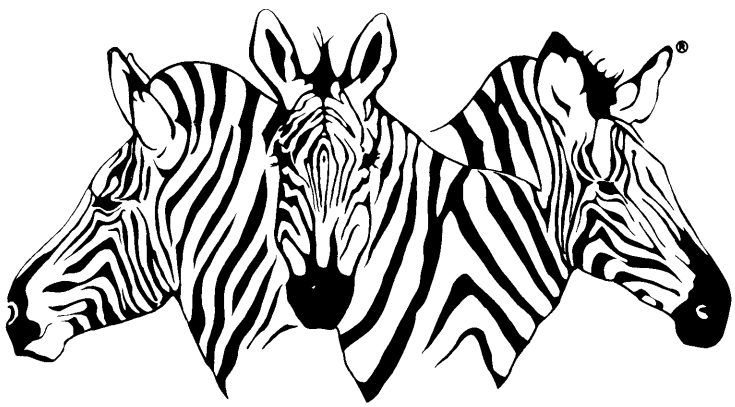
PICK SPOOLER
reference manual

88A00777A02



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FOREWORD

This document is one of a family of ZEBRA reference manuals devoted to PICK processors that are on call within the PICK operating system. Before reading this document and using the processor described, it is recommended that you first become familiar with the PICK terminal control language and file structure. These subjects are thoroughly covered in 88A00782A, listed below with other documents covering PICK processors.

Document No.	Title
88A00757A	PICK Operator Guide
88A00758A	ACCU-PLOT Operator Guide
88A00759A	COMPU-SHEET Operator Guide
88A00760A	Quick Guide for the PICK Operating System
88A00774A	PICK Utilities Guide
88A00776A	PICK ACCESS Reference Manual
88A00778A	PICK BASIC Reference Manual
88A00779A	PICK EDITOR Referance Manual
88A00780A	PICK PROC Reference Manual
88A00781A	PICK RUNOFF Reference Manual
88A00782A	Introduction to PICK TCL and FILE STRUCTURE
88A00783A	PICK JET Word Processor Guide

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1 introduction

Printer action is controlled by a subsystem called the SPOOLER, a program that sets up and manages print queues, stores them on disk and outputs them to printer when called. Each printer can only serve one user at a time. However, the SPOOLER allows many processes to generate output to a printer at the same time without conflict over the physical device, and it allows flexibility as to what gets printed where and when.

The process of generating a report and obtaining it from the printer is as follows. The user executes a routine which generates print output. This is stored on disk and creates a control record pointing to the print file. The SPOOLER then finds the print file and executes the actual printing process.

SPOOLER runs as a separate process which is numerically the last communication line on the system. Since the terminal for this line does not exist, this is often referred to as a "phantom process". The SPOOLER is automatically started by either a "FILE-RESTORE" or a "COLD-START" and is assigned to the last hardware terminal communication line in the system + 1. The SPOOLER may also be restarted by use of the :STARTSPOOLER verb.

Under the PICK operating system, SPOOLER is a unique processor and is, therefore, equipped with a complete set of TCL verbs for communicating with PICK. The use of the verbs initiates action within the SPOOLER. The tape or cartridge drive is considered a peripheral and is not part of the SPOOLER system. Tape verbs and a description of tape handling are covered extensively in the Utilities Manual.

SPOOLER verbs may indirectly call out different destinations, one of which can be 1/4" tape cartridge or 5MB disk cartridge. Whenever this is the case, it will be noted in the following text as "tape/disk cartridge."

spooler verbs 2

A summary of verbs and a brief description of their functions is described below.

Verb	Brief Description
LISTABS	Displays the assignment of each line on the system.
LISTPEQS	Displays the print file control records.
LISTPTR	Displays the printer control block.
SP-ASSIGN	Defines the print file destination.
SP-CLOSE	Terminates the SP-OPEN condition, so that the print file is closed.
SP-EDIT	Allows operation on hold files.
SP-KILL	Cancels the current output from a printer, disenqueues a print file, or deletes a printer from the system.
SP-OPEN	Causes a sequence of jobs to be taken as one job for purposes of output.
SP-STATUS	Displays the current status of the spooler and each defined printer.
SP-TAPEOUT	Prints a tape created by the spooler. Note that some ZEBRA PICK models use a cartridge disk rather than tape for system backup media. This verb may be used with either media.
STARTPTR	Initializes a printer.
STOPPTR	Halts printer after current job.
:STARTSPOOLER	Restarts spooler when necessary.

