



RTE-A Print and Spooling

Reference Manual

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Preface

This manual describes the programs available on RTE-A to print or spool files. It contains usage information for the RTE-A user as well as information required by the system administrator to set up the spooling system. This manual is organized as follows:

- Chapter 1 Describes the concept of “spooling” and list the spoolers available on RTE-A which are described in Chapters 2, 3, and 4.
- Chapter 2 Describes the LP spool system which is the newest spooler released at Revision 6100 RTE-A. The LP spool system supercedes most of the printing capabilities of the other two spoolers, SP and PRINT (described in Chapters 3 and 4).
- Chapter 3 Describes the SP spool system. The CI SP command had previously been documented in the *RTE-A User's Manual*, part number 92077-90002.
- Chapter 4 Describes the PRINT utility. PRINT had previously been documented in the *RTE-A Utilities Manual*, part number 92077-90004.



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Introduction

A spool system, or “spooler”, as it is often referred to, manages concurrent access to system resources by multiple users and processes. In particular, it manages resources that must be devoted entirely to one task at a time, starting a new task only when the current task is complete. The spooler establishes a queue of tasks for the resource and decides which of the queued tasks to next schedule for the resource.

The most common usage of spoolers is the sharing of printers and plotters among users. The basic function of the spooler is to accept tasks that request files be printed and send them to an appropriate printer, one task at a time. Managing printers in this fashion avoids the problem of “interleaved output”, where data from competing print tasks accessing the printer at the same time appears interspersed on the printed page. The spool system performs the actual output of the print data to the printer device. A number of services and options related to printing formats are provided, such as generating banner pages at the start of the output, downloading printer fonts, and so on.

There are three spoolers on RTE-A:

- The LP spool system, which supports local printers, network peripherals, and network printing between HP-UX and other RTE systems via NS-ARPA/1000. The user interface is very similar to that of HP-UX, allowing users who work on both RTE and HP-UX instant familiarity with the other system.
- The SP spool system. This is the system historically known as the “VC+ spooler”. Most of the printer spooling capabilities of this system are superseded by the LP spool system, but are retained for backward compatibility. The SP spool system continues to provide the only support for LU redirection, diverting output from an LU to a file, system error logging, and built-in support for magnetic tape devices.
- The RTE-A PRINT and PRIN0 programs, which spool files to printers. This is the only spooler available without VC+.

Each of these systems can coexist without interfering with the operation of the others. Because the output device LU is locked to the program performing the output, all three systems may simultaneously attempt to access the same device without disrupting the output of another system.

The following chapters describe each of the spoolers in detail.



LP Spool System

The LP spool system is a printer spooler for RTE-A/VC+ systems that provides compatibility with the HP-UX LP spooler and other TCP/IP-based Internet spoolers. The LP spool system supports local printers, network peripherals, and network printing between HP-UX and other RTE systems via NS-ARPA/1000. The user interface is very similar to that of HP-UX, allowing users that work on both RTE and HP-UX instant familiarity with the other system.

The LP spool system can coexist with the SP spool system and the PRINT utility without interfering with their operation. Because the output device LU is locked to the program performing the output, all three systems may simultaneously attempt to access the same device without disrupting the output of another system.

Overview

The LP spool system consists of a number of programs, the majority of which present a user interface that is very similar to the LP spool system that runs on HP-UX systems. All programs in the system take their input from the runstring; there are no interactive programs. Therefore, the “programmatic” and “interactive” modes of access to the system are very similar, the programmatic interface consisting of FmpRunProgram calls that are functionally equivalent to entering the runstrings at a CI prompt. As an aid to programmatic usage, most of the programs return error status to the scheduling program and allow any output generated to be redirected to a file for programmatic processing.

Each “task” that the LP spooler handles is called a “request”. A request specifies that a certain collection of files is to be printed on a certain printer (or on any member of a class of printers, as discussed later) in a certain format. Other properties are associated with the request as well, such as the priority of the request for priority-based printer scheduling. Requests are usually created when a user runs the program named `lp`, as documented in a following section. Each request is assigned a unique “request ID” that is used when performing subsequent LP spooler commands on the request, and in tracking the progress of the request through the system.

The LP spooler must be configured for each printer it may access, using the `lpadmin` program. At that time a name is associated with the printer. That name, rather than the device LU number, is used to refer to the printer within the LP spool system.

The spooler routes a request to be printed on a particular printer when five conditions are met:

1. The request names the printer (or a class in which the printer is a member) as its destination.
2. The printer becomes available, that is, the printer is declared to be operational for spooling purposes and it is not already busy printing a request.
3. No higher-priority requests are queued for that printer.
4. The “priority fence” for the printer is set such that the request may be sent to the printer. Details of priority fences are given in a following section.
5. The request is the first of all requests with the same priority in the queue for that printer.

Output Destinations

In the LP spool system, the term “printer” refers to any device to which it can output, in keeping with the HP-UX terminology. The actual type of output device is not restricted by the LP spool system, although HP provides support only for printer and plotter devices. In this documentation, the term printer is used to mean any output device, unless printer devices are specifically indicated.

Three general categories of printers are accessed by the LP spool system: local printers, which are actual print devices directly connected to the local system, network peripherals, which are printers connected to a LAN (not to any one system), and remote printers, which are network links to printers located on remote hosts.

Local Printers

Local printers are physical print devices directly connected to the local system, usually through a MUX, ASIC, or HP-IB interface. The LP spooler prints to any supported printer or plotter in a supported configuration using the standard RTE drivers. Additionally, you can develop your own custom device handlers for other devices to which you want to spool output.

Network Peripherals

The LP spooler prints to network peripherals connected to Ethernet LANs by HP JetDirect cards. You must have the NS-ARPA/1000 or ARPA/1000 subsystem installed to print to these devices. Network peripherals function similarly to local devices connected to your system via a LAN.

Remote Printers

A remote printer is a network link to a printer connected on a remote host. A request sent to a remote printer is transferred into the spool system on the remote host via the NS-ARPA/1000 or ARPA/1000 subsystem. The transfer is accomplished using a semi-standardized Internet protocol. The protocol also supports performing these operations on the local spool system from a remote host:

- cancelling print requests
- obtaining listings of the spool system queues

In this documentation, the term “remote printer” does not refer to a network peripheral, such as one accessed via a JetDirect card.

In this manner, each host in your network may access any printer connected to any other host in the network. The host types that support this network printing include other RTE hosts running NS-ARPA/1000 or ARPA/1000, HP 9000 hosts running HP-UX, and BSD UNIX* machines to which NS or ARPA connectivity from the HP 1000 is supported.

Printer Interfaces

Device-specific print handlers may be defined for each printer. The program or set of routines that handles printing to a particular kind of printer is known as a printer interface. In general, a printer interface is a set of routines linked into the `lpout` program. Each printer interface has a name that identifies that interface to the `lpout` program.

HP supplies a number of printer interfaces with the LP spooler. The list of interfaces provided appears in the following section, “HP-Supplied Printer Interfaces”. The source code to the local printer interfaces is included with the LP spooler. You may add your own interfaces or customize the existing ones; see the following section “Custom Printer Interfaces” for more information.

Printer Model Files

For each printer on your system, local or remote, there exists a printer model file. This file identifies the printer interface to use when printing to the associated device, and may specify options that configure the printer interface for the particular printer model. The set of printer model files available on your system are kept in directory `/usr/spool/lp/model`; list this directory to see which are available. When a printer is assigned a printer model file, the file is copied to `/usr/spool/lp/interface/printer`, where *printer* is the name of the printer being assigned a model file. To display a list of options that are valid for a printer on your system, list the printer model file named for that printer in the `/usr/spool/lp/interface` directory.

For example, to see the options that are valid for printer “raptor”, enter:

```
CI> li /usr/spool/lp/interface/raptor
```

Each printer model file contains a set of commands in line 1; the remaining lines are comments. The comments provide documentation on that model, such as the options supported. The line 1 commands are documented on page 2-61.

* UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries.

Printer Classes

A class of printers may be defined in the LP spool system. A printer class is a named collection of local printers of similar type. For example, if a host has two printers connected, a LaserJet Plus and a LaserJet III, then class "laserjet" could be created with both printers as members of the class. If a print request names a class, rather than a specific printer, as the desired destination then the request is printed on the first available member of the class. Thus, specifying destination "laserjet" in a request on our example host prints the request on either the LaserJet Plus or the LaserJet III, depending on which printer first becomes available. A printer may be a member of only one class. Neither remote printers nor network peripherals may be made members of a class.

Classes are created and deleted using the `lpadmin` program. Many programs in the LP spool system accept parameters called a destination. A destination may be either the name of a printer or the name of a class.

Destination Availability

Each destination, either a class or printer, on a host may be set to either accept or reject new requests. At the time a new destination is added to the system, it is initially set to reject submissions. If an attempt is made to enter a request locally via the LP program or from a remote host, the new request is rejected. When the system administrator verifies that the system is ready for requests to be entered for the destination, the destination may be set to accept submissions using the `accept` program. The destination may later be set to reject new submissions using the `reject` program. This might be done when a printer must be taken out of service for an extended period of time, for example.

Each printer in the system, local or remote, is either enabled or disabled at any time. The spooler will not send requests to a printer that is disabled. New requests may be entered for a disabled printer, but the requests are not sent to the printer while it is disabled. Requests entered for a class of which the printer is a member are printed on another, enabled member. At the time a new printer is added to the system, it is initially disabled. When the system administrator verifies that the printer is ready to print requests, it may be enabled using the `enable` program. The printer may later be disabled using the `disable` program. This might be done when a printer must be taken out of service for a short time, such as to load new paper.

Thus, for a request to be sent to a printer there are two conditions that must be met: either the printer or a class of which it is a member must accept new submissions, and the printer must be enabled.

Spooled File Formats

The LP spool system does not create files to be spooled, as can the SP spool system when spooling output from an LU to a spoolfile. Instead, the LP spooler prints files that have already been created by some other means.

Any RTE file type may be spooled. In general, the files fall into three categories:

- Record-structured text files of type 0 or types 2 and above. These files are printed as a series of FMP records, using a separate XLUEX call to write each record if printed on an RTE system.
- Redirected LU output captured using the SP spool system. These files may have headers that contain the EXEC CNTWD parameters and EXEC 3 control request information from the redirected EXEC calls that generated the output. The LP spooler can use these headers when printing the file on an RTE system to reproduce the print formatting specified in the original EXEC calls.
- Files of type 1, which contain a “byte stream” of print data that is not organized into FMP records. Type 1 files must conform to a special format that tells the spooler how many bytes of the file are valid print data, as documented below. These are normally introduced into the spool system only by the spool system itself when receiving a request spooled from a remote UNIX host.

In any case, various options are available to specify print formatting, such as to treat column one as FORTRAN-style carriage control. See the following section “HP-Supplied Printer Interfaces” for a list of the options supported by the HP interfaces.

The processing performed on the file data to be printed actually depends on the operation of the printer interface used to print the file. The discussion of file formats in this documentation applies only to the printer interfaces supplied by HP; see the documentation on the particular interface for the file processing of non-HP interfaces.

As mentioned previously, files of type 1 must be in a special format. The first block of a type 1 file contains an ASCII representation of the number of valid bytes in the file in the first 12 characters, blank-extended. This count tells the spooler how many bytes to actually print, since type 1 files contain no EOF position information. The rest of block 1 is unused. The remaining blocks, starting at block 2, contain the byte stream to print. If the type 1 file was spooled from UNIX, then the byte stream is the unaltered contents of the UNIX file. The “rtestd” printer interface supports printing files in UNIX format with the appropriate carriage control added; see the section on that interface for more information.

LP Spool System User Interface

This section describes the LP spool system user interface which consists of programs for both the typical user and the system administrator. These programs are summarized in Table 2-1. Most of the programs for system administration require superuser privileges to be executed. The detailed description of each program follows.

Table 2-1. LP Spool System Programs

Program	Description
User Programs:	
lp	Creates a "request" that the LP spool system print the files specified.
lpstat	Prints status information about the LP spool system.
cancel	Removes requests from the LP spool system. If a cancelled request is currently active on a printer, the printing is aborted and the printer is free to print another request.
lpalt	Alters various parameters of an existing request, such as request priority, number of copies, and so forth. The request must reside on the local system and must not be actively printing.
System Administration Programs:	
lpadmin	Can be used to add or modify a printer, delete a destination, or set the system default destination.
accept	Allows print requests to be submitted to the named destinations.
reject	Prevents print requests from being submitted to the named destinations, which may be the names of either printers or classes.
enable	Allows a printer to print requests queued for that printer, or for a class of which the printer is a member.
disable	Disables the named printers, preventing them from printing requests sent to the printers or to classes of which the printers are members.
lpsched	Starts the LP spool system, allowing it to print requests.
lpshut	Shuts down the lpsched program, the scheduler for the LP spool system.
lpmove	Moves requests from one destination to another.
lpfence	Sets the fence priority for a printer. The fence priority is the minimum priority value that a request must have to be printed on that printer.

accept

The `accept` program allows print requests to be submitted to the named destinations. The runstring for the `accept` program is as follows:

```
CI> accept destination [destination ...]
```

where:

destination is the name of a printer or class to which you want print requests to be submitted.

After running the `accept` program, new print requests are allowed to be submitted to the named destinations. No print requests may be entered for a destination that is rejecting submissions until the `accept` program is run for that destination. New printers and classes added to the LP spooler initially reject submissions.

You must be a superuser to run this program.

The `accept`, `reject`, and `lpshut` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other two may be, for example, symbolic links to the type 6 file or prototype ID segments for the type 6 file.

Return Status

The following status is returned:

`$RETURN1` = the number of errors encountered; zero if none.

Example

```
CI> accept charges
```

Accept requests for destination "charges".

The `accept` program affects only the local spool system. Only the local operation of a "remote printer" is modified. A "remote printer" that rejects submissions will not accept requests for transfer to the remote host, but the operation of the printer on the remote host is unaffected.

Error Messages

```
accept: destination "dest" was already accepting requests
```

The named destination already accepted new submissions.

```
accept: destination "dest" non-existent
```

An invalid destination was specified.

cancel

cancel

The `cancel` program removes requests from the LP spool system. If a cancelled request is currently active on a printer, the printing is aborted and the printer is free to print another request. The `cancel` runstring is as follows:

```
CI> cancel id|dest [id|dest...] [-a | -e | -uuser[@host]] [-i]
```

where:

- id* is a request ID, as reported by `lpstat`, for a request to cancel. You may cancel a request that is owned by another user only if you are a superuser.
- dest* is the name of a destination printer or class for which the `-a`, `-e`, or `-u` options apply. If none of these options are given, each destination specified must be the name of a printer; the request currently printing on each named printer will be cancelled. If any dashed options are given then the options are applied to each destination specified. You may cancel a currently-printing request that is owned by another user only if you are a superuser.
- `-a` cancels all of your requests for each *dest* specified. Each request bound for the named destinations that was generated by your logon will be cancelled.
- `-e` empties the queue for the named destinations. All requests bound for those destinations are cancelled. You must be a superuser to use this option.
- `-uuser[@host]` cancels all requests for each *dest* specified that are owned by user *user*. If the user name is given in the format "*user@host*", then all requests owned by user *user* that originated on host *host* are cancelled, otherwise only requests that originated on the local host are cancelled. More than one `-u` option may be given to cancel requests for more than one user. You must be a superuser to use this option.
- `-i` inhibits remote cancels; cancel only local requests destined for remote printers. If this option is not given, remote cancel requests will be sent to remote printers, as discussed below.

