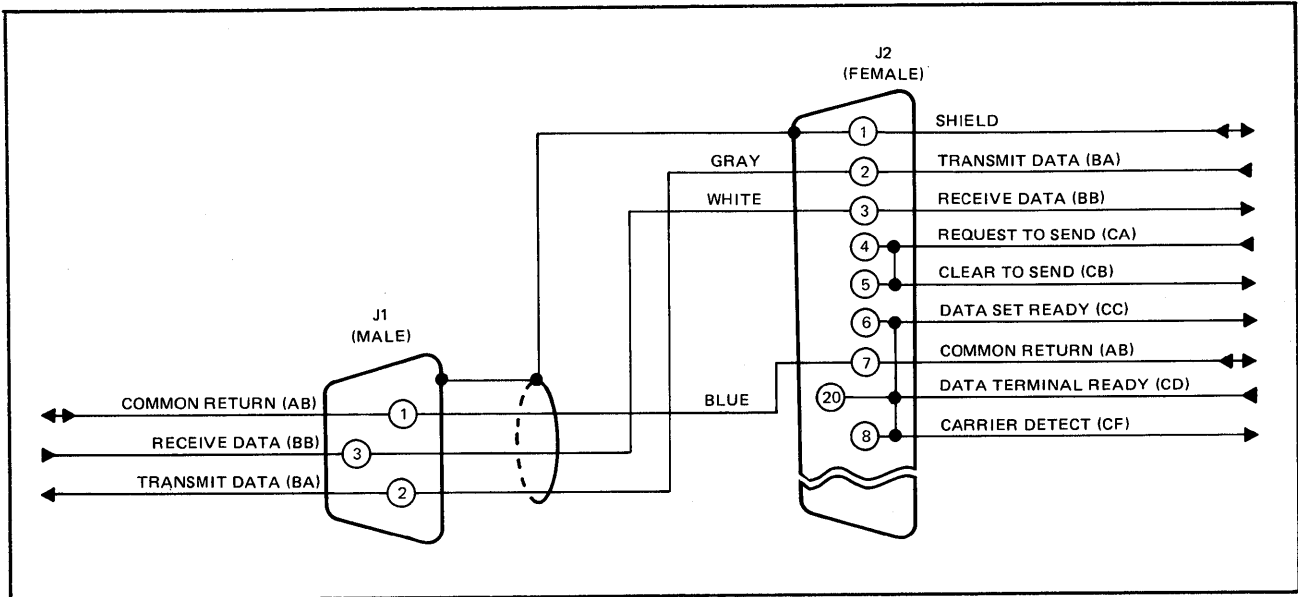
Figure D-3. ATP 3-pin to 25-pin RS-232-C Adapter Cable
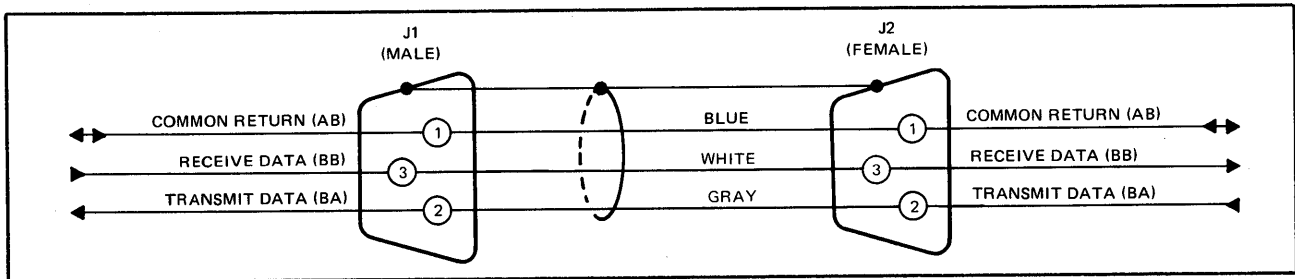
Figure D-4. ATP 3-pin RS-232-C Extension Cable
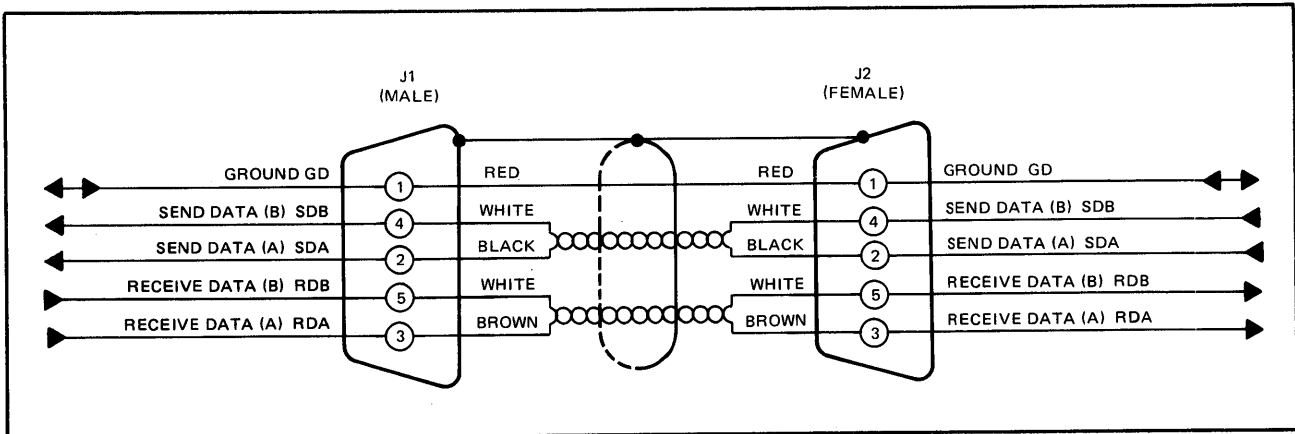
Figure D-5. ATP 5-pin RS-422 Extension Cable

THREE-PIN to 25-PIN ADAPTER CABLE

Material Required

The three-pin to 25-pin RS-232-C Adapter Cable requires the following material:

- Desired length of shielded 3-wire cable - HP 92179C or equivalent.

- Three-pin male ATP connector kit - HP 92224A or equivalent.