2.1 LISTABS

The LISTABS verb lists the current assignment of all or any lines on the system. The verb is useful if there is a question as to the allocation of a running process, or to discover why print files seem to be going to unexpected places. The general form of the LISTABS verb:

```
LISTABS {options}
```

When used without a line-number, LISTABS will list information for all lines on the system. The options are:

options

n	Lists information for line number specified.
n-m	Lists information for range of line numbers specified.
P	Prints information on the printer.

An example of the LISTABS verb:

```
>LISTABS

  LINE    STATUS  COP    FORM
    #             IES      #

     0    P         1       5
     1    PI        1       0
     2    P         4       0
     3    PIC       1       0
     4    PI        1       0
     5    PO        1       0
     6    HT        1       0
     7    H         1       0
     8              0       0
     9              0       0
    10              0       0
    11              0       0
    12              0       0
```

Status Indicators

C	Choke the creating process to printer speed.
H	Create and keep a hold file copy.
I	Enqueue the job at the beginning of the job.
O	Keep the print file open at close time.
P	Output to printer.
T	Output to tape.

2.2 LISTPEQS

The LISTPEQS verb lets you examine the permanent print file control record area. It allows the system manager and system users to find out the disposition of individual print files, the activity on specific accounts, and the condition of spooler storage. The general form of LISTPEQS is:

LISTPEQS {options}

options	
A	Displays only the print files generated on the account onto which you are currently logged.
C	Displays only the number of print files with the amount of storage used as totals for the class of print files specified by other options.
E	Displays print file real storage location. This may be used in conjunction with the DUMP verb.
F	Displays enqueued print files in their output sequence by queues in the natural order. (Null queues will not be displayed.)
L	Displays those print files which are deleted as well as those which are active.
n	Displays only information for requested print file n. Specify it with print file control block entry #n, which is the same number output as the ENTRY #n message received on the initiation of the print file, and the one used by SP-EDIT.
n-m	Displays print files n through m, inclusive, as above.
P	Causes the LISTPEQS output to be printed.
'account-name'	Displays all print files generated on the account with the name 'account-name'.

The LISTPEQS verb displays information selected from print file control block elements. The control block element refers to an individual print file and is referenced by the 'ENTRY #' number given the print file at generation time and used in SP-EDITing. The information given will describe both live and recently released print files.

The print file control block is set up when the first line of output from the generating process is spooled. The generating process enters the spooling routine and checks whether it has a place to put the current line. If it does not have the necessary storage structure, it proceeds to obtain a print file control block on a first available basis, and a frame of storage for the line of output. It transfers the output specifications for the job from the SP-ASSIGNment block and the print file storage location to the print file control block, and also transfers the line's identification and the date and time of initiation. It then proceeds to other tasks but returns at close time to mark the control block element and to transfer the number of frames used.

A diagram of the control block fields follows:

LISTPEQS CONTROL BLOCK FIELDS

```
 #  STAT LK LN STATUSES           CP FO FRMS     DATE      TIME      ACCT

16  C009    11 A (HP C RL )        1  4   38   01/31/79  16:42:30  TSB
 |      |   |  | |                  |  |    |   |         |         |
 |      |   |  | |                  |  |    |   |         |         |-Acct name
 |      |   |  | |                  |  |    |   |         |
 |      |   |  | |                  |  |    |   |         |-Creation time
 |      |   |  | |                  |  |    |   |-Creation date
 |      |   |  | |                  |  |    |-Number of frames in closed file;
 |      |   |  | |                  |  |      OPEN if open; residue at close for
 |      |   |  | |                  |  |      choked file.
 |      |   |  | |                  |  |-Form number from SP-ASSIGN or SP-EDIT R
 |      |   |  | |                  |-Copy count from SP-ASSIGN or SP-EDIT R.
 |      |   |  | |
 |      |   |  | |-Print file status indicators:
 |      |   |  |  A-Available       O-Being output
 |      |   |  |  C-Closed          P-Printer
 |      |   |  |  G-Align           R-Requeued (SP-EDITed)
 |      |   |  |  H-Hold file       S-Spooled
 |      |   |  |  I-Immediate       T-Tape
 |      |   |  |  L-Locked          X-Aborted (SP-KILL)
 |      |   |  |  N-No close
 |      |   |  |
 |      |   |  |-Line number of generation or SP-EDIT spooling.
 |      |   |-Forward link, if non-zero.
 |      |-Status tally.
 |-Spooler permanent entry number for SP-EDIT use.
```

The print file control block element (or entry) will persist until the print file is deleted from the system by either the spooler or an SP-EDITing process, at which time that print file control block entry slot will be marked available. The entry slot will remain until it is used by another print file. How long that may be depends on the relative rate at which print files whose control blocks precede the control block in question are made available, and the rate at which new print files are generated.