If a *dest* parameter, or a destination within an *id* parameter, names a remote printer, then both local and remote cancellation may be performed. Requests on the local system that meet the criteria are cancelled; the requests are queued waiting to be transferred to the remote host. If the `-i` option is not given, the remote host is asked to cancel any requests on the remote system that meet the criteria. In general, you may only cancel remote requests that you own.

Return Status

The following status is returned by `cancel`:

```
$RETURN1 = the number of errors encountered; zero for none.  
$RETURN2 = the number of requests cancelled locally.
```

Examples

```
CI> cancel milton-42 milton-43@antlan
```

Cancel requests “milton-42” and “milton-43@antlan” by request ID.

```
CI> cancel antway
```

Cancel the request currently printing on printer “antway”.

```
CI> cancel antway -uantport
```

Cancel all requests for destination “antway” that are owned by user “antport”.

```
CI> cancel lj3d -e -i
```

Cancel all local requests bound for remote printer “lj3d” without attempting to cancel requests on the remote system.

Error Messages

```
cancel: must be superuser to use "-e"
```

You must be a superuser to use the `-e` option.



```
cancel: must be superuser to use "-u"
```

You must be a superuser to use the `-u` option.

```
cancel: unknown option: parm
```

An unrecognized option was given.

```
cancel: "dest" does not name a legal destination
```

The destination name entered is unknown. Enter “`lpstat -a`” to display a list of legal destinations.

```
cancel: you do not own request requestid
```

You do not own the named request. You must be a superuser to cancel another user’s request.

```
cancel: request "requestid" not found
```

The named request was not found. Enter “`lpstat -o`” for a list of requests.

cancel

cancel: printer "*printer*" was not busy [locally]

cancel was told to cancel the request active on a printer, but the named printer was not busy with a request. If the printer is a remote printer, then the word "locally" appears at the end to inform you that this message applies only to the local operation of the printer. If the `-i` option was not given, cancel will attempt to perform the cancel operation on the remote host also.

cancel: no requests selected on "*dest*" [locally]

No requests were selected for the `-e` or `-u` options. If the printer is a remote printer, then the word "locally" appears at the end to inform you that this message applies only to the local operation of the printer. If the `-i` option was not given, cancel attempts to perform the cancel operation on the remote host also.

cancel: warning: *fmp error* /usr/spool/lp/hostname

An FMP error was encountered when retrieving the local host name from the named file.

disable

The `disable` program disables the named printers, preventing them from printing requests sent to the printers or to classes of which the printers are members. The runstring for the `disable` program is as follows:

```
CI> disable [-c] [-r["reason"]] printer [printer ...]
```

where:

- c cancels the request if a request is currently active on a printer being disabled. By default, an active request remains in the queue to be printed on the printer once it is enabled, or to be printed on another member of the destination class.
- r["reason"] specifies a reason for taking the printer out of service. This reason will be reported by `lpstat`. The reason must be less than 80 characters, and should be surrounded by double quotes. From CI, also use backward quotes to prevent upshifting and comma-insertion of the reason. The specified reason will apply to all printers named after the `-r` option; more than one `-r` may be specified, intermixed with printer names, to associate different reasons with different printers. If not specified, the reason string "reason unknown" is used.

New print requests may still be entered for a printer that is disabled. Requests sent to a disabled printer queue for the printer; requests sent to a class of which a disabled printer is a member are printed on another member of the class. New printers added to the LP spooler are initially disabled.

If a request is actively printing on a printer being disabled, that print request is aborted. If the `-c` option is given, the request is cancelled. Otherwise, the request is left in the queue to be printed on the printer once it is enabled, or to be printed on another member of the destination class.

The `enable` and `disable` programs affect only the local spool system. Only the local operation of a remote printer is modified. A disabled remote printer will not transfer requests to the remote host, but the operation of the printer on the remote host is unaffected.

The `enable` and `disable` programs are identical executables; one program may be made a copy of or a symbolic link to the other.

Return Status

The `disable` program returns the following status:

`$RETURN1` = the number of errors encountered; zero if none.

Example

```
CI> disable -r'"Changing paper"' lj0
```

Deactivate printer "lj0", specifying reason "Changing paper".

disable

Error Messages

disable: printer "*printer*" was already disabled

The named printer was already disabled.

disable: missing trailing quote: *parm*

A leading quote was found for the "reason" string, but no matching trailing quote was found.

enable

The `enable` program allows a printer to print requests queued for that printer, or for a class of which the printer is a member. The runstring for the `enable` program is as follows:

```
CI> enable printer [printer ...]
```

Each named printer is enabled. New printers added to the LP spooler are initially disabled.

The `enable` and `disable` programs affect only the local spool system. Only the local operation of a remote printer is modified. A disabled remote printer will not transfer requests to the remote host, but the operation of the printer on the remote host is unaffected.

The `enable` and `disable` programs are identical executables; one program may be made a copy of or a symbolic link to the other.

Return Status

The `enable` program returns the following status:

`$RETURN1` = the number of errors encountered; zero if none.

Example

```
CI> enable vice
```

Activate printer "vice".

Error Messages

```
enable: printer "printer" was already enabled
```

The named printer was already enabled.

lp

lp

The `lp` program creates a “request” that the LP spool system print the files specified. The `lp` runstring is as follows:

```
CI> lp [-options] file|mask [file|mask . . .] [<fileoffiles>]
```

where:

- options* is one or more options preceded by a dash (`-`), each separated by a space or comma. These may be specified in any order before the first file or mask is given. If an option takes an argument, it appears directly after the option character without an intervening blank or comma. The valid options are described in the following section.
- file|mask* specifies a file or mask of files to be printed. The files are printed in the same order in which they are specified in the runstring.
- <fileoffiles>* is the name of a file that contains a list of files to print, one per line.

Options

- `-c` Copy files to be printed into the spool request directories (directories under `/usr/spool/lp/request` that the spool system uses to access the files in a request); do not attempt to create symbolic links to the files. By default, `lp` tries to create symbolic link files in the request directories to the files to be printed. If symbolic links are created, the files must not be opened exclusively at the time the spool system actually prints the files. Any changes made to the files since the files were spooled will be reflected in the printed output. Files are always copied on systems that do not have symbolic link capability. Files that name numeric LUs are always copied.
- `-ddest` Print the files using the named destination, either a printer name or the name of a class of printers. If a class name is given, the files are printed on the first available printer that is a member of that class. If a destination is not specified, the destination named by environment variable `$LPDEST` is used. If that variable does not exist, the system default destination is used (set by the `lpadmin` program).
- `-m` Send mail when the request is printed. The system on which the request is printed must support Internet mail; on the HP 1000 this is provided by the Mail/1000 system. By default, no mail is sent.
- `-ncopies` Print the given number of copies. *copies* must be an integer from 1 to 32767. The default is 1.
- `-ooption` Specify an interface-specific option to be passed to the printer interface used to print the request. More than one `-o` option may be given to pass more than one option. See the documentation on the destination printer interface program or routine for the options that it supports.

Because RTE case folds the `lp` runstring by default, and because most options are lowercase, `lp` will reverse the upper or lowercase of each character in the option. For example, if a printer interface accepts option “BSDp”, the `lp` runstring from CI might be:

```
CI> lp -o'bsd'p filename
```

- `-ppriority` Specify the priority of the request, an integer value from 0 to 7. Higher values indicate higher priority for the request. This value is used in determining the order in which requests are printed. If not specified, the default priority for the destination printer is used (set by `lpadmin`), or the highest default priority of all printers that are a member of the destination class is used.
- `-s` Suppress informational messages such as “request id is ...”.
- `-t "title"` Use the argument as a title on the banner page of the output. The title must be less than 80 characters, and must be surrounded by double quotes if it contains blanks or commas. When executing `lp` from CI, use backward quotes to prevent upshifting and comma-insertion of the title.
- `-w` Write a message on your terminal when the request is printed. The `notify` program is used to write to all terminals on which sessions are logged in under your user name. If the request is printed remotely then e-mail is sent instead. By default, no message is written.

If the request is successfully created, `lp` assigns it a request ID, which it displays on the terminal. This request ID may be used as a parameter to several programs in the LP spool system, for example, to obtain information about the request (using the `lpstat` program), or to cancel the request (using the `cancel` program).

Return Status

`lp` returns the following status:

`$RETURN1` = the number of errors encountered; zero if none.
`$RETURN_S` = the request ID assigned, if successful.

Examples

```
CI> lp -dlj3p -n3 -occ black.lst aybe.c
```

Print 3 copies of files `black.lst` and `aybe.c` on destination “lj3p”, specifying printer interface option “cc”.

```
CI> lp -t "draft copy" <files.txt
```

Print each file named in file `files.txt` on the default destination, using the banner, “draft copy”.

The `lpalt` and `lp` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other may be, for example, a symbolic link to the type 6 file or a prototype ID segment for the type 6 file.

lp

Error Messages

lp: no files to print specified

No files to print for the request were given in the runstring.

lp: you must enter a destination; no system default

No destination for the request was given (using the `-d` option), and you do not have a default destination set in the `$LPDEST` environment variable, and no system default destination has been set. The system default destination may be set using `lpadmin`.

lp: Destination "*dest*" is not accepting submissions; the reason is:
reason not accepting requests

The destination rejects new submissions. The second line gives the reason set by the system manager when the destination was made to reject submissions. The destination can be made to accept requests by using the `accept` program.

lp: destination "*dest*" non-existent

The named destination does not exist. To display a list of the valid destinations, enter "`lpstat -a`".

lp: request not accepted

Errors have been found when collecting the list of files to print in the request. Error messages giving the FMP errors encountered should already have appeared. The request was not created.

lp: couldn't allocate a sequence number:
fmp error message

An FMP error was encountered when allocating a sequence number for the request ID. The second line indicates the FMP error. The request was not created.

lp: Invalid # of copies: *parm*

An invalid number of copies was specified in the `-n` option. It must be an integer from 1 to 32767.

lp: invalid priority: *parm*

An invalid priority was specified in the `-p` option. It must be an integer from 0 to 7.

lp: missing trailing quote: *parm*

A matching double quote (") was not given for the parameter in the -t option.

lp: unknown option: *parm*

An unknown option name was given.

lp: warning: lpsched is not running

The request was created, but the scheduler (lpsched) is not running. The request will not be printed until the scheduler is started.

lp: warning: *violation* error scheduling lpsched

The lpsched program could not be scheduled.

lp: warning: *fmp error* /usr/spool/lp/hostname

An FMP error was encountered when retrieving the local host name from the named file.

lpadmin

lpadmin

The `lpadmin` program can be used to add or modify a printer, delete a destination, or set the system default destination. The `lpadmin` runstring is as follows:

```
CI> lpadmin -pprinter setopts      add or modify a printer
CI> lpadmin -xdest                 delete a destination
CI> lpadmin -d[dest]              set system default destination
```

Only one of the `-p`, `-x`, or `-d` options must be given when `lpadmin` is run.

`-pprinter` sets the printer name to which *setopts* options apply. If the printer does not already exist, it is added to the spool system. The printer name may be up to 14 characters long, may not contain a dash (`-`), and must be a legal file name. Printer names are not case sensitive on the HP 1000; they are always reported in lowercase. *setopts* are a string of options used in creating or modifying the printer, as defined below.

`-xdest` deletes destination *dest* from the spool system. *dest* may name either a class or a printer. If *dest* names a printer and that printer is the only member of a class, then that class is removed also.

`-d[dest]` sets the system default destination for requests that do not specify a destination. The destination may be the name of either a printer or a class of printers. If no *dest* is supplied, no system default destination will be in effect.

Options (*setopts*)

The following options (*setopts* above) are given when the `-p` option is used; these options apply to the printer named in that option. These options are used to define the attributes of a new printer or modify an existing printer. The options are:

`-cclass` Make the printer a member of the named class. The class is created if it does not already exist. A printer may be a member of only one class. Thus, if the printer is already a member of a class, then it must be removed from that class, using the `-r` option, before a new class may be specified. Both the `-r` and `-c` options may be specified in the same runstring to accomplish this. Class names may be up to 14 characters long, and must be legal file names. Remote printers may not be made class members.

`-eprinter` Copy an existing printer's model file to be the new printer model file for the printer. The argument must name an existing printer in the LP spool system; the new or modified printer will use the same printer interface and automatic options as the named printer. For example, "`-edaveslj`" uses a copy of the model file used for printer "daveslj".

`-gpriority` Set the default priority for the printer (0 to 7). Requests sent to this printer will be assigned this priority by default, that is, if the `-p` option is not specified in the `lp` or `lpalt` runstring. Higher values indicate higher priority for each request that has the default priority assigned. This value is used in determining the order in which requests are printed. If not given, the default priority for the printer is 0.

- i***file* Copy the named file to be the new printer model file for the printer.
- m***model* Copy the named printer model file to be the new printer model file for the printer. The argument must be an existing model file name within the `/usr/spool/lp/model/` directory. List that directory to see the model files available. For example, “-mpcl” selects printer model file “`/usr/spool/lp/model/pcl`”.
- r***class* Remove the printer from the named class. If the printer was the last member of that class, the class is removed.
- v***lu* Set the LU number of the printer device (0 to 255). This value is ignored for remote printers. If not specified, the LU is 0.

The following *setopts* are used for remote printers and network peripherals.

- o***rmhost* Identify the name of the remote machine where a remote printer resides. For network peripherals, such as those on JetDirect cards, this is the name of the network peripheral. In general, this is the name in the `/etc/hosts` file that may be mapped to the IP address of the remote host or network peripheral.
- o***rpprinter* Identify the name of a remote printer as known on the remote machine, that is, the name by which the printer is known on the remote host. This name may be a class name on the remote host. The name will be converted to all lowercase characters, and may be up to 14 characters long. If not specified, the local printer name will also be used as the remote name. For network peripherals, no value for this option is required because this name is not used in this case. However, entering a meaningful name that adds to the information shown by the `lpstat -v` option report is suggested. For example, entering “-orpjetdirect” for a network peripheral on a JetDirect card causes “`lpstat -v`” to print:

```
device for np: remote to jetdirect on npname
```

Only one of the `-e`, `-i`, or `-m` options may be specified in a runstring to select the appropriate printer model file. If a new printer is added without specifying one of these options, a default model name will be used. For local printers the default is `generic`; for remote printers the default is `rhpux`.

Once a new destination, either a printer or a class, is added to the spool system, the `accept` program must be run to allow requests to be entered for that destination. A new printer must also be enabled for printing by running the `enable` program. Initially, a new destination will reject attempts to enter a print request for that destination with reason “new destination”. A new printer that has not yet been enabled will not print requests queued for it; `lpstat` will report that the printer is disabled for reason “new printer”. The printer should only be enabled once the physical printer is connected and ready to print.

You must be a superuser to run `lpadmin`.

The `lpadmin` and `lpfence` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other may be, for example, a symbolic link to the type 6 file or a prototype ID segment for the type 6 file.

lpadmin

Return Status

lpadmin returns the following status:

\$RETURN1 = the number of errors encountered; zero if none

Examples

```
CI> lpadmin -pp2608 -mgeneric -v114
```

Add a new local printer named “p2608” to the LP spooler. The printer device resides at LU 114; the “generic” printer model is used to print to the device.

```
CI> lpadmin -pp2608 -v115 -clocal
```

Change the device LU of printer “p2608” to LU 115 and insert the printer into class “local”.

```
CI> lpadmin -prlj3d -mrhpux -ormhpdsorte -orplj3d
```

Add a new remote printer named “rlj3d” to the LP spooler. The remote printer is connected to printer “lj3d” on HP-UX host “hpdsorte”. The “rhpuX” printer model is used to transfer requests to the remote printer.