- Twenty-five pin female RS-232-C connector kit - HP92178D or equivalent.

- Eight inches of insulated 24 gauge wire.

- Heat shrinkable tubing - 1/4" diameter by 3/4" length.

Three-Pin Connector

When you attach a 3-pin ATP connector to one end of the cable, you must crimp (or solder) the cable shield to the RF can.
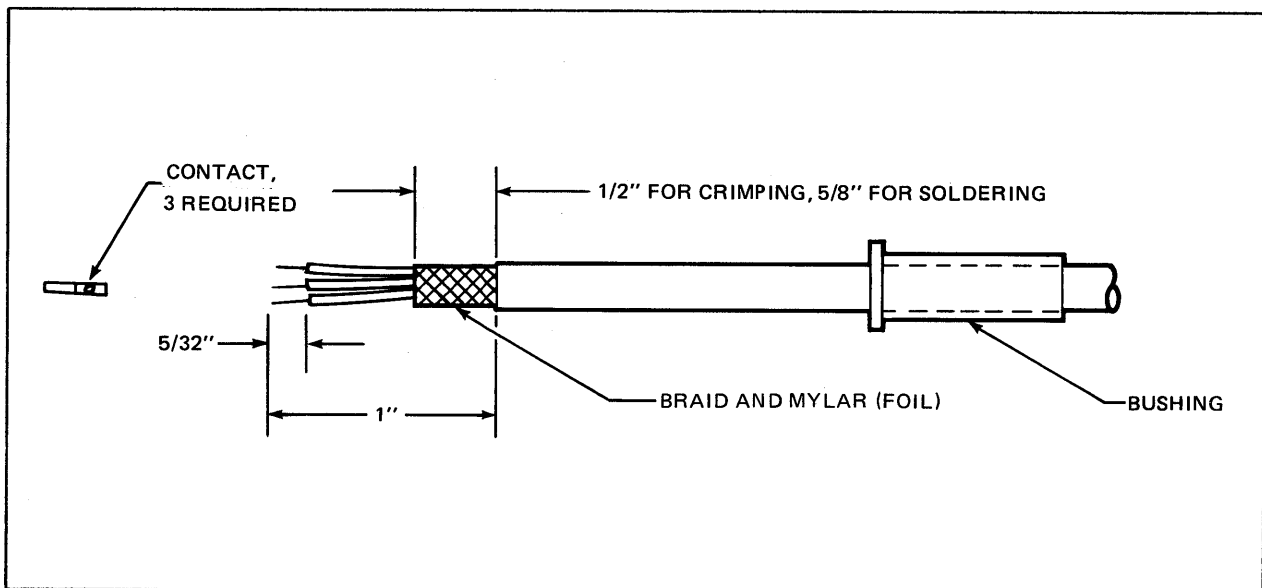
Figure D-6. Cable preparation for 3-pin ATP connector

TO CRIMP THE SHIELD. Perform the following steps:

1. Prepare the cable as shown in Figure D-6.

    a. Using a sharp knife, remove outer insulation 1" from end of cable.

<div align="center">BE CAREFUL NOT TO CUT THE BRAID.</div>

    b. Slide the rubber bushing from the connector kit onto the cable far enough to be out of the way. The bushing's flange end must face the end of the cable.

    c. Cut the braided shield 1/2" beyond the insulation using diagonal cutters.

    d. Using wire strippers, remove 5/32" of insulation from the ends of all three conductors.

2. Attach the contacts to the conductors with a crimp tool (or a 50 watt soldering iron).
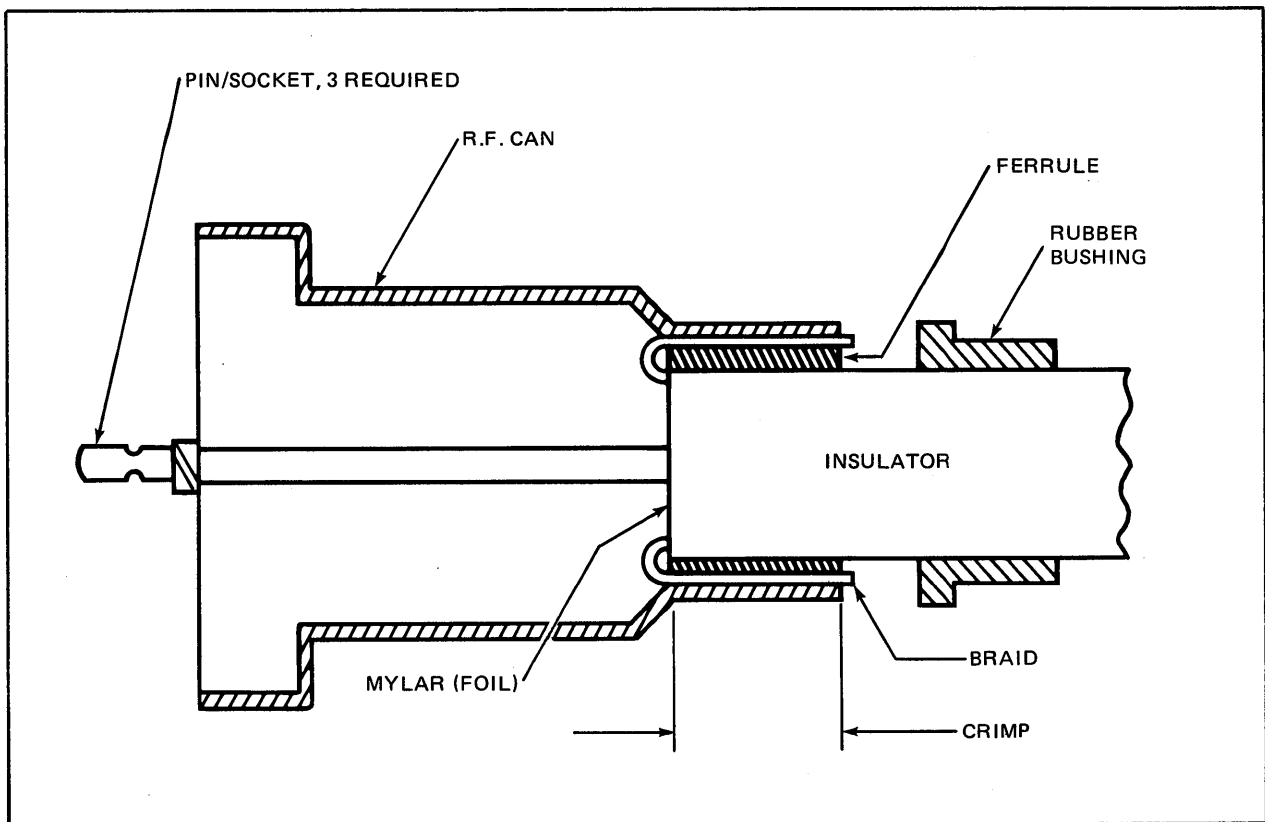
Figure D-7. RF Can Crimped to 3-wire Cable