Note that the number of frames displayed will be spurious in the case of SP-ASSIGN I and IC jobs. The number of frames used will reflect the number of frames left to print when the print file was closed, rather than the total number of frames used. This will be important only in the SP-ASSIGN HI case, or if multiple copies are desired, and when precise overflow availability calculations are being performed.

2.2.1 LISTPEQS STATUS INDICATORS

If the status is available, the leading indicator will be an A and the indicators of the status of the element will be enclosed in parentheses. The other status indicators are grouped into four blocks delimited by blanks. These appear under the heading "STATUSES" in the LISTPEQS display.

Statuses

A (...) specifies that the control block slot is available.

C Indicates that the print file is closed; its absence indicates that the print file is still open, which means that it is currently being generated or is in an SP-OPEN condition.

G Indicates that the control record references a phantom print file which is the alignment segment of another print file which was aligned.

H Specifies that this is a hold file, either by virtue of the SP-ASSIGNment under which it was created, or because it was dequeued by the execution of the SP-KILL F verb, or due to the occurrence of a cold start.

I Indicates that the print file was linked on to its specified output queue when it was initiated.

L Indicates that the record is locked. It cannot be SP-EDITed when it is locked, except by the SP-EDIT L option. The control block record will be locked when it is available, open, spooled, being output, or while being SP-EDITed. Only one process can deal with a print file at a time. It should return to an unlocked state after any abnormal termination of the SP-EDIT process. It will be set to hold file status and unlocked at cold start time, unless it does not pass certain validity tests.

N Specifies that the print file was generated under an SP-OPEN condition or SP-ASSIGN 0 specification.

O Indicates that the print file is being output. Since it is spooled, that condition should be indicated by the S indicator as well. Further, the file should show up in the LISTPEQS F display, and in the SP-STATUS display as a print file being output by one of the printers. If the print file has disappeared from the LISTPEQS F display but not the SP-STATUS display, it should terminate normally; if it has disappeared from the SP-STATUS display, a SP-KILL FOn is probably called for. If that does not remove the control record, a :STARTSPOOLER will. Be sure to check twice, however, because it is possible to display the record during transitions.

Statuses

P	Specifies the file is to go to the printer either from the initial SP-ASSIGNment, or by virtue of the SP-ASSIGNment in effect at SP-EDIT time. In the latter case, the R indicator will probably be on.
R	Indicates that the print file has been requeued (SP-EDITed) and sent to the printer at some time.
S	Indicates that the print file is spooled to an output queue, and therefore should appear in an execution of LISTPEQS F. If it does not, execute an SP-KILL Fn, and then requeue it as necessary.
T	Indicates that the print file has gone to tape by means of the SP-EDIT process.
X	Indicates that the print file has been aborted by the SP-KILL process at some time.

2.2.2 LISTPEQS EXAMPLES

List of all permanent queue elements:

```
>LISTPEQS L

     PRINTER LIST ELEMENTS                          02 FEB 1979  12:51:05

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 1 C080    11 HP C                  1  4  261  01/31/79  17:49:32  TSB
 2 C080     1 HP C                  1  4  575  02/02/79  10:58:54  TSB
 3 81C0     5 H C                   1  0   37  02/01/79  10:37:52  MANUALS
 4 C088     0 HP C R                1  0   81  02/01/79  10:32:53  BUGEYE
 5 81C1     5 H C                   3  0 OPEN  02/02/79  12:51:06  DP
 6 41C1     7 P L                   1  0 OPEN  02/02/79  12:43:06  MANUALS
 7 8001     5 A (H C L )            3  0    2  02/02/79  12:44:18  DP
 8 C088     9 HP C R                1  0   30  02/01/79  09:43:19  BUGEYE
 9 C098     5 HP C XR               5  1   21  01/31/79  12:06:56  DP
10 C080     1 HP C                  1  4  420  02/01/79  09:48:16  TSB
11 8001     5 A (H C L )            3  0    1  02/02/79  12:40:05  DP
12 6001     1 A (PI C L )           1  0    5  01/31/79  18:44:49  BFS
13 C100     5 A (HP C )             1  5    1  01/31/79  15:38:59  CAROL
14 C019    11 A (HP C XRL )         1  0    2  01/31/79  16:04:21  TSB
15 C098     7 HP C XR               1  0   19  01/31/79  16:12:08  CAROL
16 C009    11 A (HP C RL )          1  4   38  01/31/79  16:42:30  TSB
17 4011     3 A (P C XL )           1  0   64  01/31/79  17:09:12  ADM
18 C001    11 A (HP C L )           1  4    1  01/31/79  17:10:21  TSB
19 4001     7 A (P C L )            1  0    5  01/31/79  17:10:59  CAROL
20 4001     7 A (P C L )            1  0    3  01/31/79  17:11:07  CAROL
21 4001     7 A (P C L )            1  0   17  01/31/79  17:11:16  CAROL
22 4001     7 A (P C L )            1  0   22  01/31/79  17:11:30  CAROL

22 QUEUE ELEMENTS LISTED.                  1609 FRAMES IN USE.
```