Error Messages

```
lpadmin: Expected "-p", "-x", or "-d": parm
```

The first option in the runstring must be one of these options.

```
lpadmin: printer names may not contain dash (-)
```

A dash (–) is illegal in printer names.

```
lpadmin: invalid priority: parm
```

An invalid priority was given in the –g option. Priorities must be an integer from 0 to 7.

```
lpadmin: printer "printer" is not a member of class "class"
```

The –r option was given to remove the printer from a class, but the printer is not a member of that class.

```
lpadmin: printer "printer" is already a member of class "class"
```

The –c option was given to insert the printer into a class, but the printer is already a member of a class. A printer may be a member of only one class.

lpadmin

lpadmin: default printer model is "*model*"

No **-m** option was specified, so lpadmin chose a default printer model for you.

lpadmin: more than one model interface type chosen (-e/-i/-m)

Only one of the **-e**, **-i**, or **-m** options may be given.



lpalt

lpalt

The `lpalt` program alters various parameters of an existing request, such as request priority, number of copies, and so forth. The request must reside on the local system and must not be actively printing. The `lpalt` runstring is as follows:

```
CI> lpalt id [-option] [-option] ...
```

where:

id is the request ID of the request to be altered. The request must be present on the local system; remote requests cannot be altered. You must be a superuser to alter a request that you do not own.

option is one or more of the valid options described in the following section.

Options

`-ddest` Change the destination of the request, either a printer name or the name of a class of printers. If a class name is given, the files are printed on the first available printer that is a member of that class. If this option is given, then a new request ID is assigned to the request. The new request ID is printed to the terminal and returned in `$RETURN_S`. The new request ID is a local request ID, even if the altered request originated on a remote host. For example:

```
CI> lpalt ice-9@bokonon -dplan
new request id is plan-9
```

`-m` Send mail to the user that created the request when the request is printed. The system on which the request is printed must support Internet mail; on the HP 1000 this is provided by the Mail/1000 system.

`-ncopies` Change the number of copies to print of each file. *copies* must be an integer from 1 to 32767.

`-ooption` Change the interface-specific options to be passed to the printer interface used to print the request. More than one `-o` option may be given to pass more than one option. Any existing options on the request are removed. See the documentation on the destination printer interface program or routine for the options that it supports.

Because RTE case folds the `lp` runstring by default, and because most options are lowercase, `lpalt` reverses the upper or lowercase of each character in the option. For example, if a printer interface accepts option "BSDp", the `lpalt` runstring from CI might be:

```
CI> lpalt mach-5 -o'bsd'p
```

`-ppriority` Change the priority of the request, an integer value from 0 to 7. Higher values indicate higher priority for the request. This value is used in determining the order in which requests are printed.

- s Suppress informational messages such as "new request id is ...".
- t "*title*" Change the title to be printed on the banner page of the output. The title must be less than 80 characters, and must be surrounded by double quotes if it contains blanks or commas. When executing `lpalt` from CI, use backward quotes to prevent upshifting and comma-insertion of the title.
- w When the request is printed, write a message on the terminal of the user that created the request. The `notify` program is used to write to all terminals on which sessions are logged in under that user name. If the request is printed remotely or was created remotely, e-mail is sent instead.

The `lpalt` and `lp` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other may be, for example, a symbolic link to the type 6 file or a prototype ID segment for the type 6 file.

Return Status

The following status is returned by `lpalt`:

```
$RETURN1 = the number of errors encountered; zero if none
$RETURN_S = the new request ID assigned if the destination is changed
```

Error Messages

```
lpalt: can't accept requests for destination "dest" -
        reason for rejection
```

The destination rejects new submissions. The second line gives the reason set by the system manager when the destination was made to reject submissions. The destination can be made to accept requests by using the `accept` program.

```
lpalt: destination "dest" non-existent
```

The named destination does not exist. To display a list of the valid destinations, enter "`lpstat -a`".

```
lpalt: couldn't allocate a sequence number:
        fmp error message
```

An FMP error was encountered when allocating a sequence number for the request ID. The second line gives the FMP error.

```
lpalt: you do not own requestid
```

You do not own the request being altered. You must be a superuser to alter another user's request.

lpalt

lpalt: request *requestid* is active on *printer*

The request is actively printing on a printer. Active requests may not be altered. To alter the request, you may disable the printer on which it is printing, alter the request, and re-enable the printer. This will reprint the request in its entirety.

lpalt: no such request "*requestid*"

The given request ID does not exist. Enter "lpstat -o" for a list of requests.

lpalt: invalid # of copies: *parm*

An invalid number of copies was specified in the `-n` option. It must be an integer from 1 to 32767.

lpalt: invalid priority: *parm*

An invalid priority was specified in the `-p` option. It must be an integer from 0 to 7.

lpalt: missing trailing quote: *parm*

A matching double quote (") was not given for the parameter of the `-t` option.

lpalt: unknown option: *parm*

An unknown option name was given.

lpalt: warning: lpsched is not running

The request was modified, but the scheduler (lpsched) is not running. The request will not be printed until the scheduler is started.

lpalt: warning: *violation* error scheduling lpsched

The lpsched program could not be scheduled.

lpalt: warning: *fmp error* /usr/spool/lp/hostname

An FMP error was encountered when retrieving the local host name from the named file.

lpfence

The `lpfence` program sets the fence priority for a printer. The fence priority is the minimum priority value that a request must have to be printed on that printer. The runstring is as follows:

```
CI> lpfence printer priority
```

Priority values are from 0 (lowest priority) to 7 (highest priority). Only requests with the given priority or greater are printed on the named printer. A request that could otherwise be sent to the printer, but that has a priority lower than the fence, is sent to the printer once the priority fence is lowered (or the request may be sent to another member of the destination class).

This command affects only the local operation of a remote printer. The fence setting on the remote host may be different than that of the local system.

You must be a superuser to run `lpfence`.

The `lpadmin` and `lpfence` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other may be, for example, a symbolic link to the type 6 file or a prototype ID segment for the type 6 file.

Return Status

`lpfence` returns the following status:

`$RETURN1` = the number of errors encountered; zero if none.

lpmove

lpmove

The `lpmove` program moves requests from one destination to another. The requests leave the queue for the former destination and join the queue for the new destination. This command is useful when a printer must be taken out of service and another printer is available that can print the requests queued for the printer being removed from service. The `lpmove` runstring is as follows:

```
CI> lpmove id [id ...] todest
```

or

```
CI> lpmove fromdest todest
```

where:

id A request ID, as reported by “`lpstat -o`”.

fromdest Names of destinations, either printer names or class names.

todest

The first usage above moves one or more requests by request ID to a new destination.

The second usage above moves all requests for a destination to a new destination. The former destination is then set to reject new submissions with reason “all requests moved to *todest*”.

A request that is moved is assigned a new request ID that names the new destination but retains the same sequence number. For example, if request ID “epoc-220” is moved to destination “rtelj” then the new request ID is “rtelj-220”.

If a request to be moved is actively printing, the print operation is aborted before the request is moved.

Requests may be moved to a destination that is rejecting new submissions; `lpmove` prints a warning in this case.

You must be a superuser to move requests that do not belong to you, or to move all requests for a destination.

Examples

```
CI> lpmove levee chicago
```

Move all requests with destination “levee” to new destination “chicago”. Destination “levee” will now reject new submissions.

```
CI> lpmove lj-5 lj-7 pjxl
```

Move requests “lj-5” and “lj-7” to destination “pjxl”. The new request IDs are “pjxl-5” and “pjxl-7”.

Error Messages

lpmove: warning: destination "*dest*" is not accepting requests

The destination to which requests are being moved rejects new submissions. The requests are moved to the destination anyway.

lpmove: destinations are identical

The "from" and "to" destination names are the same.

lpmove: you do not own "*requestid*"

The named request belongs to another user. You must be a superuser to move another user's request.

lpmove: request "*requestid*" is already destined for *dest*

The named request is already destined for the new destination.

lpmove: "*parm*" is not a request id

A parameter was expected to be a request ID but that request was not found.

destination *dest* is not accepting requests

This message informs you that the destination from which all requests have been moved now rejects new submissions. This message does not indicate an error condition.

lpsched

lpsched

The `lpsched` program is the central printer scheduler for the LP spool system. Executing this program allows the LP spool system to print requests. It is normally executed in the welcome file at boot time. The runstring is:

```
CI> lpsched [pq]
```

where:

`pq` An optional parameter that causes a running `lpsched` to process the remote job queue immediately. See below for more information.

`lpsched` takes requests from the LP spool system queue and sends them to the appropriate printer. When `lpsched` is not running, new requests may be created, but the requests are not printed locally or sent to remote printers until `lpsched` is started. `lpsched` is normally started at system boot time in the welcome file. `lpsched` is shut down by the `lpshut` program. All LP spool system programs continue to function while `lpsched` is shut down.

`lpsched` need not be scheduled without wait via the CI XQ command; it allows the scheduling program to continue after `lpsched` initializes.

`lpsched` keeps a log of its activity in file `/usr/spool/lp/log`. You may wish to periodically purge this file to conserve disk space.

If file `/usr/spool/lp/jobdone.cmd` exists, `lpsched` runs CI with wait on it each time a request successfully finishes printing, before the request files are purged. The request ID of the request printed is passed in `$1`.

If `lpsched` is restarted after being aborted by a means other than the `lpshut` program, it attempts to stop any printing activity it started before it aborted. If the print requests it terminates are still present in the queues, the requests are restarted.

When `lpsched` is run to start the LP spool system, it returns the following status:

`$RETURN1` = number of errors encountered; zero if none.

`lpsched` time-schedules itself every 5 minutes to perform cleanup and other periodic chores. The actions performed are:

- Requests are retried on remote printers that are in “retry” status, meaning that temporary network errors have prevented access to the printer.
- Requests that could be scheduled on a printer but, for an unknown reason, have not been scheduled, are now scheduled. This recovers after disruptions, such as those caused by program aborts.
- Printer interface programs that have aborted without properly informing `lpsched` of their termination are cleaned up. The printer handled by the interface is downed with reason “interface program aborted” and the request that was printing is held in the queues.

You may schedule `lpsched` to perform the above actions immediately, if needed. For example, once a network problem is fixed, you may want queued remote print jobs on the local host to be retried right away, rather than waiting for the next time-schedule interval to elapse. To cause `lpsched` to immediately perform the above actions, enter:

```
CI> xq lpsched pq
```

You must be a superuser to run `lpsched`.

Error messages:

lpsched: scheduler was already active

An attempt was made to run lpsched when lpsched was already started.

lpsched: invalid schedule

lpsched was run with invalid parameters.

scheduler is running

This message informs you that lpsched was successfully started. It does not indicate an error condition.

lpshut

lpshut

The `lpshut` program shuts down the `lpsched` program, the scheduler for the LP spool system. The runstring is:

```
CI> lpshut
```

All printing activity at the time of shutdown is halted. No further printing occurs until the scheduler is restarted by running `lpsched`. Each print request that is actively printing at the time of shutdown is reprinted in its entirety when `lpsched` is restarted.

You must be a superuser to run this program.

The `accept`, `reject`, and `lpshut` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other two may be, for example, symbolic links to the type 6 file or prototype ID segments for the type 6 file.

Return Status

The following status is returned:

`$RETURN1` = the number of errors encountered; zero if none.

Error Messages

```
lpshut: scheduler not running
```

The `lpsched` scheduler was already shut down.

```
scheduler stopped
```

This message indicates that `lpsched` was successfully shut down. It does not indicate an error condition.

lpstat

The `lpstat` program prints status information about the LP spool system. The `lpstat` runstring is as follows:

```
CI> lpstat [-option | request_id] [-option | request_id] ... [>[>]file]
```

Each parameter not starting with a dash (`-`) or greater-than (`>`) must be a request ID. The status of that request is shown, in the same format as if “`-orequest_id`” were given.

If `>file` is given, then `lpstat`'s output is redirected to that file, overwriting an existing file. If `>>file` is given, then `lpstat`'s output is appended to an existing file. If neither of these are given, then `lpstat` prints its output to the scheduling terminal.

Many of the options listed below take an optional parameter named *list*. If given, this parameter may be either:

- A single word not containing blanks or commas. For example:

```
-plj3
```

- A list of words separated by blanks or commas and enclosed in double quotes (“”). For example:

```
-p"lj3, magiclj"
```

The description of each option below indicates what kind of names are expected in the *list* parameter. If the *list* parameter is given, only information pertaining to the given names is shown. If the *list* parameter is not given, information for all the valid names is shown. For example:

```
CI> lpstat -p
```

displays information about all printers on the system.

Options

The options are:

- a [*list*] Display the acceptance status of destinations for requests, that is, whether new requests may be entered for the destinations. *list* is a list of printer names and/or class names. By default, all destinations are shown. An example listing is:

```
lj3 accepting requests since Mar  4  2:38 pm
    default priority : 0
lj4 not accepting requests since Mar 24 11:06 pm -
    down for repairs
    default priority : 0
```

Note that for remote printers, only the status of the printers on the local system is shown. The acceptance status of printers on remote hosts is unknown. A remote printer that accepts requests will accept submissions on the local host for transfer to the remote host. However, the acceptance status of the printer on the remote host may be to reject submissions. In this case, the local host will place the remote printer in retry status with reason “remote host rejects submissions”.

lpstat

- c** [*list*] Display class names and the printers that are members of those classes. *list* is a list of class names. By default, all classes are shown. An example listing is:

```
members of class laserjets:
    lj3
    lj4
```

- d** Display the system default destination. If a request is entered using the `lp` program and no destination is specified, then by default, the request is sent to this destination.
- i** Inhibit the display of remote status; only local status is shown. If not given, then `lpstat` will query remote hosts for the status of requests on remote printers when the `-o` or `-u` option is given.
- o** [*list*] Display the status of output requests. *list* is a list of destination names and/or request IDs. Entering a destination name, either a printer name or a class name, limits the display to requests queued for that destination. Entering a request ID displays only that request ID. To select the information shown by user name, see the `-u` option. By default, all requests are shown. An example listing is:

```
lj-169                      emo                      priority 0    Mar 25  3:14 pm
    lp.lod                      2        copies                      3 records
    lp.help                      2        copies                      93 records
    on printer lj3
lj-11@hpdsorte              samantha              priority 0    Mar 25  3:34 pm
    hpgl2                                              77212 bytes
```

The above example shows that request ID “lj-169”, generated by user “emo” on the local system, is currently printing on printer “lj3”. Request ID “lj-11@hpdsorte”, which was entered by user “samantha” on remote host “hpdsorte”, is queued waiting for an available printer.

The names of the files included in the request are indented beneath the line displaying the request ID. The size of an RTE-format file is printed in records; the size of a file spooled from UNIX is printed in bytes. The number of copies to print is only displayed if more than one copy is being printed.

The time shown is the time the request was entered into the local spool system. If the request was entered from a remote system, this is not the time the request was originally created on the remote host.

If the destination name or the destination portion of a request ID in the *list* parameter names a remote printer, both local and remote status may be displayed. Local requests that match the list are shown first, followed by a listing of requests in the queue for the remote printer that match the list. Remote status display may be inhibited by specifying the `-i` option.

-p [*list*] Display the status of printers. *list* is a list of printer names. By default, all printers are shown. An example listing is:

```
printer lj3 is idle.  enabled since Mar  4  3:16 pm
      fence priority : 0
printer lj4 now printing lj4-166.  enabled since Mar 24  5:01 pm
      fence priority : 0
```

Note that for remote printers, only the status of the printers on the local system is shown. The full status of printers on remote hosts is unknown. A remote printer that is enabled on the local system will transfer requests to the remote host. However, the printer on the remote host may be disabled.

-r Display whether or not the printer scheduler, `lpsched`, is running.

-s Display status summary. The same as entering “`-r -d -c -v`”.

-t Display all status. The same as entering “`-s -a -p -o`”.