3. Attach the RF can to the shield as shown in Figure D-7.

    a. Slide the ferrule back over the insulation, until it is flush with insulation as in Figure D-7.

    b. Spread the braid and wrap it back evenly over the ferrule as in Figure D-7.

    c. Cut the aluminized mylar foil flush with the insulation.

    d. Slide the RF can onto the cable until the round "neck" covers the ferrule and braid.

    e. Crimp using the proper tool. Be sure any external lips left by the crimp tool lie in the horizontal (wide) plane, not the vertical (narrow) plane; otherwise the RF can will be too thick to fit in the connector shell.

4. Insert the contacts into the numbered positions of the insulator block.

    a. Install the blue wire into position one.

    b. Install the gray wire into position two.

    c. Install the white wire into position three.

5. Push the RF can forward over the insulator block.

6. Slide the rubber bushing forward to the small end of the RF can.

7. Assemble the connector housing with two screws as shown in Figure D-9.

TO SOLDER THE SHIELD

Perform the following steps:

1. Prepare the cable as shown in Figure D-6.

    a. Using a sharp knife, remove outer insulation 1" from end of cable.

                   BE CAREFUL NOT TO CUT THE BRAID.

    b. Slide the rubber bushing from the connector kit onto the cable far enough to be out of the way. The bushing's flange end must face the end of the cable.

    c. Unravel the shield, twist it into a pigtail and cut to 5/8".

    d. Cut the aluminized mylar foil back to the braid and insulation.

    e. Using the wire strippers, remove 5/32" of insulation from the ends of all three conductors.

2. Attach the contacts to the conductors with a crimp tool (or a 50 watt soldering iron).

NOTE

The ferrule supplied with the connector kit is NOT used
when the shield is *soldered* to the RF can.

a. Tin the shield pigtail with solder.

b. Apply a solder bead to the flat triangular surface on the inside of the RF can as shown in
Figure D-8.

c. Slide the RF can over the cable and solder the shield pigtail to the inside of the RF can at
the solder bead.

BE CAREFUL NOT TO MELT THE INSULATION ON THE CONDUCTORS.
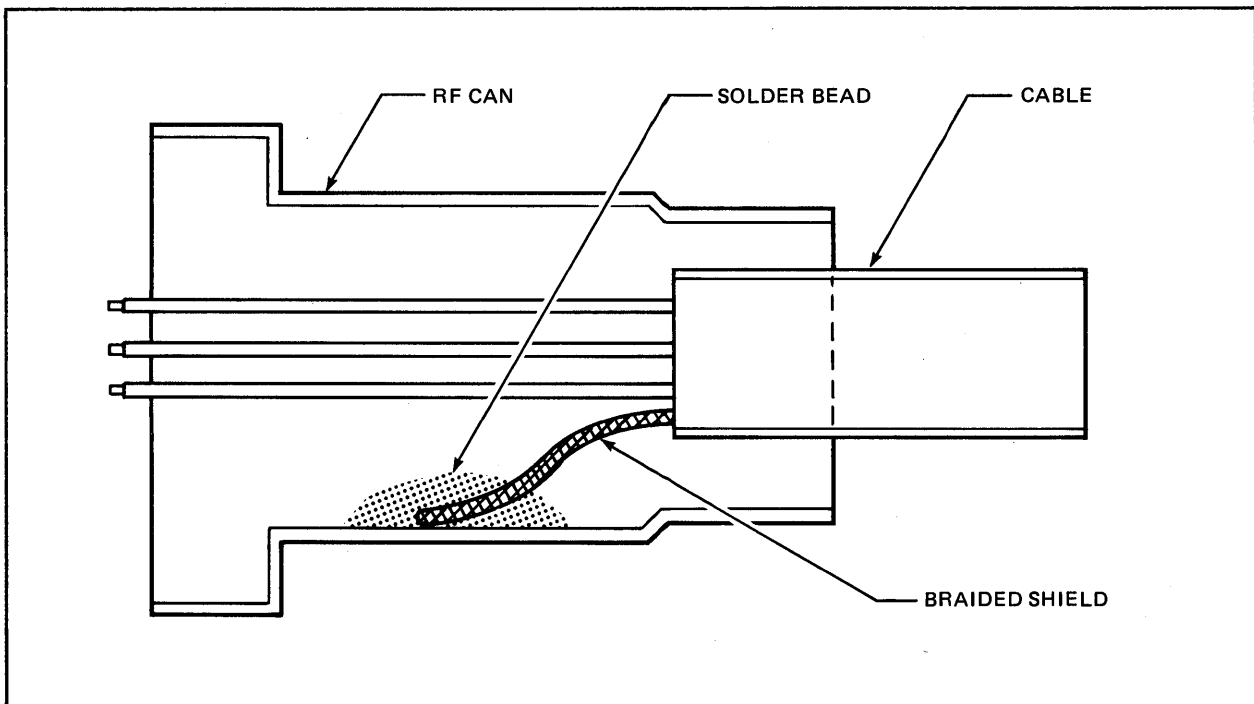
Figure D-8. RF Can Soldered to Shield

4. Insert the contacts into the numbered positions of the insulator block.

    a. Install the blue wire into position one.

    b. Install the gray wire into position two.

    c. Install the white wire into position three.