Listing of control records of print files generated on this account:

```
>LISTPEQS AL

     PRINTER LIST ELEMENTS                          02 FEB 1979  12:51:17

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 5 8080     5 H C                   3  0    4  02/02/79  12:51:06  DP
 7 80C1     5 H L                   3  0 OPEN  02/02/79  12:51:18  DP
 9 C098     5 HP C XR               5  1   21  01/31/79  12:06:56  DP
11 8001     5 A (H C L )            3  0    1  02/02/79  12:40:05  DP

 4 QUEUE ELEMENTS LISTED.                     26 FRAMES IN USE.
```

Listing of queue elements retaining storage:

```
>LISTPEQS

     PRINTER LIST ELEMENTS                          02 FEB 1979  12:51:55

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 1 C080    11 HP C                  1  4  261  01/31/79  17:49:32  TSB
 2 C080     1 HP C                  1  4  575  02/02/79  10:58:54  TSB
 3 81C0     5 H C                   1  0   37  02/01/79  10:37:52  MANUALS
 4 C080     0 HP C R                1  0   81  02/01/79  10:32:53  BUGEYE
 5 8080     5 H C                   3  0    4  02/02/79  12:51:06  DP
 6 41C1     5 P L                   1  0 OPEN  02/02/79  12:43:06  MANUALS
 7 8080     5 H C                   3  0    1  02/02/79  12:51:18  DP
 8 C088     9 HP C R                1  0   30  02/01/79  09:43:19  BUGEYE
 9 C098     5 HP C XR               5  1   21  01/31/79  12:06:56  DP
10 C080     1 HP C                  1  4  420  02/01/79  09:48:16  TSB
11 80C1     5 H L                   3  0 OPEN  02/02/79  12:51:56  DP
15 C098     7 HP C XR               1  0   19  01/31/79  16:12:08  CAROL

12 QUEUE ELEMENTS LISTED.                  1449 FRAMES IN USE.
```

Listing of queue elements 5 through 10:

```
>LISTPEQS 5-10

     PRINTER LIST ELEMENTS                          02 FEB 1979  12:52:43

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 5 8080     5 H C                   3  0    4  02/02/79  12:51:06  DP
 6 41C1     5 P L                   1  0 OPEN  02/02/79  12:43:06  MANUALS
 7 8080     5 H C                   3  0    1  02/02/79  12:51:18  DP
 8 C088     9 HP C R                1  0   30  02/01/79  09:43:19  BUGEYE
 9 C098     5 HP C XR               5  1   21  01/31/79  12:06:56  DP
10 C080     1 HP C                  1  4  420  02/01/79  09:48:16  TSB

 6 QUEUE ELEMENTS LISTED.                   476 FRAMES IN USE.
```

Listing counts number of live queue elements and the number of frames used:

```
>LISTPEQS C

     PRINTER LIST ELEMENTS                          02 FEB 1979  12:53:37

12 QUEUE ELEMENTS LISTED.                  1449 FRAMES IN USE.
```

Listing of queue elements by output queue. In this case, note that there is a printer outputting print file control block entry 5, which is in form queue 4:

```
>LISTPEQS F

FORM QUEUE 0

     PRINTER LIST ELEMENTS                          15 FEB 1979  12:08:37

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 3 4085  4  3 P C S L                1  0   77  02/15/79  11:09:48  ADM
 4 4085  8 13 P C S L                1  0    1  02/15/79  11:32:40  JB
 8 4085    14 P C S L                1  0    2  02/15/79  11:52:20  CHRIS

FORM QUEUE 4

 5 COAD     0 HP C SO RL             1  4  250  02/15/79  10:26:43  DP

FORM QUEUE 5

 6 4085  2  0 P C S L                1  5    1  02/15/79  11:52:09  DP
 2 C09D     0 HP C S XRL             3  5  420  02/14/79  22:08:31  TSB

 6 QUEUE ELEMENTS LISTED.                   751 FRAMES IN USE.
```