-u [*list*] Display the status of output requests by user name. *list* is a list of user login names, optionally qualified by an at sign (@) and a host name. By default, all requests are shown. To select the information shown by other criteria, see the `-o` option. The report shown is identical to that shown by the `-o` option. Example runstrings are:

```
lpstat -uwoody              Show all local requests for user “woody”.
```

```
lpstat -uwoody@vanguard    Show all requests for user “woody” that
                           originated on host “vanguard”.
```

If remote printers exist on the system, then both local and remote status may be displayed. Local requests that match the list are shown first, followed by a listing of matching requests in the queue for each remote printer. Remote status display may be inhibited by specifying the `-i` option.

-v [*list*] Display the following device information for printers:

- If the printer is local, show the device LU number.
- If the printer is remote, show the remote host name and the name of the printer on that host.
- If the printer is a network peripheral, as on an HP JetDirect card, the network peripheral name is shown.

list is a list of printer names. By default, all printers are shown. An example listing is:

```
device for lj3: lu 114
device for rlj4: remote to lj4 on hpdsolab
device for rlj5: remote to jetdirect on hpswt06
```

lpstat

Error Messages

lpstat: missing trailing quote: *parm*

A matching double quote was not supplied for a *list* parameter that began with a double quote.

lpstat: unknown option "*parm*"

An unrecognized runstring option was given.

lpstat: no printers

No printers exist in the system. Printers may be added using `lpadmin`.

lpstat: printer "*printer*" non-existent

The named printer does not exist. Use "`lpstat -p`" to display the names of the valid printers.

lpstat: no classes

No class names exist on the system. Classes may be added using `lpadmin`.

lpstat: class "*class*" non-existent

The named class does not exist. Use "`lpstat -c`" to display the names of valid classes.

lpstat: no destinations

No destinations exist in the system. Destinations may be added using `lpadmin`.

lpstat: destination "*dest*" non-existent

The named destination does not exist. Use "`lpstat -a`" to display the names of valid destinations.

lpstat: "*parm*" is not a request id

A parameter was given, not as an option argument, that is not a valid request ID.

reject

The `reject` program prevents print requests from being submitted to the named destinations, which may be the names of either printers or classes. The runstring for the `reject` program is as follows:

```
CI> reject [-r["reason"]] destination [destination ...]
```



where:

`-r["reason"]` specifies a reason for preventing submissions. This reason will be reported by `lp` when an attempt is made to enter a request for the destination, and by `lpstat`. The reason must be less than 80 characters, and should be surrounded by double quotes. From CI, also use backward quotes to prevent upshifting and comma-insertion of the reason. The specified reason will apply to all destinations named after the `-r` option; more than one `-r` may be specified, intermixed with destination names, to associate different reasons with different destinations. If not specified, the reason string "reason unknown" is used.

No print jobs may be entered for a destination that is rejecting submissions until the `accept` program is run for that destination. New printers and classes added to the LP spooler initially reject submissions. Attempts to enter new requests to a destination that rejects submissions, either locally with the `lp` program or remotely by a remote printer on another host, are refused.

You must be a superuser to run this program.

The `accept` and `reject` programs affect only the local spool system. Only the local operation of a "remote printer" is modified. A "remote printer" that rejects submissions will not accept requests for transfer to the remote host, but the operation of the printer on the remote host is unaffected.

The `accept`, `reject`, and `lpshut` programs are identical executables. Only one of these program files needs to be a type 6 executable; the other two may be, for example, symbolic links to the type 6 file or prototype ID segments for the type 6 file.

Return Status

The following status is returned:

`$RETURN1` = the number of errors encountered; zero if none.

Example

```
CI> reject -r"Printer on loan" offer
```

Reject submissions to destination "offer", specifying reason "Printer on loan".

reject

Error Messages

reject: missing trailing quote: *parm*

A leading quote was found for the "reason" string, but no matching trailing quote was found.

reject: destination "*dest*" was already not accepting requests

The named destination already rejected new submissions.

reject: destination "*dest*" non-existent

An invalid destination was specified.

LP Spooler Administration

This section documents system administration information. Most of the programs mentioned in this section require superuser privileges to be executed. For detailed information on how to use the programs, refer to the description of each program earlier in this chapter.

Network Printing Administration

This section applies to systems that have the NS-ARPA/1000 or ARPA/1000 networking subsystem installed. If you do not wish your system to send requests to remote hosts or network peripherals, or to receive requests from remote hosts, then this section may be skipped.

NS-ARPA/ARPA Configuration

The network printing utilities use the `/etc/hosts` file to map host and network peripheral names to IP addresses and vice-versa. That file should contain an entry for each 8-character host name that the local host is to send requests to or receive requests from.

The `/etc/services` file must contain an entry similar to:

```
printer 515/tcp spooler # remote print spooling
```

This entry is contained in the file as shipped with the ARPA and NS-ARPA products.

The `rlpout` Program

The `rlpout` program contains the remote printer interface, which allows sending requests from the local system to remote hosts and to HP JetDirect network peripherals. This program is not required if no remote destinations are accessed by the local system.

`rlpout` is scheduled by the `lpsched` program.

The `rlpdaemon` Program

The `rlpdaemon` program receives requests from remote hosts for processing on the local system. `rlpdaemon` is scheduled when:

- A remote host transfers a print request to the local host.
- A remote host cancels a print request on the local host.
- A remote host retrieves a queue listing for a local printer, as happens in response to an `lpstat` execution on a remote host.

This program is not required if no local printers are accessed by remote hosts.

`rlpdaemon` is scheduled by the `inetd` program. `inetd` must be running and the `/etc/inetd.conf` file must contain an entry similar to:

```
printer stream tcp nowait root /programs/rlpdaemon.run rlpdaemon -l
```

This entry is added automatically when installing the LP spooler software.

The runstring portion of the `inetd.conf` entry has the following syntax:

```
CI> rlpdaemon [-l | -L logfile]
```

where:

- l specifies to write error messages to file `/usr/spool/lp/lpd.log`. If a request from a remote host is rejected by the local system, this file may contain more information on the error.
- L *logfile* specifies to write error messages to the named file instead of the default.

Installing the Spool System Software

If you wish to use networked spooling between different hosts or to network peripherals, then the current revision of the ARPA/1000 or NS-ARPA/1000 subsystem must be installed on your system before the LP spool system is installed. If your system runs ARPA/1000, rather than NS-ARPA/1000, then you will need to make the networking libraries available for loading the network spooling programs. The `.LOD` files for `rlpout` and `rlpdaemon` must be modified to reflect the different file names.

The file `mklp.cmd` is used to install the LP spool system programs and files. This command file should be executed by a superuser with the working directory set to the directory in which the LP product is shipped (normally `/vcpplus/lp`). The runstring is as follows:

```
CI> mklp [usrlu]
```

where:

usrlu is the LU on which to create the `/usr` directory, if it does not already exist.

The following CI variables may be set prior to execution of this command file (the variables need not be exported):

`$lp_local` Set to "F" if you do not want the LP spooler to be installed on the local system. The default is to install the spooler locally. Unless this variable is set to "F", the following actions are performed:

- The `/usr/spool/lp` directory structure is created, if necessary, and files therein are modified.
- Help files on `/help` are updated.
- The LP spooler on the local host is shut down before installation and restarted after installation.

Set this option to "F" when loading the LP spooler programs for a system other than the local system.

`$lp_loadprogs` Set to "F" if you do not want the LP spooler programs to be loaded. Use this option when the programs have already been loaded but the directory structure must be created, or other local configuration must be performed. The default is to load programs.

- `$lp_progs` Directory in which type 6 program files are to be placed. The default is `/programs`.
- `$lp_slink` Set to "T" if you want symbolic links to be created for program files that may be made symbolic links to other program files. Otherwise, copies of the program files are made using the `CI CO` command. Only set this variable if your file system has symbolic link capability (determined at RTE installation time).
- `$lp_remote` Set to "T" if you want to install both incoming and outgoing remote printer support. This variable should be set to "T" if this host must send requests to remote hosts and/or to JetDirect network peripherals, and must receive requests from remote hosts. You can select incoming or outgoing remote printer support separately using the `$lp_remotein` and `$lp_remoteout` variables if this host requires only one direction of network printing. Only set this variable if your system has the ARPA/1000 or NS-ARPA/1000 networking subsystem installed.
- `$lp_remotein` Set to "T" if you want to install incoming remote printer support only. This variable should be set to "T" if this host must receive requests from remote hosts, but does not require sending requests to remote hosts or network peripherals. Only set this variable if your system has the ARPA/1000 or NS-ARPA/1000 networking subsystem installed.
- `$lp_remoteout` Set to "T" if you want to install outgoing remote printer support only. This variable should be set to "T" if this host must send requests to remote hosts or network peripherals, but does not need to receive requests from remote hosts. Only set this variable if your system has the ARPA/1000 or NS-ARPA/1000 networking subsystem installed.
- `$lp_hostname` Set to the name of the local host to use in file names and request IDs. This name must be 8 characters or less, and must be a legal file name. The name should be entered in all lowercase characters, using back quotes to protect the name from upshifting by `CI`, as in:

```
CI> set lp_hostname = 'myhost'
```

The name must be unique among all hosts in the remote spooling network. This name need not be given if remote spooling is not used on this host, or if the name has previously been set. If file `/usr/spool/lp/hostname` already exists and this variable is set, the new name replaces the old one in that file.

You may also want to set and export the `$LINK` environment variable, which contains runstring commands for the link program. For example, to use snap file `/system/madison.snp`, enter:

```
CI> set -x link = madison.snp
```

The actions that may be performed by this command file, subject to the setting of the options above, are:

- If the LP spooler is already running, it is shut down.
- The `/usr/spool/lp/` directory structure is created, if needed.
- The local host name is set in `/usr/spool/lp/hostname`, if supplied.
- Printer model files in the `model/` subdirectory are copied to `/usr/spool/lp/model/`. Only files that are missing or newer than the existing printer model files of the same name are copied.
- Help files are copied to `/help/`. Only files that are missing or are newer than the existing help files are copied.
- If remote software is to be installed, then `/etc/inetd.conf` is modified to support the `rlpdaemon` program.
- The LP spooler programs are loaded.
- The LP spooler is restarted.

The following example execution performs these actions: (a) updates local files; (b) loads programs into `/programs/`; (c) installs incoming and outgoing remote printer support; (d) establishes “myhost” as the local host name; (e) uses symbolic links where possible; and (f) creates the `/usr` directory on LU 22.

```
CI> set lp_remote = T
CI> set lp_hostname = 'myhost'
CI> set lp_slink = T

CI> mklp 22
```

You may also wish to automatically start the LP spool system at boot time. To accomplish this, add the command to your welcome file:

```
lpsched
```

You may now add printers to the system using the `lpadmin` program.

If `link` reports undefined symbol errors on network spooling programs and suggests that some symbols may be found in system common, you may need to search the `$FNDLB` library to load the programs. This can happen on systems that search the `$FDSL` library by default.

Spooler Administration Tasks

This section provides an outline of the steps necessary to perform common spooler administrative functions.

To add a new printer:

1. Choose a name for the printer (called *printer* in the examples below). You may wish printer names to be unique throughout your network, such that the same name may be used from any host to access the same printer.
2. Select the appropriate model file to be used for the printer. See the section “HP-Supplied Printer Interfaces” for help in choosing a model file.
3. If the printer is a local, direct-connect printer, select the LU number at which the printer will be connected.

If it is a remote printer, obtain the 8-character remote host name and the name of the printer on the remote host (called *rprinter* in the example below). The host name must be entered into the `/etc/hosts` file.

If the new printer is a network peripheral, obtain the 8-character network peripheral name (called *nprname* in the example below) and enter that name into the `/etc/hosts` file.

4. Run `lpadmin` to add the printer to the LP spooler. The runstring is similar to one of the following:

- For direct-connect local printers:

```
CI> lpadmin -pprinter -mmodel -vlu
```

- For remote printers:

```
CI> lpadmin -pprinter -mmodel -orhost -orprinter
```

- For network peripherals:

```
CI> lpadmin -pprinter -mmodel -onprname -opjetdirect
```

See the section on the `lpadmin` program for more information.

5. Once the new printer is ready to print, both the `accept` and the `enable` programs must be run. This allows requests to be submitted for the printer and allows the printer to print them. The runstrings are:

```
CI> accept printer  
CI> enable printer
```

6. If you wish the new printer to be the system default destination, enter:

```
CI> lpadmin -dprinter
```

To add a remote printer on an HP-UX system that accesses a printer on the HP 1000 (these steps are performed on the HP-UX machine):

1. You are encouraged to use the `sam` (System Administration Manager) program to add the printer. The appropriate model file name is `rmodel`. The following steps apply if `sam` is not used.
2. Obtain the 8-character remote host name of the HP 1000 (called *host* in the example below) and the name of the printer on the HP 1000 (called *rdest* in the example below). The host name must be recognized by the HP-UX system by entering it into the `/etc/hosts` file or adding it to the DNS database.
3. Shut down the printer scheduler by entering:

```
$ lpshut
```

This will abort any printing requests, so you may wish to wait for any activity to complete.

4. Run the `lpadmin` program to add the printer to the LP spooler. The runstring is similar to the following:

```
$ lpadmin -ppr -v/dev/null -mrmmodel -ormhost -orprdest -ocmrcmodel -osmrsmode
```

where:

pr is the name of the remote printer on the HP-UX system.
host is the name of the RTE system.
rdest is the name of the remote destination (printer) on the RTE system.

See the documentation on the HP-UX spooler for more information. Note that the last two options are not specified on older HP-UX revisions.

5. Once the remote printer is ready to print, both the `accept` and the `enable` programs must be run. This allows requests to be submitted for the remote printer and allows the HP-UX host to send requests to the HP 1000. The runstrings are:

```
$ accept printer  
$ enable printer
```

6. If you wish the new remote printer to be the system default destination, enter:

```
$ lpadmin -dprinter
```

7. Restart the LP scheduler by entering:

```
$ lpsched
```

To create a class with existing printers as members:

1. Choose a name for the class (called *class* in the examples below).
2. Run `lpadmin` to insert the desired printers into the class. The runstring is similar to:

```
CI> lpadmin -pprinter -cclass
```

3. Allow requests to be submitted for the class by running `accept`:

```
CI> accept class
```

4. If you wish the new class to be the system default destination, enter:

```
CI> lpadmin -dclass
```

To remove a printer from the system:

1. Disallow further submissions to the printer by running `reject`:

```
CI> reject -r "reason for removal" ' printer
```

2. Verify that the printer is not busy by running `lpstat`:

```
CI> lpstat -oprinter
```

If the printer is busy, you may wish to terminate the request active on that printer, or you may wish to let it complete.

3. Disable the printer from printing any further requests by running `disable`. If a request is active on the printer, this will abort the printing. The runstring is:

```
CI> disable -r "reason for removal" ' printer
```

4. When activity on the printer stops, the physical printer device may be disconnected.
5. If any requests remain queued for the printer, you may wish to move them to a new destination. To see if any requests are queued, enter:

```
CI> lpstat -oprinter
```

If any requests need to be moved, run the `lpmove` program:

```
CI> lpmove printer newprinter
```

6. If you wish to remove all traces of the printer from the spool system, run the `lpadmin` program to remove the printer name:

```
CI> lpadmin -xprinter
```


To load new forms into a printer for printing a single request:

1. Spool the request requiring the special forms with the `lp` “-ohold” option. When the request is sent to the printer, the `lpout` program suspends in the paused state after printing a message on the system console. The forms may then be changed. When the new forms are in place, enter a system `GO` command for the suspended copy of `lpout`:

```
go lpout
```

`lpout` will print the proper program name to use as the argument to the above command in its message on the system console.