5. Push the RF can forward over the insulator block.

6. Slide the rubber bushing forward to the small end of the RF can.

7. Assemble the connector housing with two screws as shown in Figure D-9.
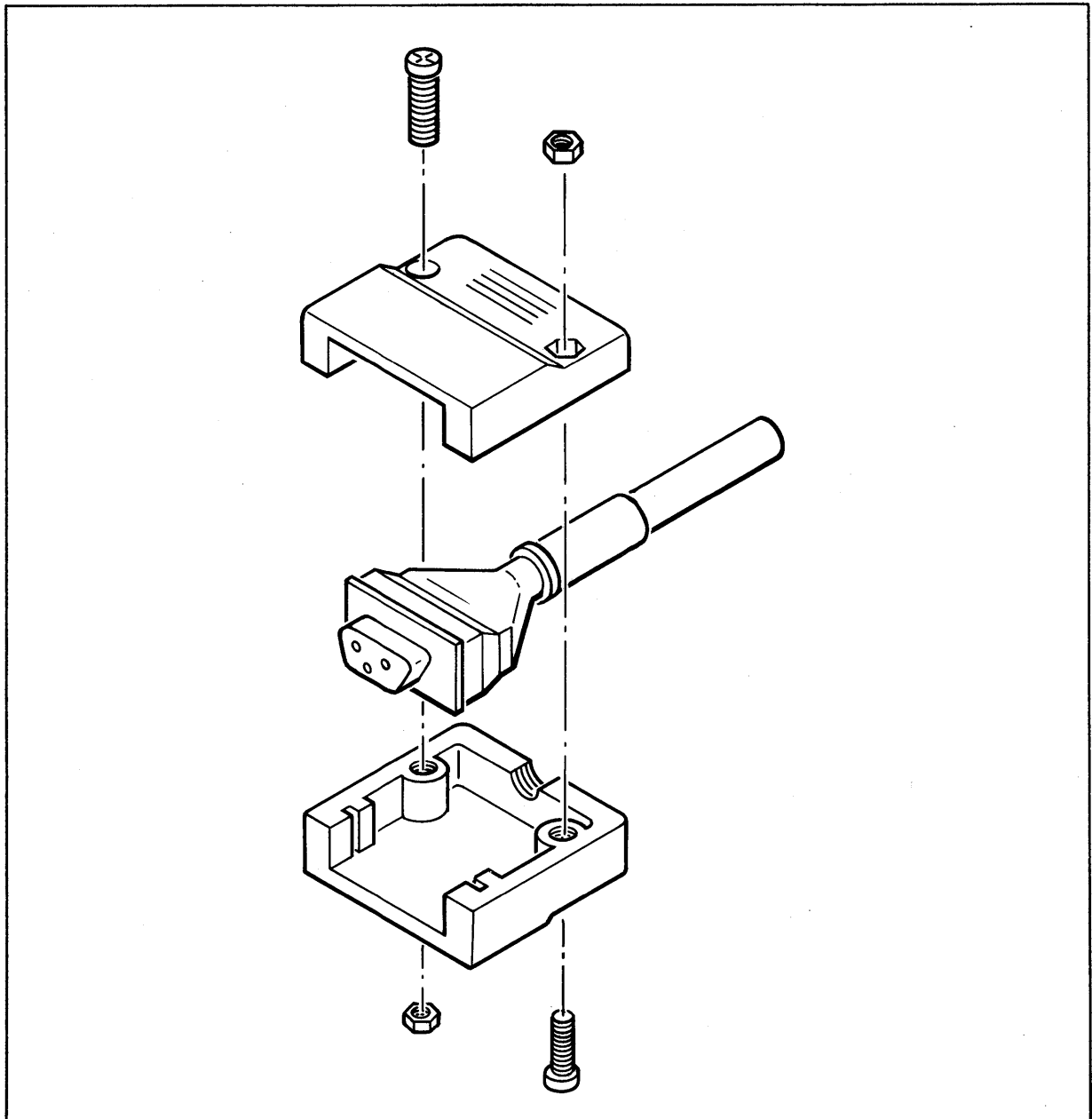
Figure D-9. ATP 3-Wire Connector Shell Assembly Details.

Twenty-Five Pin Connector

When you attach a 25-pin RS-232-C connector to other end of the cable, the shield is always soldered.

Perform the following steps:

1. Prepare the second end of the cable as shown in Figure D-10.

    a. Using a sharp knife, remove the outer insulation 1" from the end of the cable.

<div align="center">BE CAREFUL NOT TO CUT THE BRAID.</div>

    b. Slide the rubber bushing from the connector kit onto the cable with the flange-end last.

    c. Unravel the braided shield and twist into a pigtail.

    d. Cut the aluminized mylar foil back to the braid and insulation.