Listing for LISTPEQS 'account-name':

```
>LISTPEQS 'MANUALS'

     PRINTER LIST ELEMENTS                          11 MAY 1979  11:55:13

 # STAT LK LN STATUSES              CP FO FRMS    DATE      TIME     ACCT

 1 C8AD  7  7 HP A SO RL             1  0 3946  05/10/79  10:57:15  MANUALS
 2 CB88     7 HP C R                 1  0   67  05/10/79  11:32:26  MANUALS
 4 8880     0 H C                    1  0 3945  05/11/79  10:42:48  MANUALS
 5 8880     0 H C                    1  0   67  05/11/79  11:02:44  MANUALS
 6 8880     0 H C                    1  0  107  05/11/79  11:05:33  MANUALS
 7 C88D     7 HP C S RL              1  0  128  05/08/79  08:00:48  MANUALS

 6 QUEUE ELEMENTS.                          8260 FRAMES IN USE.
```

Note that if other options are used, they must be given either in front of the 'account-name', or following it preceded by a left parenthesis. (The account-name must precede any left parenthesis.) In this particular example, print file #1 is being output, and print file #7 is linked on behind it.

2.3 LISTPTR

The LISTPTR verb lists the currently allocated printer control blocks, including number, status and forms allocated.

The general form of the LISTPTR verb is:

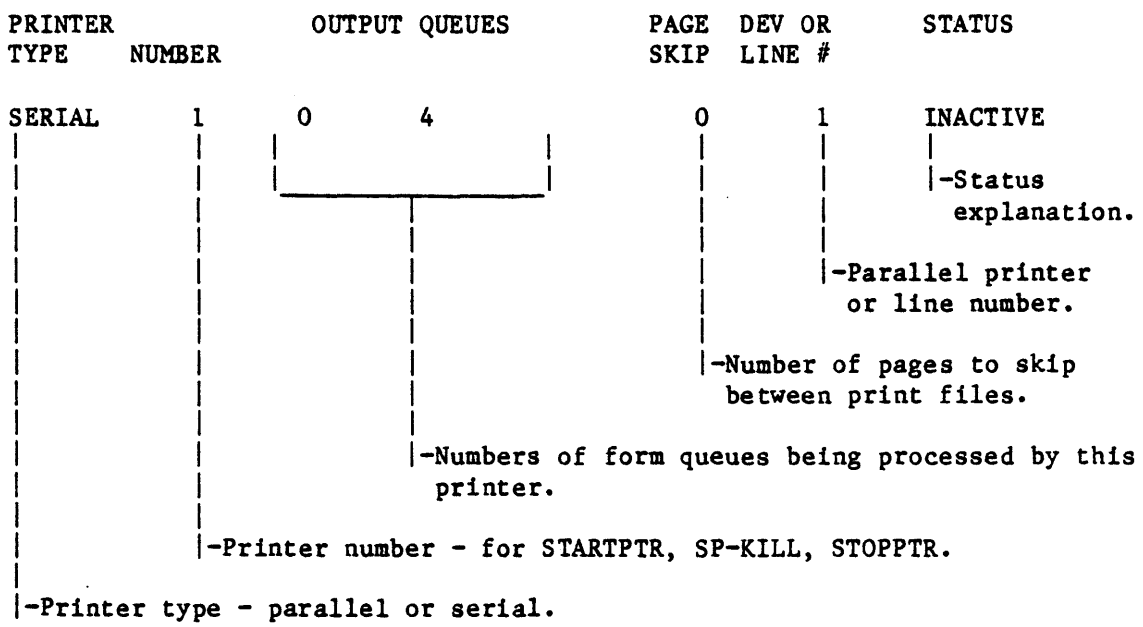
LISTPTR {options}

When used without options, LISTPTR will list information for all printers on the system that are currently allocated. The options are:

options

B	Also lists unallocated printers.
n	Lists only the allocated printer whose number is specified.
n-m	Lists only the allocated printers whose range of numbers is specified.
P	Prints information on the printer.