2. When printing is complete, `lpout` prints an identical message on the console indicating that it is suspending for forms changes. Reinstall the original forms into the printer and issue another RTE `GO` command for the `lpout` copy.

To load new forms into a printer and print several requests that use those forms:

1. If the first request requiring the special forms has been spooled with the `lp` “-ohold” option, then when that request is scheduled for the printer the `lpout` program will suspend in the paused state after printing a message on the system console. The forms may then be changed before a system `GO` command is issued for the suspended copy of `lpout`.

Alternatively, the printer may first be disabled such that no requests are sent to it, using the runstring:

```
CI> disable -r "Changing forms" ' printer
```

If a request is active on the printer, it is aborted and the request remains in the queues, to be reprinted in its entirety later. You may wish to first verify that the printer is not busy by entering:

```
CI> lpstat -oprinter
```

2. While the printer is inactive and either disabled or occupied by a suspended copy of `lpout`, change the forms.
3. Using the `lpalt` program, modify the priority of each request that requires the special forms to be above the highest priority of any request that does not. For simplicity, this example runstring modifies the priority of a request to 7, the highest priority:

```
CI> lpalt requestid -p7
```

4. Using the `lpfence` program, set the “priority fence” of the printer to the priority of the requests that require the special forms:

```
CI> lpfence printer 7
```

No lower-priority requests will then be sent to the printer. If any existing requests are at priority 7, you may wish to lower the priority of those requests in the same manner.

5. If the printer has been disabled, enable the printer as follows:

```
CI> enable printer
```

If the “-ohold” option was used, enter an RTE GO command for the suspended copy of lpout:

```
go lpout
```

lpout will print the proper program name to use in the above message on the system console. Continue entering GO commands as necessary at the start and end of the printing of requests spooled with “-ohold”.

6. When all requests requiring the forms are printed, the normal forms may be re-installed. You may wish to disable the printer while doing this. The priority fence may then be lowered to allow normal requests to print:

```
CI> lpfence printer 0
```



Log File Maintenance

The LP spool system keeps two log files:

```
/usr/spool/lp/log  
/usr/spool/lp/lpd.log
```

The `/usr/spool/lp/log` file contains a log of spool system activities, including an entry for each request printed or transferred to another host. This file may also contain error messages logged by various LP spooler programs. `/usr/spool/lp/lpd.log` contains error messages logged by the `rlpdaemon` program.

New entries are appended to these files, so the files may grow without bounds. Either file may be purged at any time to reclaim disk space. You may wish to periodically rename the files using a “.old” extension after purging an existing “.old” file.

Resetting the Request ID Sequence Number

To restart the request ID sequence number, purge the file `/usr/spool/lp/seqfile`. The next request will be assigned request ID sequence number 1.

Troubleshooting

This section provides troubleshooting hints for situations in which the spool system is not working.

Problem: Requests are sent to a printer, but are never printed.

Check each of the following:

- Is the printer scheduler running? Entering “`lpstat -r`” will display an answer to this question. If the scheduler is not running, start it by entering “`lpsched`”. You can also check that `lpsched` is not hung up somehow.
- Is the printer enabled or in “retry” status? Check this by entering “`lpstat -p`”. If so, see the following discussion on disabled printers.
- Is the priority fence of the printer low enough to print the queued requests? Check this by entering “`lpstat -p`” and comparing the displayed value to the priority of the requests, as reported by “`lpstat -o`”. If the priority fence is too high, you may wish to lower it.
- Is the printer busy with a request that is hung for some reason? If “`lpstat -p`” indicates that the printer is busy, check the progress of that request. The copy of `lpout` responsible for printing the request may be in the paused state if the “`-ohold`” option was given when the request was created.
- Is the proper device LU associated with the printer for a local printer? You can check this by entering “`lpstat -v`”.
- Check file `/usr/spool/lp/log` for error messages related to the printer.

Note that the spool system can hold off scheduling requests onto printers for short periods of time while spooling utilities modify the queues. If a spooling program is aborted while it has a scheduling lock in place, the spooler will break the lock after about 5 minutes have elapsed. `lpsched` makes an entry in its log file when it does this.

Problem: The printer is disabled or in “retry” status when it is accessed.

Check the reason, as reported by “`lpstat -p`”, for which the printer is disabled or is retrying requests. Some common reasons are discussed in the items that follow:

- `new printer`

The printer has never been enabled after being added to the spool system. If the printer is ready to print, enable it using the `enable` program.

- `interface program aborted`

`lpsched` noticed that the interface program used to print requests on the printer (usually either `lpout` or `rlpout`) aborted without properly telling `lpsched` the request was complete. Check the system console for an abort message.

- `fmp_error program`

An FMP error was encountered when RP'ing the printer interface program.

- *violation* error scheduling *program*

An EXEC error was encountered when scheduling the printer interface program.

- *idget* error on interface program

The printer interface program immediately disappeared after *lpsched* RP'ed a copy. Ensure that nothing in the system either aborts or schedules copies of the interface programs that *lpsched* RP's.

- *lurq* error *violation*

An EXEC error was encountered by the printer interface program when attempting to lock the device LU. Check that the LU is legal.

- *violation* error on *xluex(code)*

An EXEC error was encountered by the printer interface program when performing an XLUEX call on the device LU. Check that the LU is legal.

- *device is down*

The printer interface program noticed that the device LU is in the "down" state. If the device is OK, then perform an RTE UP command on the LU and enable the printer.

- *lpout* break flag set for *requestid*

An RTE BR command was issued against the printer interface program. If the printer is OK, then it may be enabled.

- *host unknown* in */etc/hosts*

The host or network peripheral name must be added to the */etc/hosts* file.

- *'printer'* not found in */etc/services*

The TCP port definition of service name *printer* must be added to the */etc/services* file. This is normally done automatically at ARPA or NS-ARPA installation time.

- *unable to create socket*

A BSD IPC error occurred when creating a socket for contacting the remote host or network peripheral. Your NS/ARPA or ARPA subsystem may be out of resources.

- *unable to connect to remote*

The remote host or network peripheral cannot be connected to. Check that the host name is correct and that the remote machine is up and ready to receive print requests from the network.

- *error reading acknowledgement*
Connection aborted on error

A networking error occurred while engaged in the network spooling protocol. The remote spooling daemon may have aborted.

- remote rejects submissions

The remote host rejected an attempt to transfer a request to it. This may be because the remote destination rejects new submissions, or because the remote destination name is invalid.

Also check file `/usr/spool/lp/log` for error messages related to the printer.

Problem: Remote printers on other hosts cannot access the printer on my HP 1000.

If `rlpdaemon` logging is enabled, check file `/usr/spool/lp/lpd.log` for error messages logged by the HP 1000 network printing daemon. If logging is not enabled, you may wish to enable it. Logging is enabled by specifying the `-l` option in the `rlpdaemon` runstring in file `/etc/inetd.conf`. Remember to tell `inetd` to re-read that file after changes are made by entering `"inetd -c"`. Common entries in the `lpd.log` file are discussed in the following items:

- destination *dest* is not accepting requests

An attempt was made to enter a request for a destination that rejects new submissions. The destination can be made to accept requests using the `accept` program.

- destination *dest* non-existent

An attempt was made to enter a request for an invalid destination name. Check the name of the remote destination on the host that tried to transfer the request. On RTE and later HP-UX systems, this is reported by entering `"lpstat -v"`.

- IP address not found in `/etc/hosts: nn.nn.nn.nn`

The IP address of the remote host is not present in the `/etc/hosts` file. The spool system needs this information to map addresses to a list of host names for matching against the host names in request IDs. Each host that sends network spooling requests to the local system should be present in the `/etc/hosts` file.

- NetIPC error *nnn*

An NS-ARPA NetIPC error occurred. See the *NS-ARPA Error Messages and Recovery Manual*, part number 91790-90045, for more information about the error code.

- unknown command code received: *nn*
unrecognized receive job subcommand: *nn*
control file byte count incorrect
invalid control file name: *name*
invalid byte count *datafile*

These messages indicate internal errors caused by failure to recognize the network spooling protocol sent by the remote host. Contact your HP representative for help in diagnosing the problem.

Also check for networking errors in file `/system/ns_event.log`.

HP-Supplied Printer Interfaces

This section documents the printer interfaces and printer model files supplied by Hewlett-Packard with the LP spooler. The printer interfaces supplied by HP are:

Interface Name	Usage
<code>rtestd</code>	Standard local RTE printer using standard drivers.
<code>passthru</code>	Local plotter or other non-RTE-printer device.
<code>remote</code>	Remote printing via NS-ARPA/1000.

The printer model files supplied by HP are:

Model File	Interface Used	Usage
<code>generic</code>	<code>rtestd</code>	Generic non-PCL local printer.
<code>pcl</code>	<code>rtestd</code>	Local PCL printer.
<code>passthru</code>	<code>passthru</code>	Local plotter or other non-RTE-printer device.
<code>rrte</code>	<code>remote</code>	Remote printing to printers on RTE hosts.
<code>rhpux</code>	<code>remote</code>	Remote printing to printers on HP-UX hosts.
<code>rbsd</code>	<code>remote</code>	Remote printing to printers on BSD UNIX hosts.
<code>hnp_pcl</code>	<code>remote</code>	Remote printing to PCL network peripherals.
<code>hnp_passthru</code>	<code>remote</code>	Remote printing to network peripheral plotters.

The local printer interfaces above handle the printing of requests on directly-connected local printers, that is, printers directly attached to the local system. The remote printer interface sends print requests to a remote host for printing on a printer located on that host, and prints to network peripherals.

The various interfaces and model files are discussed in the following sections.

Local Printers

Local printer interfaces handle the printing of requests on printers attached directly to the local system. A local printer interface consists of a set of routines linked into the `lpout` program (or a copy of the `lpout` program with a different name).

HP recommends that the following local printer model files be used for the named HP printers:

Printer Model	Recommended Model File
ThinkJet	<code>generic</code>
HP 256x, 293x, DeskJet, LaserJet, PaintJet, QuietJet, RuggedWriter	<code>pcl</code>
Any HP plotter	<code>passthru</code>

HP local printer interfaces disable the printer if device I/O errors are encountered. The device is also disabled if the break flag is set on the `lpout` program while printing using an HP printer interface (using the RTE BR command). The print request printing at the time of the error or interruption remains in the request queue. The request is reprinted in its entirety on the printer once it is re-enabled, or is printed on another printer that is a member of the destination class of the request, if applicable.

The `rtestd` Interface

The `rtestd` interface is for use by printers that are controlled by the standard RTE printer drivers. This interface issues the standard control requests or escape sequences for controlling printer devices and supports the standard set of EXEC control word bits for the RTE printer drivers DD*12, DDC12, DDC00, and DDC01.

Two printer model files are supplied for this interface: `generic` and `pcl`. The `pcl` model file is for printers that support the HP Printer Control Language (PCL). The `generic` model file is for printers that do not support PCL.

Features Common to `generic` and `pcl` Models

This section lists options common to both the `generic` and the `pcl` models of the `rtestd` interface. The options that are supported only by the `pcl` model are listed in the following section. Printer interface options are specified in the `lp` program runstring preceded by a `-o`. The options are:

- Device Handling:

- `cc` The files contain FORTRAN-style carriage control in column 1. Use of the “raw” (or “r”) or “nolnc” options negates the effect of this option.
- `kc` The files include EXEC control word headers. The files must have been created by the ON command of the SP spooler with the KC option specified. These headers specify the control word flags that were used in the redirected EXEC/XLUEX writes and preserve information on control requests that were sent to the redirected device. This option has no effect on type 1 files.
- `r` File data should be sent unretouched to the printer. Uses transparent (also known as honesty mode) writes to the device, that is, automatic CRLF adding and trailing underscore processing does not occur. This option causes type 1 files to not be processed in UNIX text file format, where lines are separated by linefeed characters (see below). This option cancels the effect of the “cc” option.
- `raw`
- `nolnc` Do not treat an underscore at the end of a record as a line continuation character. A CRLF is still printed at the end of each record. Uses transparent (also known as honesty mode) writes to the device. This is the same as using the “raw” option, except that a CRLF sequence is sent at the end of each record. This option cancels the effect of the “cc” option.

- Other:

- `nb` Do not print a banner page (save a tree).

hold Suspend operation before and after printing the request, while the printer LU is locked to the `lpout` program. Both times, `lpout` prints a message on the system console of the form:

```
prog: suspending per user request; enter "GO,prog" to resume
```

where *prog* is the program name of the `lpout` copy that is suspending. The copy of `lpout` handling the print operation remains in the paused state until an RTE GO command is issued for that program name. In this manner, adjustments to the printer, such as forms loading, may be performed before and after the request is printed.

Two of these options are also supported by many HP-UX printer interfaces. Option "nb" commonly suppresses the banner page, and option "raw" commonly suppresses spooler and device driver meddling with the print data (the option is also commonly abbreviated to "r"). None of the other options above should be used when spooling a file to a remote printer on a system other than an HP 1000. See the documentation for the printer interface on the remote host to see which options are supported by that interface. The rest of the information in this section applies only to the HP 1000.

Files of type 2 and above are printed with an XLUEX call per FMP record. The files are assumed to be in RTE FMP format. The default file processing performed for file type 2 and above, in absence of options to the contrary, is:

- Column one is not treated as FORTRAN-style carriage control. The "cc" option overrides this.
- The default driver-dependent output processing is performed for all operations other than column-one carriage control. For the standard RTE printer drivers, this entails adding a carriage-return/linefeed sequence at the end of each record except for those that end in an underscore (_). The "nolnc" option overrides the line continuation on underscore feature.

The "raw" option overrides both of the above.

Type 1 files are normally introduced into the spool system only by the spool system itself. These files are created when receiving a spool request from a remote UNIX host. Type 1 files are always printed using transparency (also known as honesty) mode flags set in the XLUEX write call. For the standard RTE drivers, this inhibits adding carriage-return/linefeed sequences at the end of data written via XLUEX write calls and inhibits treating trailing underscore characters as "line continuation" characters. However, if the file is in UNIX text format, the spooler adds its own carriage control as documented below.

When printing type 1 files, if the "raw" (or "r") option is not specified in the request, the file is assumed to be in UNIX text format. In the UNIX text format, each line is terminated by a linefeed (ASCII code 12b) without a carriage return character (ASCII code 15b). The interface prints a carriage return character after each linefeed character is sent and after each form feed character (ASCII code 14b) is sent to emulate the behavior of UNIX device drivers.

If the "raw" (or "r") option is specified in the request, the type 1 file blocks are written to the printer in transparency mode without characters added by the interface. See the *RTE-A Driver Reference Manual*, part number 92077-90011, for more information on the operation of the various RTE printer drivers and on the transparency (or honesty mode) processing.

The `pcl` Model

The `pcl` model supports printers that use the HP Printer Control Language (PCL) protocol. Use of this model is preferred over the `generic` model for PCL printers. The `pcl` model supports the options listed for the `generic` model, plus the options listed below. Many of the option names are chosen to be compatible with option names supported by common HP-UX printer model scripts.

Each `pcl` model option description below is followed by information contained in square brackets ([]). The information is in two parts. The first part is the escape sequence sent to the printer to implement the option, with “Esc” denoting the “escape” character and underscores (_) denoting characters filled in from the option argument. If both primary font and secondary font variants of the command exist, then only the primary form is shown; the secondary generally replaces the “(” character with “)”. This information is provided as an aid in determining which variants of which PCL commands are supported by your printer.