    e. Using wire strippers, remove 5/32" of insulation from the ends of all three conductors.
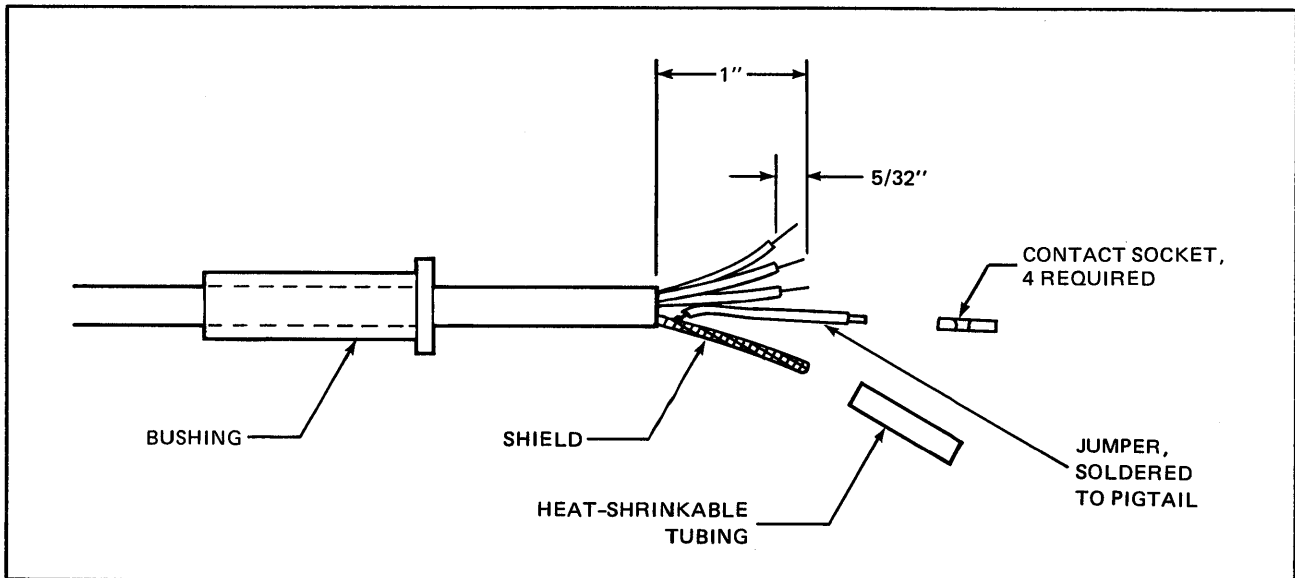
<div align="center">Figure D-10. RS-232-C, 25-Pin, Cable Preparation Details</div>
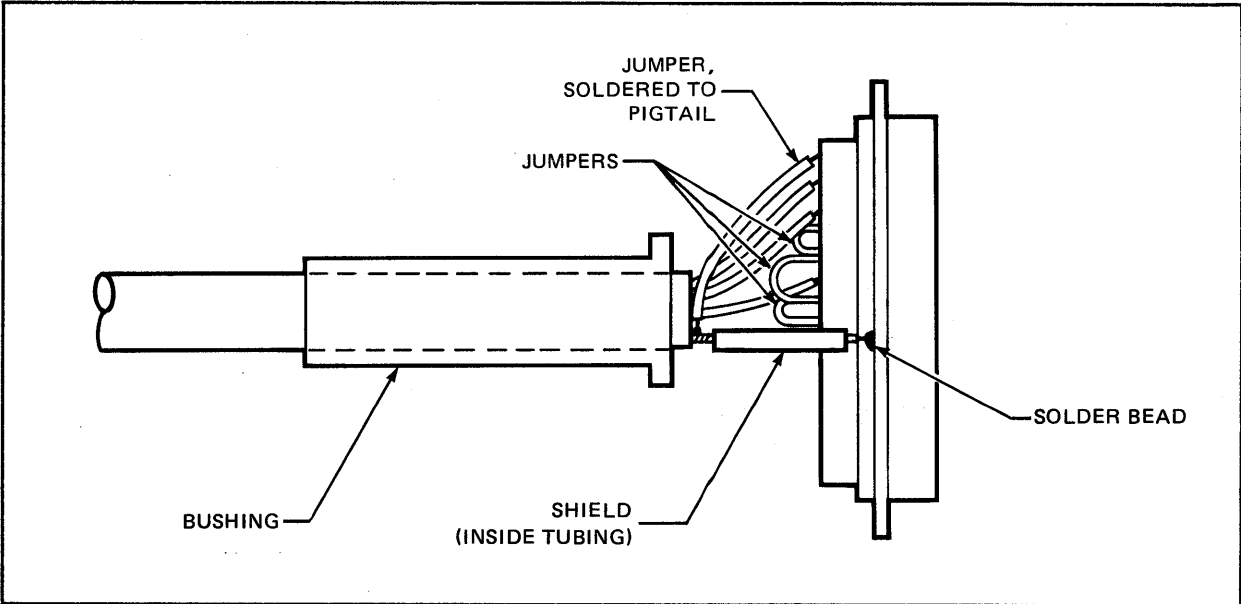
Figure D-11. RS-232-C, 25-Pin, Shield Wiring Details
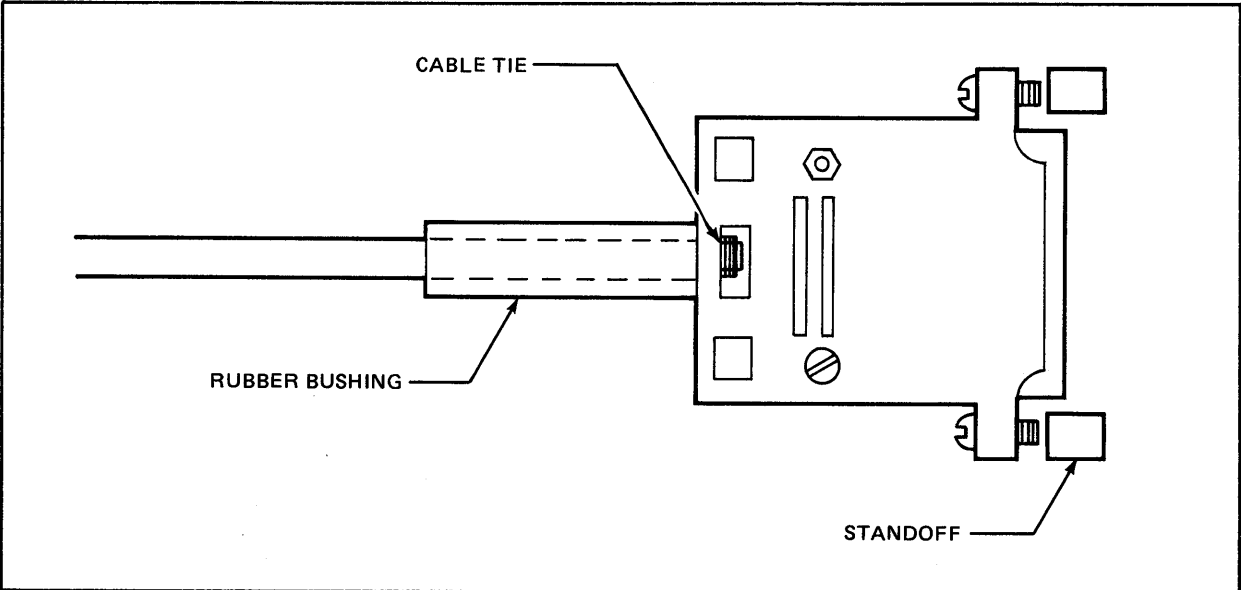
Figure D-12. RS-232-C, 25-Pin, Shell Final Assembly

ATP Cable Assembly

2. Install jumpers as follows:

    a. Cut three pieces of 24 gauge wire, each 2" long.

    b. Using wire strippers, remove 5/32" of insulation from each end of each piece of wire.

    c. Crimp (or solder) contact sockets to the ends of the jumper wires as described below.