The LISTPTR verb is used to reveal the state of the printers and their form allocations. It is to be used in conjunction with the STARTPTR, LISTPEQS, and SP-EDIT verbs, and when the information given by the SP-STATUS verb is more than you want. The LISTPTR data fields are:



The possible status conditions are:

STOPPED	The printer is set to stop.
INACTIVE	The printer is inactive. If it is also STOPPED, the STARTPTR verb may be used on the printer.
ACTIVE	The printer is printing a report, or initiating or terminating a print file.
UNALLOCATED	The printer has never been started, or has been deleted by the SP-KILL D verb, or has been lost due to a control block error. It may be started by the STARTPTR verb.

Note that it is possible for a printer to be STOPPED and either ACTIVE or INACTIVE. This is because the STOPPTR verb only marks the printer to stop at the completion of the current job or copy of a print file. A printer may not be restarted until the printer is both INACTIVE and STOPPED.

2.3.1 LISTPTR EFFECT ON PROC

The LISTPTR verb generates the following pattern in the PROC secondary input buffer: The first argument will always be 1134, which is the source of the heading in the display. Each printer is then represented as a block of either two or six arguments. If the printer is unallocated, there will be two arguments; if the printer is allocated, there will be six. The first element in each printer block is a condition value. Printers with the condition 1174, unallocated, will have one argument following the condition code. Printers with the condition 1171, inactive, and 1172, active, will have five arguments following the condition code. The argument following the condition code is the printer number in all cases. This finishes the block for unallocated printers.

If the printer is allocated, the printer number will be followed, in order, by the numbers of the first, second, and third specified output queues. The sixth argument in the block is the number of pages to eject. Two examples showing the PROC secondary input buffer contents which result from executing LISTPTR in a PROC follow.

LISTPTR and the PROC secondary input buffer listing one printer:

```
>LISTPTR 1
PRINTER ASSIGNMENTS                                        12:44:11
PRINTER              OUTPUT QUEUES          PAGE  DEV OR      STATUS
TYPE    NUMBER                              SKIP  LINE #

SERIAL       1      0       4                  0       1      INACTIVE
             /      /       /     /            /              /
          --+------+-------+-----+-----------+--------------
            | |     /       /     /           /
            | |    /    ----     /           /
            | |   |    /    -----           /
            | |   |   |    /   ------------
            | |   |   |   |   /
            | |   |   |   |  |
1134  1171 1   0   4 127  0
   |      | |   |   |   |  |-Page skip specification.
   |      | |   |   |   |
   |      | |   |   |   |-Queue 3; 127 specifies no queue and is
   |      | |   |   |     internal flag.
   |      | |   |   |
   |      | |   |   |-Output queue 2; in this case, 4.
   |      | |   |
   |      | |   |-Output queue 1; in this case, 0.
   |      | |
   |      | |-Printer number 1.
   |      |
   |      |-The printer is inactive.
   |
   |-The buffer contents are marked as a LISTPTR result.
```

LISTPTR PROC secondary input buffer contents listing several printers:

```
>LISTPTR 0-4

PRINTER ASSIGNMENTS                                        12:44:19

PRINTER              OUTPUT QUEUES          PAGE  DEV OR      STATUS
TYPE    NUMBER                              SKIP  LINE #

SERIAL      0      1                          0       0      ACTIVE STOPPED
SERIAL      1      0       4                  0       1      INACTIVE
SERIAL      2                                                 UNALLOCATED
SERIAL      3                                                 UNALLOCATED
SERIAL      4                                                 UNALLOCATED

1134 1172 0 1 127 127 0 1171 1 0 4 127 0 1174 2 1174 3 1174 4
   | |               | |              | |    | |    | |    |
   | ----------------- ---------------- ------ ------ ------
   |         |                  |           |      |      |
   |         |                  |           |      |      |-Printer 4 block
   |         |                  |           |      |
   |         |                  |           |      |-Printer 3 block
   |         |                  |           |
   |         |                  |           |-Printer 2 block
   |         |                  |
   |         |                  |-Printer 1 block; inactive
   |         |
   |         |-Printer 0 block; active
   |
   |-The LISTPTR PROC secondary input buffer residue mark.
```

In this example, note that allocated printers have six arguments, that unallocated printers have two, that the first argument in each block is the printer condition code, and that the second is the printer number. The third through sixth arguments are the output queue and page skip specifications. An output queue value of 127 specifies that there is no output queue specified for that element.