The second part of the information in square brackets is the PCL language level base at which most printers accept the option. If your printer is at or above that PCL language level, then the option may be accepted if your printer supports that feature. Some printer models that are below that PCL level, but that are known to support the option, may also be listed. In general, a PCL printer that receives a PCL escape sequence that it does not support will ignore the sequence. See the technical reference manual for your printer to find its base PCL language level, as well as other information on the PCL commands available. The following table lists the base PCL language levels of many HP PCL printers:

Table 2-2. PCL Levels of HP Printer Models

Printer Model	Base PCL Level
HP 256x Dot-Matrix	PCL2
HP 2932A Dot-Matrix	PCL2
HP 2933A, 2934A Dot-Matrix	PCL3
DeskJet, DeskJet Plus, DeskJet 500, 500C, 550C	PCL3
LaserJet	PCL3
LaserJet+, LaserJet500+	PCL4
LaserJet II, IID, IIP	PCL4
LaserJet III, IIID, IIIP, IIISi	PCL5
LaserJet 2000	PCL4
PaintJet	PCL1
PaintJet XL	PCL3
PaintJet XL 300	PCL5
QuietJet, QuietJet Plus	PCL1
RuggedWriter	PCL3

Note that all of the options listed below are also supported by the `hpn_pcl` model, which supports PCL printers connected to an Ethernet LAN by an HP JetDirect card.

The `pcl` model supports all the options listed under the `generic` model, plus these options:

- Horizontal Pitch Selection (these are obsolete at PCL4 and above):

- `c` Compressed print pitch (16.7 CPI for HP 256x). [`Esc&k2S PCL1`]
- `e` Expanded print pitch. [`Esc&k1S`]
- `10` 10 CPI (Pica print pitch). [`Esc&k3S PCL3`]
- `12` 12 CPI (Elite print pitch). [`Esc&k4S PCL3`, some HP 256x]

(Also see “fp” and “sfp” below.)

- Print Quality Selection (these are obsolete at PCL4 and above):

- `nlq` Set primary print quality to “near letter” quality. [`Esc(s1Q PCL2`; called letter or high quality on older models]
- `lq` or `q` Set primary print quality to letter quality. [`Esc(s2Q PCL3`]
- `dq` Set primary print quality to draft (also known as normal) quality. [`Esc(s0Q PCL2` (not the same as 2567B draft quality)]
- `qn` or `sqn` Set primary (q) or secondary (sq) print quality by number. The available qualities vary by printer model. [`Esc(s_Q PCL2`]

- Font Selection:

The acceptable values for all of these options are dependent on the printer model and the fonts available. See your printer technical reference manual.

`csid` or `scsid` Set primary (cs) or secondary (scs) character set by symbol set ID. Some common values are:

<code>8M</code>	HP Math-8	<code>0U</code>	US ASCII
<code>8U</code>	HP Roman-8	<code>0N</code>	ECMA-94 Latin 1
<code>10U</code>	PC-8 (USA)	<code>0O</code>	OCR A
<code>0A</code>	HP Math	<code>1E</code>	ISO 4: United Kingdom
<code>0B</code>	HP Line Draw	<code>1U</code>	HP US Legal
<code>1G</code>	ISO 21: German	<code>8K</code>	HP Kana-8

The interface automatically upshifts the last character of the symbol set ID; thus, the usual rules of upper versus lowercase option characters for the HP 1000 `lp` program need not be followed. [`Esc(__ PCL2`]

- `r8` or `k8` Set the primary character set to Roman-8 (r8) or Kana-8 (k8). [`Esc(8U PCL2`]

typenn or *stypenn* Select the primary (type) or secondary (stype) font typeface by number. Some common values are:

0	Line Printer	1	Pica
2	Elite	3	Courier
4	Helvetica	5	Times Roman
6	Letter Gothic	7	Script
8	Prestige	9	Caslon #3 & 540
10	Orator		

[Esc(s__T PCL4)]

fpn.n or *sfpn.n* Primary (fp) or secondary (sfp) font pitch in characters/inch, a decimal fraction.
[Esc&(s__H PCL2)]

fh.n or *sfhn.n* Set primary (fh) or secondary (sfh) font height in points, a decimal fraction.
[Esc&(s__H PCL2)]

stylenn or *sstylenn* Set the primary (style) or secondary (sstyle) font style by number. Some common values are:

0	upright	1	italic
2	slanted	4	condensed
5	condensed italic	8	compressed
24	expanded	32	outline
64	inline	128	shadowed
160	outline shadowed		

[Esc(s__S PCL3, some 256x)]

upright or *supright* Set the primary (upright) or secondary (supright) font style to upright (normally the default). [Esc(s0S PCL3, some 256x)]

italic, *italics*, or *i*
sitalic, *sitalics*, or *si*

Set the primary (italic) or secondary (sitalic) font style to italic. [Esc(s1S PCL3, some HP 256x)]

slant or *sslant* Set the primary (slant) or secondary (sslant) font style to slant.
[Esc(s2S PCL3)]

weightn or *sweightn* Set primary (weight) or secondary (sweight) font stroke weight by number. In general:

<0	light or thin
0	medium
>0	bold or black

[Esc(s__B PCL3)]

- b or bold** Set primary font stroke weight to bold (weight 1). [Esc(s1B PCL3]
 - ps or sps** Set the primary (ps) or secondary (sps) font to proportional spacing. [Esc(s1P PCL3]
 - fs or sfs** Set the primary (fs) or secondary (sfs) font to fixed spacing. [Esc(s0P PCL3]
- (Font selection is also influenced by the “portrait” and “landscape” options described below.)

- **Page Layout:**

- portrait** Set portrait orientation, printing left-to-right across the width of the page. This is usually the default. [Esc&l0O PCL4]
- landscape** Set landscape orientation, printing top-to-bottom across the length of the page. [Esc&l1O PCL4]
- double, duplex, or d** Use automatic double-sided printing with vertical (long-edge) binding. This option is valid only on printers with double-sided print capability. [Esc&l1S PCL4]
- hdouble or hduplex** Use automatic double-sided printing with horizontal (short-edge) binding. This option is valid only on printers with double-sided print capability. [Esc&l2S PCL4]
- hsin.n** Horizontal spacing increment in 1/120 inches. The available increments vary by printer model. [Esc&k_H PCL3]
- lpinn** Set the number of lines per inch to print. This is an alternate way of setting the vertical spacing index (see “vsi” below). The default is usually 6 lines per inch. Acceptable values vary by printer model. [Esc&l_D PCL2]
- vsin.n** Set the vertical spacing index in 1/48 inches. The acceptable values vary by printer model. [Esc&l_C PCL3]
- lnnn** Set the logical length of the entire page in lines. The default is 66 lines. [Esc&l_P PCL2]
- tlenn** Set the text length of the page in lines. The default is 60 lines in portrait orientation; 45 lines in landscape orientation. [Esc&l_F PCL2]
- lmnnn** Set the left margin column (the leftmost column is numbered 0). [Esc&a_L PCL2]
- rmnnn** Set the right margin column. [Esc&a_M PCL2]
- tmnnn** Set the top margin line. [Esc&l_E PCL4]
- wrap or nowrap** Turn line wrap on (wrap) or off (nowrap). [Esc&s0C PCL4]
- perfskip or noperfskip** Turn perforation skip mode on (perfskip) or off (noperfskip). [Esc&l1L PCL1]

- Paper Source (available paper sources vary by printer model):
 - upper Feed paper from upper tray. [Esc&11H PCL4]
 - lower Feed paper from lower tray. [Esc&14H PCL4]
 - man or m Feed paper from the manual feed slot. [Esc&12H PCL4]
 - envelope Feed envelope from the manual feed slot. [Esc&13H PCL4]
 - deck Feed paper from the paper deck. [Esc&15H PCL4]

The passthru Interface

This interface is for use by devices that are not printers, or by printers that are not controlled via the standard RTE printer interfaces. All HP plotters that do not have text printing capability fall into this category. There is only one model file associated with the `passthru` interface; that model file is also named `passthru`.

No processing of the data stream or meddling with the output is performed by this interface; the print output is sent as is to the device. This is similar to the effect of the `raw` option supported by many of the other interfaces. Transparency (or honesty) mode is always used in the device driver, if one exists for the device. See the *RTE-A Driver Reference Manual*, part number 92077-90011, for more information on the operation of the various RTE device drivers and on the transparency or honesty mode processing. No data or control requests other than those specified in the print data are sent to the device. No banner page is printed; no page ejects, control requests, or device resets are performed by the interface.

Printer interface options may be specified in the `lp` program runstring preceded by a `-o`. This interface supports the following options:

- Device Handling:

`kc` The files include EXEC control word headers. The files must have been created by the `ON` command of the `SP` spooler with the `KC` option specified. These headers specify the control word flags that were used in the redirected EXEC/XLUEX writes and preserve information on control requests that were sent to the redirected device. This option has no effect on type 1 files.

- Other:

`hold` Suspend operation before and after printing the request, while the printer LU is locked to the `lpout` program. Both times, `lpout` prints a message on the system console of the form:

```
prog: suspending per user request; enter "GO,prog" to resume
```

where *prog* is the program name of the `lpout` copy that is suspending. The copy of `lpout` handling the print operation remains in the "paused" state until an RTE `GO` command is issued for that program name. In this manner, adjustments to the printer, such as forms loading, may be performed before and after the request is printed.

Remote Printers and Network Peripherals

The remote printer interface, `remote`, sends a print request to a remote destination via NS-ARPA/1000. The destination may be of two general types:

- The destination may be a remote printer connected to a remote host. The remote host may be an RTE, HP-UX, or a BSD UNIX system that supports network printing; separate printer model files are provided for each host type. The remote interface transfers the request to the remote host for further processing by the spool system on that host. The printer on the remote host may itself be a remote printer; the spooler on the remote host may forward the request to another host for printing.
- The destination may be a network peripheral, that is, a printer directly connected to a network and shared among the hosts on that network. For example, a printer may be connected to an Ethernet LAN by an HP JetDirect card, which allows printers to be connected directly to a LAN, rather than to a host that is connected to a LAN. The remote interface opens a connection to the network peripheral and sends it the data to be printed, as if the printer were a local printer connected via the LAN.

The interface consists of a program named `rlpout` that handles the network transfer.

The LP spooler provides five printer model files for remote printing:

- `rrte` for sending requests to printers on RTE hosts.
- `rhpuX` for sending requests to printers on HP-UX hosts.
- `rbsd` for sending requests to printers on BSD UNIX hosts.
- `hpnP_pcl` for printing on PCL printers connected to a LAN via an HP JetDirect card.
- `hpnP_passthru` for printing on plotters connected to a LAN via an HP JetDirect card.



Each of these models is discussed separately in the following sections.

The protocol used to transfer print requests to a remote host is based on the Line Printer Daemon Protocol (LPDP), a de facto standard (but not formally standardized) protocol documented in Internet RFC document RFC-1179. The LPDP protocol is used to send requests to BSD UNIX hosts via the `rbsd` model. Certain extensions to the protocol implemented in HP-UX are used in the `rhpuX` model. The `rrte` model implements further extensions that preserve RTE FMP file attributes and offer better performance by avoiding conversions between UNIX and RTE file formats.

The `remote` interface disables the printer if network or protocol errors are encountered during the transfer. The print request being transferred at the time of the error remains in the request queue. The request is retransmitted in its entirety to the remote host once the printer is re-enabled.

The `rrte` Model

The `rrte` model is used for transferring print requests to a remote RTE host. The remote RTE host must also run NS-ARPA/1000 and the LP spool system.

There are no options that are interpreted by the `rrte` model.

The `rhpux` Model

The `rhpux` model is used for transferring print requests to a remote HP-UX host. The remote host must run the HP-UX LP spool system.

This model supports the following options:

- Data Formatting:

`r` Print data should be sent unretouched to the remote host. If not given, a linefeed character will be added to each FMP record sent to the remote host, converting the file to UNIX text format as it is transferred. If this option is given then the linefeed characters are not added between records; the records must already have the necessary carriage control embedded in the text. This option has no effect on type 1 files, which contain no record structure (see below).

This option is preserved in the request as sent to the remote host.

Type 1 files are always sent to the remote host as if raw mode were in effect, that is, linefeed characters are not added to delimit line boundaries. The first block, containing the valid byte count for the following data in the first 12 characters, is dropped during transmission (it will be recreated on the remote side if the remote host is an HP 1000).

The `rbsd` Model

The `rbsd` model is used for transferring print requests to a remote BSD UNIX host. The remote host must run the BSD spooler (`lpr`, `lpd`, and so on).

The options accepted by the `rbsd` model fall into three categories:

- Those that are consumed by the `rbsd` model for its own use. These affect the format of the request sent to the remote host; the options are not passed to the remote host.
- Those that the `rbsd` model interprets but leaves intact in the request sent to the remote host.
- Those that the `rbsd` model ignores but passes on to the remote host. These options are for interpretation by the destination printer interface. All options not listed below will be passed on to the remote host without interpretation.

This model supports the following options:

- Data Formatting:

`r` Print data should be sent unretouched to the remote host. If not given, a linefeed character will be added to each FMP record sent to the remote host, converting the file to UNIX text format as it is transferred. If this option is given then the linefeed characters are not added between records; the records must already have the necessary carriage control embedded in the text. This option has no effect on type 1 files, which contain no record structure (see below).

This option is preserved in the request as sent to the remote host.

- BSD UNIX Spooler Options (unless stated otherwise these options are deleted from the request):

BSD	Use BSD-style request conventions, such as 3-digit request IDs.
BSDCclass	Specify the class name for the banner page.
BSDJjob	Specify the job name for the banner page.
BSDTtitle	Specify the title used by the pr program if “BSDp” is given.
BSDi[numcols]	Specify the number of columns by which the output is to be indented. If <i>numcols</i> is not given, the default is 8.
BSDwcols	Specify the page width used by the pr program if “BSDp” is given.
BSDd	The print data is in DVI format, produced by TeX.
BSDf	Treat the first column of each line as FORTRAN-style carriage control.
BSDI	Use an output filter that suppresses page breaks.
BSDp	Use the pr utility to format the printed output.
BSDh	Suppress printing the banner page.
nb	Suppress printing the banner page (for compatibility with other printer interfaces). This option is preserved in the request sent to the remote host.

Note that many of the options above contain uppercase characters. To enter these options using the `-o` option of the HP 1000 `lp` program, the uppercase characters must be entered in lowercase and quoted to prevent upshifting because the HP 1000 `lp` program reverses the case of option characters. See the documentation on the `lp` program for more information.

Type 1 files are always sent to the remote host as if raw mode were in effect, that is, linefeed characters are not added to delimit line boundaries. The first block, containing the valid byte count for the following data in the first 12 characters, is dropped during transmission.

The `hpnpc1` Model

The `hpnpc1` model prints requests on PCL printers connected to a TCP/IP Ethernet LAN by an HP JetDirect card. Devices supported by this model include LaserJet and PaintJet printers. By specifying an alternate TCP port for the connection, you may print to other network peripherals that accept a simple TCP print data stream.

If the “raw” (or “r”) option is not given, the following carriage control processing is performed on the print data sent to the printer:

- If the file being printed is of type 2 or above (RTE text format), a carriage-return/linefeed sequence is sent after each FMP record is sent to the printer.
- If the file being printed is of type 1 (UNIX text format), a carriage-control character is sent after each linefeed or formfeed character is sent.

This model supports the following options:

- Data Formatting:

`r` Print data should be sent unretouched to the printer. If not given, carriage control characters are added to the print data as documented above. If this option is given, carriage control is not added; the records must already have the necessary carriage control embedded in the text.

- Networking:

`portnn` Specify the TCP port number to use when connecting to the network peripheral. The default port is 9100, which is the default port used by HP JetDirect network peripherals.

- Other:

`nb` Inhibit printing the banner page.