        • Attach contact sockets to both ends of one piece of wire.

        • Attach contact sockets to one end of each of the other two pieces of wire.

        • Attach the free ends of these two wires to a single contact socket.

    d. Install the single wire jumper between positions four and five in the insulator block.

    e. Install one end of the double wire jumper at position six and the other end at position 20. Install the center contact at position eight.

3. Crimp (or solder) contact sockets to the ends of the 3 cable conductors.

4. Connect the shield as follows:

    a. Cut a 2" piece of 24 gauge wire.

    b. Using wire strippers, remove 5/32" of insulation from one end of the wire.

    c. Solder or crimp a contact socket to this end of the jumper.

    d. Remove 1/4" of insulation from the other end of the wire.

    e. Solder this end of the wire to the base of the pigtail and tin the entire pigtail.

BE CAREFUL NOT TO OVERHEAT ANY INSULATION.

    f. Slip a 3/4" length of 1/4" heat-shrinkable tubing over the pigtail.

    g. Solder the end of the pigtail to the metal shell of the insulator block as shown in Figure D-11. Heat the metal shell and lay a bead of solder first. Keep the profile of the bead as low as possible.

    h. Using a heat gun, shrink the tubing over the shield pigtail.

    i. Insert the contact socket that is connected to the shield into position one of the insulator block.

5. Install the contact sockets into the numbered positions of the insulator block as follows:

    a. Install the gray wire from J-1 pin 2 in position two.

    b. Install the white wire from J-1 pin 3 in position three.

    c. Install the blue wire from J-1 pin 1 in position seven.

6. Assemble the connector housing as shown in Figure D-12.

    a. Slide the rubber bushing forward as shown.

    b. Loop the cable tie from the connector kit through one half of the connector shell and around the rubber bushing and cable.

    c. Assemble the two parts of the connector housing over the rubber bushing and insulator block using the screws provided.

    d. Tighten the cable tie around the rubber bushing and cut of the excess with diagonal wire cutters.

    e. Attach standoffs to the connector shell with the screws provided.

THREE-PIN EXTENSION CABLE

Material Required

The 3-Pin RS-232-C Direct Connect Extension Cable requires the following material:

- Desired length of shielded 3-wire cable - HP 92179C or equivalent.

- Three-pin male ATP connector kit - HP 92224A or equivalent.

- Three-pin female ATP connector kit - HP 92224B or equivalent.

Three-Pin Male Connector

To attach the 3-pin male ATP connector to one end of the cable, perform the same steps as for attaching a "Three-pin to 25-pin Adapter Cable".

Three-Pin Female Connector

To attach the 3-pin female ATP connector to the other end of the cable, again follow all of the steps to attach a 3-pin connector under the discussion "Three-pin to 25-pin Adapter Cable".

FIVE-PIN EXTENSION CABLE

Material Required

The 5-pin RS-422 Direct Connect Extension Cable requires the following material:

- Desired length of shielded 5-wire cable - HP 92179D or equivalent.

- Five-pin male ATP connector kit - HP 92225A or equivalent.

- Five-pin female ATP connector kit - HP 92225B or equivalent.

Five-Pin Male Connector

When you attach the 5-pin male ATP connector to one end of the cable, you must crimp (or solder) the shield to the RF can.

TO CRIMP THE SHIELD. Perform the following steps:

1. Prepare the cable as shown in Figure D-13.

   a. Using a sharp knife, remove the outer insulation 1 1/4" from the end of the cable.

   <div align="center">

   BE CAREFUL NOT TO CUT THE BRAID.

   </div>

   b. Carefully cut the braided shield AND the aluminized foil 3/8" beyond the insulation using diagonal cutters.

   c. Using wire strippers, remove 5/32" of insulation from the ends of each conductor.

2. Attach a contact to each conductor using a crimp tool or a 50 watt soldering iron.
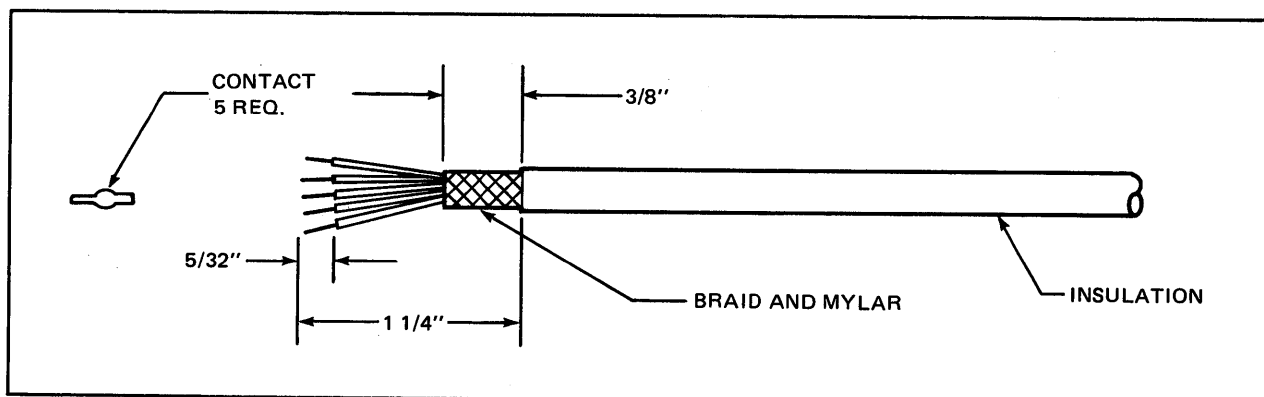
Figure D-13. Five-Wire Cable Prepared For CRIMPED RF Can

3. Attach the RF can to the shield as shown in Figure D-14.

    a. Slide the RF can back over the insulation until it is out of the way.

    b. Spread the braid and insert the ferrule between the braid and the mylar foil, pushing the ferrule all the way to the insulation.

    c. Slide the RF can forward just past the insulation so the round "neck" is over the ferrule and braid.

    d. Crimp using the proper tool. Be sure any external lips left by the crimp tool lie in the horizontal (wide) plane, not in the vertical (narrow) plane; otherwise, the RF can will be too thick to fit in the connector shell.