2.4 SP-ASSIGN

Device assignments are set by the individual terminal user. Each user can modify his device assignment by use of the SP-ASSIGN verb. The logon process assigns the line printer as the standard output device. This can be altered at any time via the SP-ASSIGN verb. The general form of SP-ASSIGN:

SP-ASSIGN {options}

Any or all of these options can be used together, except that the S option causes the I option to be without meaning, and that the absence of the I option or the presence of the H option causes the C parameter to be meaningless. The options can be in any order. The numbers associated with predefinition and form specification must be concatenated with their character keys; R and F.

Destination	SP-ASSIGN Options
H	Hold file.
S	Suppress printing.
T	Tape or cartridge disk.
(default)	Printer.

Queue-time	
I	Immediate.
(default)	At end of job.

Miscellaneous

C	Choke. Input enters wait loop when more than 20 frames ahead of output.
Fn	Form number (i.e., output queue). 125 maximum. Default: 0.
n	Number of copies of print file to output. 125 maximum. Default: 1.
O	Open. Keeps print file open at end of job.
Rn	Preassigns print file generated by BASIC program using PRINT ON n statement. n = PRINT ON n.
?	Query. Displays your line's assignments.

2.4.1 DESTINATION SPECIFICATION

There are four possible output destinations: printer, tape or cartridge disk, hold file, and nowhere. Output to the printer is the default. The possibilities are:

Destination Options	Results
S	Suppress printer output. Causes output not to be printed.
T	Tape or cartridge disk. Causes output to be sent to the tape or cartridge disk.
H	Holdfile. Causes output to be retained in a hold file.

Note that the T specification will cause the process to send its print file output directly to tape or cartridge disk. This allows control over the tape block size and suppression of the tape or cartridge disk label. It also means that several different print files created by the PRINT ON statement in BASIC can be intermixed on the tape or cartridge disk. See the discussion of print file predefinition below.

The specifiers used with SP-ASSIGN may be in any order. The above three specifiers may be used in the following combinations with the following meanings:

Destination Options	Results
S	The print file disappears.
H	The print file will become a hold file on disk, and it will be enqueued for output.
HS	The print file will become a hold file. It will not be enqueued for output.
T	The print file will be output to tape or cartridge disk as it is generated, and a disk print file will be created which will be enqueued for output.
TS	The print file will be output to tape or cartridge disk as it is generated; it will not become a disk print file.
THS	The print file will be output to tape or cartridge disk as it is generated; a hold file copy of it will be created on disk, and it will not be enqueued for output.

Examples of HS and T options:

HS Option:

```
    >SP-ASSIGN HS3?

    LINE     STATUS  COP   FORM
       #             IES     #

       5     H         3     0

       This will cause:  Retention of the print file upon completion;
                         If the form and copy parameters are not
                             changed at SP-EDIT time, it will:
                         Print three copies on a printer allocated to form 0.
                         In order to change the assignment parameters
                             at SP-EDIT time, use the SP-ASSIGN verb,
                             followed by SP-EDIT with the R option.
```

T Option:

```
    >SP-ASSIGN TS?

    LINE     STATUS  COP   FORM
       #             IES     #

       5     T         1     0

       This will cause:  The output generated by the process to go
                             directly to tape or cartridge disk under
                             the control of the generating process.
                         There will be no spooler involvement.
```

2.4.1.1 Immediate Specification

There are two enqueing timings, immediate and at the end of the job. At the end of the job is the default.

Queue-Time Option	
I	Immediate. Links the job on at the start.

The I flag will only be set in conjunction with output to the printer. It will have no effect on the H option. Tape or cartridge disk output is done by the generating process concurrent with the generation; therefore, this option has no meaning when attached to a T option. An S option will nullify an I option. The following four output storage protocols apply when printing a single copy:

1. Hold files are not released to overflow by the spooler. They are released by a specific command within the SP-EDIT processor by the user's process.

2. Closed non-hold files are released frame by frame during output.

3. Open non-hold files are released upon completion of output.

4. Choked open non-hold files are released to overflow frame by frame during output, and the frame counter is decremented.

The difference in release timing allows you to SP-KILL an open print file without loss of the print file or its associated storage. (See SP-KILL verb.) When printing multiple copies, storage cannot be released until the last copy is printed. Therefore, the following considerations hold: The first copy may be SP-KILLed while it is still open, but it will turn into a hold file. All succeeding copies are closed. Storage will be released during the printing of the last copy if release is specified. The multiple copy option is not valid with the choke option, and the specification of the choke option will cause the copy count to go to 1.

2.4.1.2 Choked Specification

A print file may be defined as "choked" with the C option. The input processor will then enter a wait loop when it is more than 20 frames ahead of the output processor. It will resume operation when the output processor releases another frame to overflow.