In addition, this model supports the options listed for the `pcl` model beginning on page 2-53.

The `hpnnp_passthru` Model

The `hpnnp_passthru` model prints requests on plotters connected to a TCP/IP Ethernet LAN by an HP JetDirect card. Devices supported by this model include HP DesignJet plotters. By specifying an alternate TCP port for the connection, you may print to other network peripherals that accept a simple TCP print data stream.

No processing of the data stream or meddling with the output is performed by this interface; the print output is sent as is to the device. This is similar to the effect of the `raw` option supported by many of the other interfaces. No data other than the print data are sent to the device. No banner page is printed; no page ejects or device resets are performed by the interface.

This model supports the following options:

- Networking:

`portnn` Specify the TCP port number to use when connecting to the network peripheral. The default port is 9100, which is the default port used by HP JetDirect network peripherals.

Custom Printer Interfaces

This section documents how to modify the HP-supplied printer interfaces and printer model files. You may also create your own printer interfaces for non-HP printers.

Printer Model File Format

Each printer model file contains a set of commands in line 1; the remaining lines are comments. The commands in line 1 are a string of keywords and arguments, each separated by a blank. The commands are:

`intf interfacename`

Print using the named printer interface. The interface name must be recognized by the copy of the `lpout` program scheduled. See the next section for a list of printer interfaces supplied with the LP spooler.

If this keyword is not given, then interface `rtestd` is used for local printers, or interface `remote` for remote printers.

`exec program`

Schedule the named program to handle the request. By default, program `lpout` is scheduled for local printers; program `rlpout` is scheduled for remote printers (including network peripherals). This keyword allows separate versions of `lpout` that support various printer interfaces to coexist.

`opts options`

If this keyword is given, the rest of the line contains interface-specific options to be automatically passed to the printer interface. These options are given without the leading `-o` used by the `lp` program. Options are case sensitive. This keyword must be the last in the line.

For example, the model file line 1:

```
intf rtestd opts nb
```

specifies printer interface `rtestd` with option “nb” always in effect, causing the banner page to never be printed.

You may wish to make copies of HP-supplied printer model files under a new name before making modifications. This prevents future HP distributions from overwriting your modified printer model files.

Modifying Printer Interface Sources

The HP-supplied local printer interfaces are implemented in program `lpout`, the source files to which are provided with the LP spooler. See the instructions contained in comments in the files for help in making modifications. Some files that you may wish to modify or use as the basis of a new printer interface are:

<code>lpout_if.ftn</code> <code>lpout_m.mac</code>	Interface support routines, including those that recognize local interface names and call the appropriate handler routines.
<code>lpout_rtestd.ftn</code>	The non-PCL portions of the <code>rtestd</code> interface.
<code>pcl.ftn</code>	PCL printer support for the <code>pcl</code> and <code>hpn_pcl</code> models. Changes made to this file will be reflected in the operation of both models if both the <code>lpout</code> and <code>rlpout</code> programs are re-loaded.
<code>lpout_passthru.ftn</code>	The <code>passthru</code> interface.

Look for the comment “* POSSIBLE USER MODIFICATION” for suggestions on customizing.

Programming Considerations

The `lpout` program suspends in “operator suspend” state just after starting if the local printer name begins with the string “debug”. This allows the program to be adopted with `Debug/1000` before continuing.

When an actively-printing request is either cancelled via the `cancel` program or aborted via the `disable` or `lpshut` programs, the printer interface program scheduled by `lpsched` is OF’ed. Any programs scheduled in turn by the interface program are not OF’ed. Thus, any activity performed by programs scheduled by interface programs does not halt when an active request is terminated. For this reason, the HP-supplied interface programs do not schedule other programs that are expected to be OF’ed if the interface program is OF’ed.

SP Spool System

The SP spool system provides three major features:

- capturing output sent to an LU for spooled printing,
- redirection of output between LUs, and
- system error logging.

Most of the print spooling features of the SP spool system are superseded by those of the LP spool system described in Chapter 2, but are retained for backward compatibility. The SP spool system may be used to capture output destined for an LU into a file for printing using the LP spool system.

SP Runstring

To run SP, enter the following runstring:

```
CI> SP [command]
```

where *command* is one of the commands described below. Command subparameters are separated by spaces or commas. If a command is not specified, the spool system enters interactive mode.

Commands

The following are the SP commands that can be entered in the SP runstring or at the “-” prompt when running SP interactively:

IN	Starts the spooling system. Needed only when the spooling system is inactive.
ON[, -S <i>sess</i>] [, <i>lu</i>] [, [, <i>options</i>]]	Starts spooling for <i>lu</i> . The default is LU 6. All subsequent output to this LU is written into a temporary spool file (OUTSPOOL <i>xx</i> .SPL; <i>xx</i> is a spool system code). When spooling is stopped, the file is sent to the LU and the spool file is purged. “-S <i>sess</i> ” can be specified by a superuser to start spooling for session number <i>sess</i> . By default, spooling is started for your session. Valid options are NC, NF, BP, and SS as defined at the end of the command descriptions.

ON[, -S *sess*][, *lu1*], *lu2*[, DC]

Starts LU redirection from *lu1* to *lu2*. The default *lu1* is LU 6. All I/O to *lu1* will be routed to the *lu2* specified. Both *lu1* and *lu2* must be valid LU numbers. By default, up to 2 levels of I/O redirection are allowed. For example, “sp, on, 7, 9” and “sp, on, 9, 11” will redirect LU 7 to LU 11.

“-s *sess*” can be specified by a superuser to start spooling for session number *sess*. By default, spooling is started for your session.

The DC (do not chain redirections) option can be specified to inhibit chaining of redirection.

ON[, -S *sess*][, *lu*], *file*[, *options*]

Starts spooling for the LU specified. Any subsequent output to *lu* is written in the file specified. At completion, the file is removed from the spool system but not purged. The default *lu* is LU 6.

“-s *sess*” can be specified by a superuser to start spooling for session number *sess*. By default, spooling is started for your session.

Valid options are NC, NF, BP, SS, KC, and PU as defined at the end of the command descriptions.

Note that unless the KC option is given, the spooled output written to the specified file does not contain EXEC CNTWD flags that were given in the spooled write requests. The file also does not contain device control requests that were issued to the LU via an EXEC 3.

LI, *file*[, *lu*][, *options*]

Queues the file in the spool system for output to *lu*. The default *lu* is LU 6. Valid options are NC, NF, BP, SS, KC, and PU as defined at the end of the command descriptions.

RE, *fileref*[, *offset*]

Restarts spool file output. The optional offset parameter can be either positive or negative. If specified, the appropriate number of relative records (+ or -) will be skipped. For example, “RE, FILE, -5” will restart output five records back. The *fileref* parameter may be either the file name or the reference number displayed by the ST command.

PU, *fileref*

Removes the file from the spool system. This file is purged only if it is a spool file (that is, OUTSPOOLxx.SPL). The *fileref* parameter may be either the file name or the reference number displayed by the ST command.

OF[, *lu*][, *session*]

Stops spooling or LU redirection for *lu*. The default is LU 6. If *lu* was spooled to a default spool file, output is started to the device. Note that non-default spool files are not output. See the SP LI command to output non-default spool files.

A superuser may terminate spooling or redirection for another session by specifying the *session* parameter.

LO, ON, <i>file</i>	Initiates error logging to the error file specified. The file parameter is a file descriptor of the error log file.
LO, OFF	Terminates error logging.
QU	Terminates the spool system. This can only be used by a superuser. All spool system activity must be stopped, including outputting of files to an I/O device and I/O redirection. All current spool files will be purged and other files removed from the spool system.
? or ??	Displays all valid parameters, their formats, and descriptions.
ST	Displays the current status of the spool system, including spool file names, owners, destination spool LU, file size, and status.
LR [, <i>session</i> *]	Displays the LU redirections. If <i>session</i> is specified, redirections for that session number are displayed. If '*' is specified, redirections for all sessions are displayed. By default, redirections for your session are displayed.
LQ	Displays the spool system queue in quick format, one line per entry.
EX	Terminates interactive mode.

ON and LI Command Options

The options that can be used with the ON and LI commands are:

NC	no carriage control
NF	no form feed
KC	keep control headers
PU	purge file when done
BP	print banner page
SS	suspend before and after printing

LU Redirection

LU redirection can be used to direct output to a different LU. For example, if you have a printer generated into your system at LU 25 but you have a program that outputs to LU 6, you can redirect output to LU 25, by entering the following commands to the SP program:

```
CI> sp on 6 25
LU redirection started from LU 6 to LU 25
```

Now, when you run your program, the output is rerouted to the printer at LU 25 instead of LU 6. Output begins to come out at the printer immediately. To terminate the redirection from LU 6 to 25, enter the following command from SP:

```
CI> sp of 6
LU redirection terminated from LU 6 to LU 25
```

By default, two-level chains of LU redirections may be created. For example:

```
CI> sp on 6 7
CI> sp on 7 8
```

In the above, output sent to LU 6 is sent to LU 8, following the chain of LU redirections. Note that only one chain of LU redirections is followed. For example, if LU 8 above were redirected to another LU, output sent to LU 6 would still be sent to LU 8, without following the next link in the chain.

To inhibit the chaining feature, use the DC option of the ON command. For example:

```
CI> sp on 6 7 dc
CI> sp on 7 6 dc
```

In the above, output sent to LU 6 is sent to LU 7, and output sent to LU 7 is sent to LU 6. If the DC option were not used, output sent to either LU would, in effect, not be redirected because the chain of redirections would redirect the output back to the same LU.

Spooling LU Output

In order to set up a spool file to a particular LU, the ON command is again used. This time no redirection LU is specified and, if no file name is specified, a default output spool file is created by the spool system. Any output to the LU is then stored in the default file until the spool system is again entered and the output is terminated using the OF command. At that point, all of the output is immediately spooled from the default file to the LU. The following example shows how to spool all output for LU 6 to a default spool file.

```
CI> sp on 6
  Spooling started from LU 6 to OUTSPOOL01.SPL::SPOOL
CI> co boot.cmd::system 6
CI> co temporary.file::texts 6
CI> co leternine.txt::texts 6
CI> sp
  RTE A Spooling System
  Type ? for help
- st
  Spool File Status:

Reference      : 1           Filename: OUTSPOOL01.SPL::SPOOL
Owner         : SCOUT       Session  : 1
Spool LU      : 6           Status   : Actively spooling
Approx Lines  : 21

- of 6
  Spooling terminated from LU 6 to OUTSPOOL01.SPL::SPOOL
- st
  Spool File Status:

Reference      : 1           Filename: OUTSPOOL01.SPL::SPOOL
Owner         : SCOUT       Session  : 1
Spool LU      : 6           Status   : Outputting to device
Approx Lines  : 21
```

The spool file OUTSPOOL01.SPL::SPOOL can be restarted or purged from the spooling system using the RE or PU commands. If purged, the file itself is removed. If errors are encountered, messages and suggested solutions are displayed from the spool system.

You may specify your own file to replace the default file of

OUTSPOOL01.SPL::SPOOL

in the ON command. In this case, spooling output is queued into the specified file. When the "OF *lu*" command is then issued, the output does NOT automatically begin at the LU. Only in the case of a default spool file name is output automatically sent from the file to the LU when the OF command is issued. To output the file to the re-directed LU, the spool LI command may be used.

ST Command Listing Format

If you specify the ST command, the status is displayed in the following format:

```
LU redirections for session 93:
```

```
5 => 6
```

```
8 => 9
```

```
Spool File Status:
```

```
Maximum Spool Files= 59
```

```
Reference      : 2
```

```
Filename: SRC/ARF::EMO
```

```
Owner          : TODD
```

```
Session : 93
```

```
Spool LU       : 6
```

```
Status  : Actively Spooling
```

```
Approx Lines  : 0
```

If the originating session has logged off, the session may show 0.

The status field can contain any of the following:

Actively spooling

All I/O destined for the spool LU is being routed (spooled) to file name specified.

Actively spooling (disk full)

Same as above but the disk is full or some other error has occurred. Attempts to continue writing to this LU will result in IO24 errors.

Outputting to device

Data in the file name specified is being routed to the spool LU.

Queued for outspooling

Data in the file name specified is waiting to be routed to the spool LU.

Waiting (downed device)

Output is suspended on a downed LU.

The line count field contains the current number of lines in the file.

SP Spooler Administration

To initialize the spooling system, enter the following from CI:

```
CI> sp in
Maximum Spool Files= 74
To increase the spool file limit, change the E/VMA size of SPGET
Spool System Initialized
```

The default EMA/VMA size of program SPGET allows for approximately 70 spool files. If the EMA/VMA size of SPGET is increased by 1 page, approximately three more files may be actively spooling at one time. The following example illustrates the process of shutting down the spooling system, resizing SPGET, and reinitializing. This example assumes that SPGET has been loaded as an EMA, not VMA, program, which is the default.

```
CI> sp qu
Spool System Shutting Down
CI> sz spget
Last Addr= 36441 Min.Part. 37 EMA/WS= 20 Mseg= 1 VMA = 0
CI> sz spget 30
CI> sz spget
Last Addr= 36441 Min.Part. 47 EMA/WS= 30 Mseg= 1 VMA = 0
CI> sp in
Maximum Spool Files= 112
To increase the spool file limit, change the E/VMA size of SPGET
Spool System Initialized
```

Spooling uses a SPOOLINFO file and creates spooling files on the global directory /SPOOL. If this global directory does not exist when the SP, IN command is given, SP creates it on the same LU as the current working directory. It is suggested that you create this directory on the desired disk. Then SP will use this directory for its SPOOLINFO and default spool files.

Occasionally the spool system may get lost beyond repair. Even attempts to shut down are ignored. To force spooling to shut down you may do the following:

1. Wait for all ongoing useful spool activity to complete. That is, if outspooling is still working or a session is still successfully spooling, allow it to continue.
2. Using the CI OF command, off the programs SPGET and SMP.
3. Off any hung OUTPT programs. They will be renamed to reflect the LU to which they are outputting; for example, OUTP6 outputs to LU 6, and OUT35 outputs to LU 35.
4. Purge the file /SPOOL/SPOOLINFO.SPL.
5. Restart spooling by entering "SP IN".

Programmatic Spooling

For information on programmatic spooling using the SP spool system, refer to the *RTE-A Programmer's Reference Manual*, part no. 92077-90007.

The PRINT Utility

The Print utility (PRINT) instructs the line printer to print files. PRINT has options that allow you to tailor the output to your individual programming and printing needs. PRINT runs in the background, instead of tying up your terminal until the printer has finished. It recognizes file masks and performs carriage control as specified in your file. Optionally, PRINT can indent the printed output, produce numbered listings, and create banners.

PRINT puts a file identifying header and a banner headline on the first page of each printed file. The header contains the complete file name and the create, update, access, and print times of your printed file. The banner headline contains your name and file name. You can stop the generation of the header and banner headline at link time or with runstring options.

PRINT Runstring



To run PRINT, enter the following runstring:

```
CI> [RU,] PRINT [filename] [lu] [options]
```

You may enter more than one file name in the runstring. When it runs, PRINT starts each file on a new page.

PRINT returns a listing of the print queue to your terminal screen if you do not enter any parameters in the runstring.

Normally, PRINT defaults to LU 6. You can set a different default LU at link time, or you can send the file to another LU by specifying an LU number in the runstring. Note that PRINT recognizes the LU specification as the printer regardless of where the LU number appears in the runstring.

You may enter a file mask in the runstring, and you may combine several features into a single runstring, as shown in the section on "PRINT Examples".

PRINT Options

You can place PRINT options anywhere in the runstring provided a plus sign (or a minus sign in the case of the `-B` option) precedes each one. Options entered once apply to all files entered in a runstring. The `+B`, `+T`, and `+W` options can be entered more than once in a runstring. Table 4-1 summarizes the available options.