4. Insert the contacts into the insulator block.

    a. Install the red wire into position one.

    b. Install the black and white twisted pair into positions two and four respectively.

    c. Install the brown and white twisted pair into positions three and five respectively.

5. Push the RF can forward over the insulator block.

6. Assemble the connector housing with two screws as shown in Figure D-16.
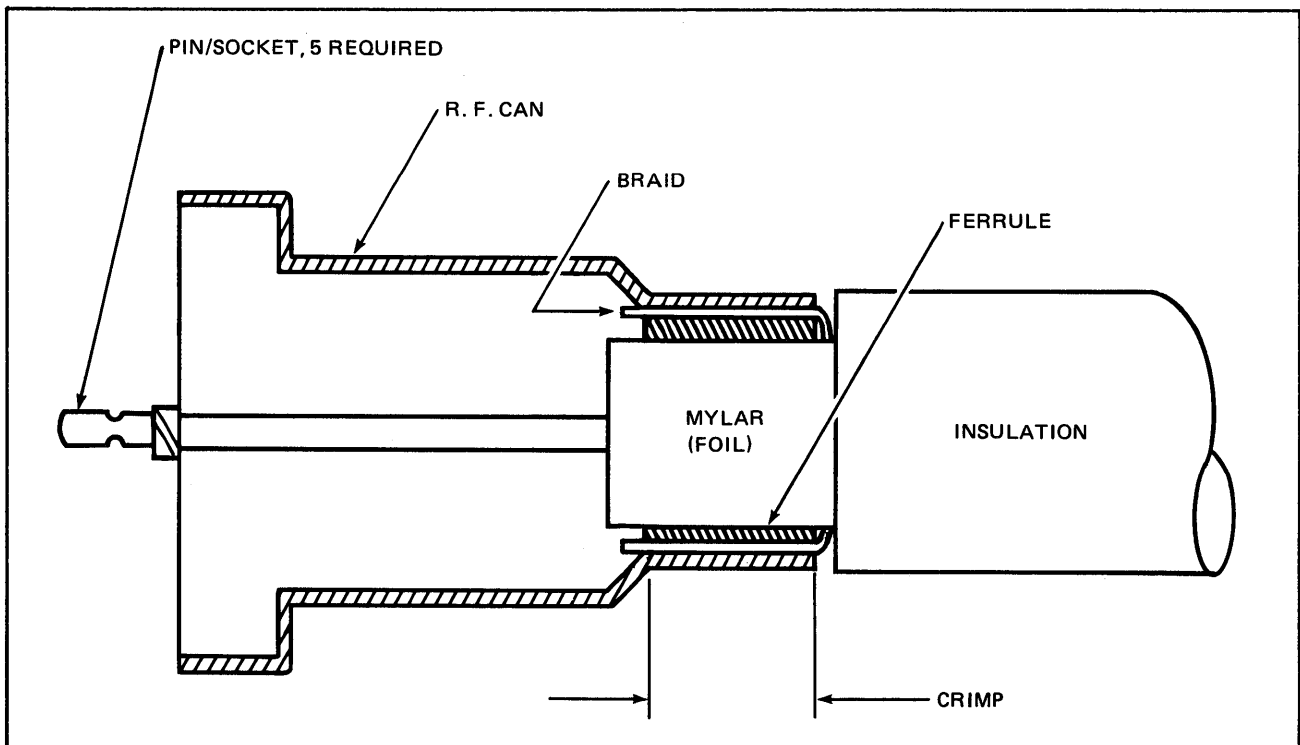
Figure D-14. RF Can Crimped to 5-wire Cable

TO SOLDER THE SHIELD. Perform the following steps:

1. Prepare the cable as shown in Figure D-15.

    a. Using a sharp knife, remove the outer insulation 1" from the end of the cable.

<p align="center">BE CAREFUL NOT TO CUT THE BRAID.</p>

    b. Unravel the exposed braided shield, twist it into a pigtail and cut to 5/8".

    c. Cut the aluminized mylar foil back to the braid and insulation.

    d. Using wire strippers, remove 5/32" of insulation from the ends of each conductor.

2. Attach a contact to each conductor using a crimp tool or a 50 watt soldering iron.

3. Attach the RF can to the shield as shown in Figure D-8.

    a. Tin the shield pigtail with solder.

    b. Apply a solder bead to the flat triangular surface on the inside of the RF can.

    c. Slide the RF can over the cable and solder the shield pigtail to the inside of the RF can at the solder bead.

<p align="center">BE CAREFUL NOT TO MELT THE INSULATION ON THE CONDUCTORS.</p>

<p align="center">NOTE</p>

The ferrule supplied with the connector kit is NOT used
when the shield is *soldered* to the RF can.
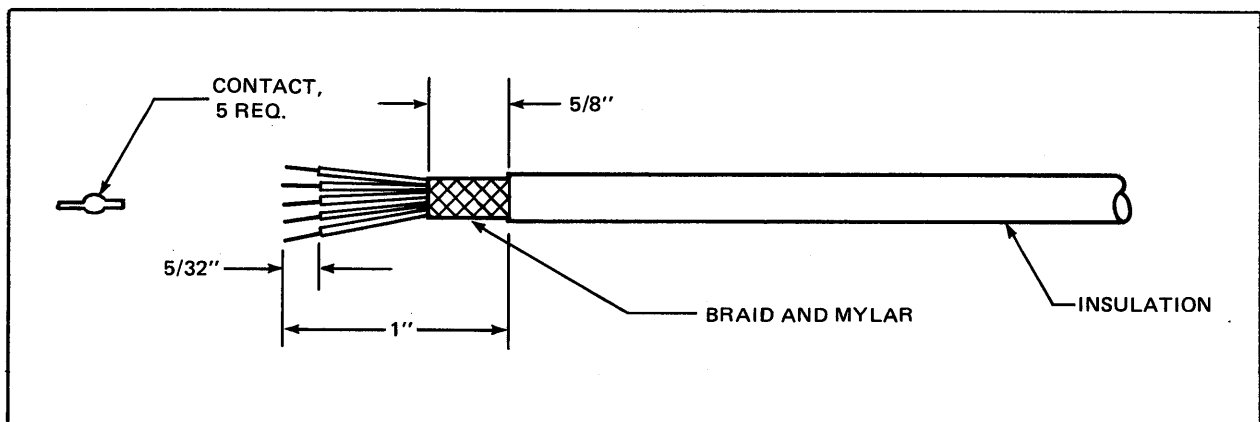
Figure D-15. Five-Wire Cable Prepared For SOLDERED RF Can