Table 4-1. PRINT Options Summary

Option	Description
+?	Returns a short explanation of available options.
+A <i>output filename</i>	Appends the output to a specified file instead of an LU.
+B <i>string</i>	Prints the specified string as a banner headline.
-B	Do not print a banner.
+C ON OFF	Sets the carriage control option ON or OFF.
+F <i>n</i>	Advances paper the specified number of pages after all files are printed.
+H ON OFF	Print (ON) or do not print (OFF) the header before each file that is printed.
+I <i>n</i>	Indents each line by the specified number of spaces.
+L <i>n</i>	Specifies the number of characters per line in the banner.
+M <i>n</i>	Merges successive files with the specified number of blank lines between them.
+N	Produces a numbered listing for each file in the runstring.
+O <i>output filename</i>	Sends each file listed in the runstring to a specified destination.
+P	Purges printed files sent to the line printer.
+Q	Suppresses file mask verification.
+S	Suppresses the message "Print job supervised by PRINX".
+T <i>filename</i>	Transfers to <i>filename</i> to get the list of files to print.
+W <i>working directory</i>	Interprets file names from a specified working directory instead of current directory.
+X <i>n</i>	Prints all files contained in the runstring a specified number of times.
+Y <i>n</i>	Specifies the number of spaces between characters in the banner.
+Z	PRINT waits for PRIN0 to finish before completing.

+?

This option returns a short explanation of the PRINT options.

The format of the option is:

+?

+A

This option appends the output to a specified file instead of an LU. Compare +A to the +O option.

The format of the option is:

+A: *outputfilename*

+B

This option prints the specified string as a banner headline.

The format of the option is:

+B: *string*

Note that you may use +b more than once in a single runstring. In the following example, you may request up to six headlines per page by extending the option as shown:

```
PRINT +b:pascal +b:stuff file.pas file.lod
```

Here +b is used to combine specified banner headlines with default banners in the same runstring. This runstring prints the following two special headlines before the default banner and header:

```
PASCAL  
STUFF
```

The two headlines in this example precede the first page of output for file.pas.

-B

This option inhibits printing the default banner headline before each file that is printed.

The format of the option is:

-B

+C

This option sets the carriage control option ON or OFF. When you set it ON, the line printer does not print the first character of each line. Instead, it interprets any character in column one (of an otherwise blank line) as line or page formatting instructions.

When you set the carriage control OFF, the line printer prints the entire line, including the first character.

If you do not specify this option, PRINT determines the setting of the option by searching for a carriage control (a “1” in column one of an otherwise blank line) in the first 70 lines of the file. If it is not found, PRINT assumes that there is no carriage control information in the file. The search terminates before the 70 lines have been scanned if PRINT finds anything other than a “*”, “+”, “0”, “2”, or “3”.

The format of the option is:

```
+C : ON | OFF
```

+F

This option advances paper the specified number of pages after all files are printed. The form feed option overrides the defaults in the %FFL module set by the system installer at load time. Specify +F:3, for example, to get three form feeds at the end of a printed file.

The format of the option is:

```
+F : n
```

Note

In the case of serial I/O drivers, setting bit 10 in the CN,34B word is required to ensure that form feeds are recognized. This causes the driver to treat CN,11B,-1 as an unconditional page eject. (See Chapter 4, Serial I/O Drivers, in the *RTE-A Driver Reference Manual*, part number 92077-90011, for more information.)

+H

This option specifies whether or not to print the identifying header before each file printed. The header option overrides the defaults in the %FFL module set by the system installer at load time. Specify +H:OFF to suppress the identifying header.

The format of the option is:

```
+H : ON | OFF
```

+I

This option indents each line by the specified number of spaces. The default number of spaces is five.

The format of the option is:

```
+I : n
```

+L

This option specifies the number of characters per line in the banner headline. The characters per line option overrides the defaults in the %FFL module set by the system installer at load time. For example, specify +L:120 for a banner headline of 120 characters.

The number of characters per line should exceed the number of spaces between headline characters by at least 6 (see the +Y option).

The format of the option is:

+L:*n*

+M

This option merges successive files with the specified number of blank lines between them. The default number of blank lines is zero.

The format of the option is:

+M:*n*

+N

This option produces a numbered listing for each file in the runstring.

The format of the option is:

+N

+O

This option sends each file listed in the runstring to a specified destination. Use the +O option to transmit output to other files, including files on remote systems. This option overwrites destination files if they already exist. Compare this to the +A option.

The format of the option is:

+O:*outputfilename*

+P

This option purges the disk file that you have sent to the line printer.

The format of the option is:

+P

PRINT prompts you to confirm before it purges the files, unless you qualify the command with OK, as shown below:

+P:OK

In this case, prompting for confirmation is suppressed, and the files are purged.



+Q

This option suppresses file mask verification. If you do not use +Q, PRINT displays the files that match your runstring mask, and prompts you to verify printing them.

The format of the option is:

+Q

+S

This option suppresses the message “Print job supervised by PRINX”. It overrides the default included in the %FFL module set by the system installer.

The format of the option is:

+S

+T

This option allows PRINT to read from a given file the files that are to be printed.

The format of the option is:

+T:*filename*

The file can contain file names, file masks, blank lines, and comment lines. Only one file name per line is evaluated.

+W

This option interprets file names from a specified working directory instead of your current directory.

The format of the option is:

+W:*workingdir*

+X

This option prints all files contained in the runstring a specified number of times.

The format of the option is:

+X:*n*

+Y

This option allows a specified number of spaces to be inserted between headline characters in the banner. The number of spaces option overrides the defaults in the %FFL module set by the system installer at load time.

The number of characters per line (see the +L option) should exceed the number of spaces between headline characters by at least 6.

The format of the option is:

+Y:*n*

+Z

This option forces PRINT to wait for PRIN0 to finish before PRINT itself completes. This allows PRIN0 to pass return values back to PRINT, which can then pass them back to the caller (for example CI).

The format of the option is:

```
+Z
```

The return values are passed through the \$RETURN variables as described in the section “PRINT Return Values”.

PRINT Operation

When you call the PRINT utility, the following steps are executed:

1. PRINT expands any file masks, examines runstring arguments, and then stores any numeric argument as the output LU. PRINT defers evaluation of all options until the files are ready to print.
2. PRINT opens all the files, including those specified by the +T option, to ensure that it can read them.
3. PRINT RPs PRIN0 as PRIN1 (or PRIN2 and so on, if that program already exists). PRINT schedules this clone in the background, passing it all options, output, and input file names.

Note

Because only the PRINT program should invoke the clone, Hewlett-Packard reserves the right to change the parameter sequence. Invoking PRIN0 or its clones directly may destroy the parameters passed to it.

4. The PRIN0 clone takes control of the printing process. The PRINT command terminates and the CI or FMGR prompt returns to your screen, unless the +Z option is specified.
5. PRIN0 clone retrieves the working directory and locks the specified output file or device. If the carriage control option is not specified, the PRIN0 clone checks the first 70 lines of each input file for carriage control characters. The character 1 in the first column of an otherwise blank line signifies a carriage control character and directs the line printer to discard the first column of each line in your file. By contrast, alphabetic letters in column 1 force PRINT to copy your file column-for-column to the line printer.
6. If the +Z option is specified, PRIN0 passes return values to PRINT, see the “PRINT Return Values” section.

To abort a print job, use the CI command WH to determine the name of the PRIN0 clone doing the actual printing, and then use the BR command. For example:

```
CI> br prin1
```


PRINT Messages

When you run it without any parameters, PRINT displays the printer queue and reports:

- the name of the file printing slave program
- the status of the file printing slave program
- the line printer LU for that print job
- the print job's priority (lower numbers get printed earlier)
- the terminal LU from which that print job was invoked

When you run it with parameters, PRINT displays a warning message if any input file is a type 1, 2, 5, 6, or 7 file, or if FMP errors occur while reading a file.

In these cases, control passes from the first unprintable file in the runstring to the next printable file.

PRINT issues a warning and quits entirely in the following cases:

- if you enter the system BR (Break) command
- if you enter an unrecognizable option
- if you create an unwritable output file, or if an FMP error occurs while accessing an output file
- if the printer LU goes down, or the LU number is outside the 0 to 255 range or does not exist
- if PRINT cannot find PRIN0, the master printing clone, or cannot execute PRIN0
- if nine or more PRINT requests are already active

PRINT Return Values

PRINT always returns the following values:

`$RETURN1` the number of errors encountered by PRINT
`$RETURN_S` the name under which PRIN0 was run

In addition, the +Z option can be used to force PRINT to wait for PRIN0 to finish before PRINT itself completes. This allows PRIN0 to pass return values back to PRINT, which can then pass them back to the caller (for example, CI). Therefore, if the +Z option is specified, the following additional values are returned:

`$RETURN2` the number of files printed by PRIN0
`$RETURN3` the number of errors encountered by PRIN0

PRINT Examples

Example 1: Print one copy of INPUT.ROFF, two copies of OUTPUT, and one of INDEX.

```
CI> print input.roff output output index
```

Example 2: Send the OUTPUT file to LU 12 instead of LU 6.

```
CI> print output 12
```

Example 3: Print every file in the current directory that has a type extension of .FTN.

```
CI> print @.ftn
```

Example 4: Send several files to LU 24 instead of LU 6.

```
CI> print 24 kalderesult src/kalde@
```

Example 5: Print MV.HELP from the current directory along with the following files:

/HELP/RN	/HELP/TUTORIALS/CI
/HELP/MO	/HELP/TUTORIALS/MAKE
/HELP/CO	/HELP/TUTORIALS/MACRO

```
CI> print mv.help +w:/help rn mo co +w:/help/tutorials ci make macro
```

Example 6: Print the following files:

SRC/PLIBF.FTN	SRC/PLIBM.MAC
HELP/PRINT	HELP/FILES
/SCRATCH/OUT	

```
CI> print +w:src plibf.ftn plibm.mac +w:help print files /scratch/out
```

Note that SRC and HELP are subdirectories of the current directory; /SCRATCH is a global directory. Working directories without a leading slash are interpreted as relative to the working directory.

Example 7: Print the file MV.HELP from the current working directory and the first occurrence of &PLIBF found on a FMGR cartridge.

```
CI> print mv.help +w:0 &plibf
```

Example 8: Include C.85 as a banner headline along with the default banner headlines.

```
CI> print +b:C.85 +b:libraries: fnewf.ftn @.mac
```

This example produces a leading page with the following banners:

```
C.85  
LIBRARIES:  
FNEWF.FTN
```

These are followed by the printed contents of FNEWF.FTN, a page with the following banner:

```
FOLDF.MAC  
USERNAME
```

The banner is followed by the contents of the file FOLDF.MAC (assuming that is the only file matching @.MAC).

Example 9: Create the following pages (note that the current directory contains A.FTN, B.FTN, C.FTN, ALIB.MAC, BLIB.MAC, A.MAKE, and MAKEFILE.MAKE):

- a page with the banner headlines FMP SOURCES and A.FTN followed by the contents of the file A.FTN
- a page with the banner headline B.FTN followed by the contents of the file B.FTN
- a page with the banner headline C.FTN followed by the contents of the file C.FTN
- a page with the banner headline ALIB.MAC followed by the contents of the file ALIB.MAC
- a page with the banner headline BLIB.MAC followed by the contents of the file BLIB.MAC
- a page with the banner headlines MAKEFILES and A.MAKE followed by the contents of the file A.MAKE
- a page with the banner headline MAKEFILE.MAKE followed by the contents of the file MAKEFILE.MAKE

```
CI> print +b:fmp +b:sources @.ftn @.mac +b:makefiles @.make
```

PRINT Administration

Install PRINT by linking PRINT and PRIN0 and placing the resulting type 6 files on the directory /PROGRAMS. Use the link command files #PRINT and #PRIN0.

You can configure certain PRINT attributes at link time using the &FFL module. To change the attributes listed in Table 4-2, edit and compile &FFL, then link PRINT and PRIN0 using #PRINT and #PRIN0. The #PRINT, #PRIN0 command files and the &FFL module all reside in the directory /RTE_A.

Note The &FFL module requires the HP 92836A FORTRAN 77 product in order to customize it for the PRINT utility. The FORTRAN 77 product is an optional product and is not available on the system unless purchased separately.

Table 4-2 shows the &FFL variables, their defaults, and the corresponding PRINT runstring options that can be used to override the value set in &FFL. These variables exist in data statements in the &FFL module.



Table 4-2. &FFL Variables

Variable	Explanation	Default Value	PRINT Option Override
defbanner	Should a banner be printed before each file?	yes	-B
header	Should a header be printed before each file?	yes	+H
numffs	How many form feeds belong at the end of the listing?	2	+F
outputlu	Default printer LU	6	n
printmsgquiet	Should message "Print job supervised by PRINX" be suppressed?	no	+Q
The following variables control the width and spacing of banner headlines only:			
printerlength	How many spaces per line sent to the line printer?	80	+L
filelength	How many spaces per line sent to the file?	80	+L
printerbanspace	How many spaces between banner characters?	3	+Y
filebanspace	How many spaces between banner characters?	3	+Y

A listing of the &FFL module is given below:

```
ftn7x,l,q,s,c
*
*   NAME:   FFL
*   SOURCE: 92077-18067
*   RELOC:  92077-16067
*   PGMR:   sb
*
* *****
* * (C) COPYRIGHT HEWLETT-PACKARD COMPANY 1984. ALL RIGHTS *
* * RESERVED. NO PART OF THIS PROGRAM MAY BE PHOTOCOPIED, *
* * REPRODUCED OR TRANSLATED TO ANOTHER PROGRAM LANGUAGE WITHOUT *
* * THE PRIOR WRITTEN CONSENT OF HEWLETT-PACKARD COMPANY. *
* *****
*
*   block data ffl
*   +,92077-16067 REV.6100 <930709.1609>
*
*   Do not alter these declarations !!
*
*
*   common /defoptions/ defbanner,header
*   logical*2           defbanner,header
*
*   common /ff/ numffs
*   integer*2          numffs
*
*   common /outputlu/ outputlu
*   integer*2          outputlu
*
*   common /lengths/ printerlength,filelength,
*   +                printerbanspace,filebanspace
*   integer*2         printerlength,filelength,
*   +                printerbanspace,filebanspace
*
*   common /optprintmsg/ printmsgquiet
*   logical*2         printmsgquiet
*
*   common /drivers/ driversok
*   integer*2         driversok(0:3)
*
*   Tailor the values within the slashes below according to local tastes
*
*
*   data defbanner      /.true./  ! print banner before each file?
*   data header         /.true./  ! print header before each file?
*
*   data numffs         /2/       ! number of form feeds after last file
```

```

data outputlu          /6/          ! default printer lu

data printmsgquiet     /.false./ ! suppress print verification message
                        "Print job supervised by PRINx"
*
*
* Following variables are used to determine the number of banner
* characters allowed on one line
*

data printerlength     /80/          ! printer line length
data filelength        /80/          ! file line length
data printerbanspace   /3/          ! spaces between banner chars - printer
data filebanspace      /3/          ! spaces between banner chars - file

*
* The following array is used to determine which drivers PRINT will
* recognize. These bits correspond to driver types with DVT=0 being
* the most significant bit of the first word and DVT=77b being the least
* significant bit of the last word.

* The following are set by default:
*   Driver Type          Device
*   1-7b                 Terminals
*   12b                   Printers

data driversok         /077440b,    ! driver types 0b-17b
+                      000000b,    ! driver types 10b-37b
+                      000000b,    ! driver types 40b-57b
+                      000000b/    ! driver types 60b-77b

end

```



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