4. Insert the contacts into the insulator block.

    a. Install the red wire into position one.

    b. Install the black and white twisted pair into positions two and four respectively.

    c. Install the brown and white twisted pair into positions three and five respectively.

5. Push the RF can forward over the insulator block.

6. Assemble the connector housing with two screws as shown in Figure D-16.

Five-Pin Female Connector

To attach the 5-pin female ATP connector to the other end of the cable, repeat the same steps as for the "Five-Pin Male Connector".
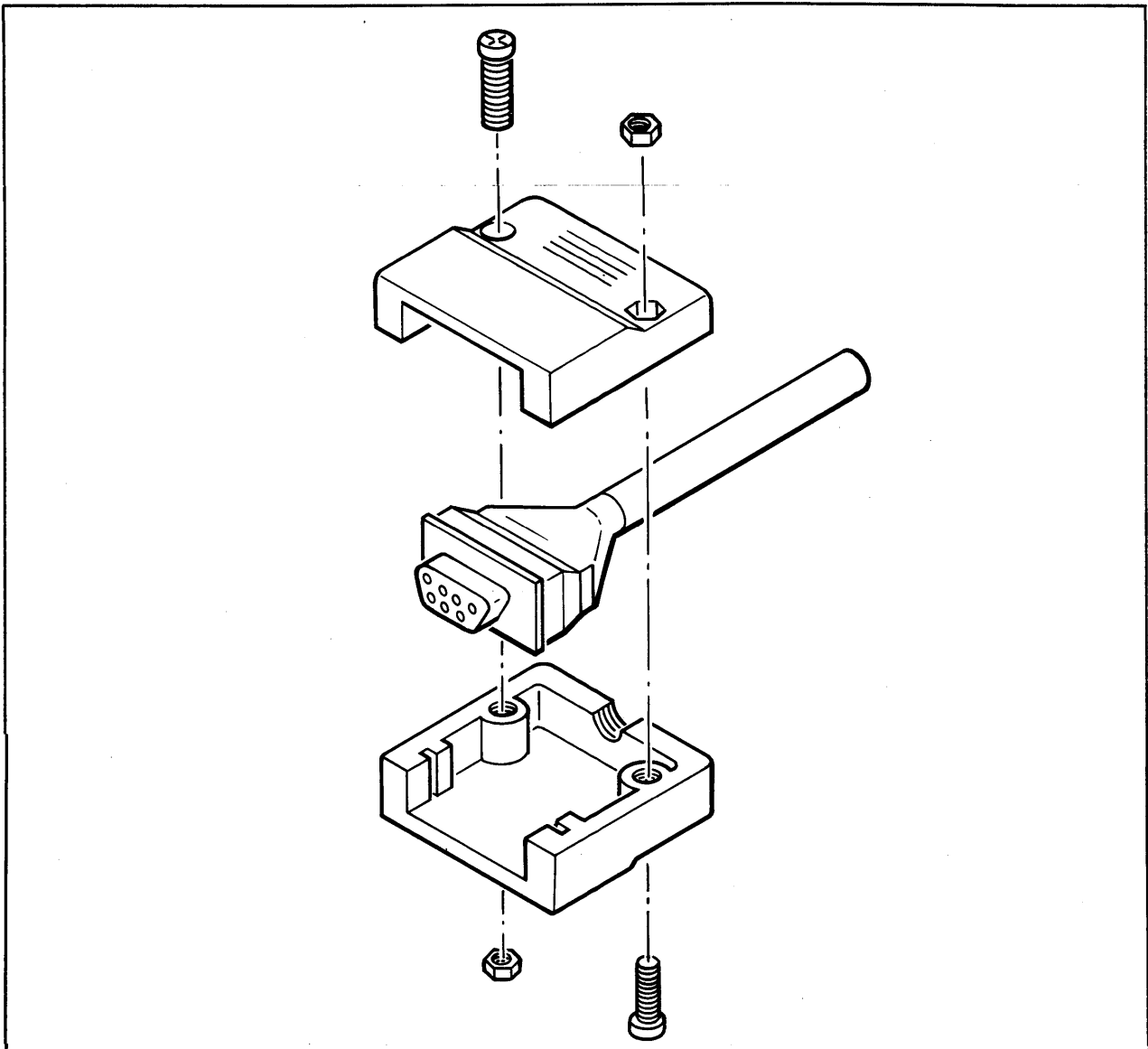
Figure D-16. ATP 5-Wire Shell Assembly Details

TESTING

After a cable is completely assembled, check the following with an ohmmeter, using the pin diagrams in Figure D-3, D-4, or D-5 as a guide.

- Continuity between connectors for each conductor.

- Continuity between jumpered pins.

- Continuity between the connectors' metal housings (and pin-1 of the 25-pin connector for the Adapter cable).

- Discontinuity between conductors.

- Discontinuity between each conductor and the connectors' metal housings.

- Discontinuity between each conductor and each group of jumpered pins.

- Discontinuity between each group of jumpered pins and the connectors' metal housings.

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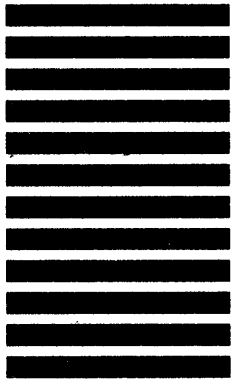
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