Choke Option	
C	Choke. Limits the storage used by a print file.

This option will work only if immediate output to the printer is specified with the I option. It will then cause the copy count to be set to one. This option is not available if the print file is a hold file. Also, it will not work if a printer is not available to process the form number specified for the output. The option has no relevance to tape or cartridge disk and will not affect tape or cartridge disk output.

An example of the C option:

```
>SP-ASSIGN CI?

LINE     STATUS    COP    FORM
  #                IES      #

  5.     PIC         1       0
```

This will cause:
- The print file to be linked onto output Queue 0 as soon as the first line of output is available.
- If a printer is available for form Queue 0, and idle, it will commence to output the job.
- When generating process is 20 frames ahead of the output processor, the generating process will wait until the output processor has output another frame.
- Should the output processor catch up to the input processor, it will wait until the output processor has completed its current frame.
- This option does not allow multiple copies.
- This option is available for tape or cartridge disk input to the spooler.

2.4.1.3 Open Specification

It is possible to keep a print file open at the end of a print generation run, that is, before the job is actually printed. If a number of related jobs which need to be run together are assigned to be printed at different times, they can all be run together by using the 'O' option on all of them. Then when they are ready to run, the 'O' specifications may be removed by an SP-EDIT, and they will all be printed together. This option is compatible with all other options; its primary value is keeping a related set of reports together.

Open Option	
O	Keep Open. This flags the print file not to be closed at close time.

Executing the SP-ASSIGN verb will have the effect of closing print files, unless the O or R option is used in the current SP-ASSIGNment, in which case, they will remain open. SP-CLOSE and logging off will force the print files to close.

2.4.1.4 Form Number

The form number specified for a print file allocates it to a print queue. It is thus possible to specify classes of print jobs. The default form number is 0. The maximum is 125. The format of the form option requires that the form number given is concatenated with the F option specifier. Note that "form" is a synonym for "output queue".

Form Number Option	
Fn	Form number. Where n is the desired form number, which may be between 0 and 125 inclusive.

This option is not effective until the job is enqueued for output. The job is then enqueued in output queue n. A print job may be enqueued in only one output queue, while each printer may service up to three output queues, and any, some, or all of the printers on the system may service one output queue. The output queue specification for a print file may be changed by the SP-EDIT function. This option is irrelevant for tape or cartridge disk output.

2.4.1.5 Copy Count

You may specify the number of copies of a print file to be output. The default is one; the maximum is 125. The copy count generated is the first numerical string in the SP-ASSIGNment parameter list not preceded by an F or an R.

Copy Count Option	
n	Copy count. n is the number of copies to output, which may be between 1 and 125 inclusive.

This option is irrelevant for tape or cartridge disk output, and may not be used with the C option. In cases which specify release of storage by the spooler, storage is not released until the last copy is being output. The copy count specification for a print file may be changed by the SP-EDIT function. At the completion of output, the copy count parameter will always be decremented to one.

2.4.1.6 Assignment Specification Inquiry

You can display your assignment specification by using the ?.

Query Option	
?	Your assignment. A "?" will output your line's assignment specification.

If the ? option is used with other options, the other options will be inserted in your line's assignment block, and then the contents of that block will be displayed. The LISTABS verb will give the assignments for all lines, (the discussion of the LISTABS verb includes a list of the indicators and their meanings). The only difference is that with LISTABS when "S" is not specified, "P" is displayed, and when "S" is specified, "P" is not displayed.

2.4.1.7 Print File Predefinition

It is possible to preassign the various print files which may be generated by a BASIC program using the PRINT ON expression statement. Execution of an SP-ASSIGN with this option will reserve input and permanent control blocks and obtain the first frame of storage for the print file. If the print file is defined as a hold file, the entry number will be issued at this time. If it is to go to tape or cartridge disk, the device will be attached at this time, if it has not already been attached. The format of this option requires that the PRINT ON number of this print file be concatenated with the R option specifier.

Predefinition Option	
Rn	Predefinition. Where n is the number of the print file specified by 'expression' in the PRINT ON expression statement in a BASIC program or from RUNOFF.

This option allows all of the other options. Clearly, however, if two or more print files are sent to tape or cartridge disk, their outputs will be commingled on the media. Further, if more than one print file is to be choked, then there should be more than one printer available to process these jobs or the job will hang. Note that predefinition with the I option will cause the printer to attempt to output the print file before the program commences to generate it. There is no harm in this, except that no other print jobs can be serviced by that printer until the program is completed. The execution of the SP-ASSIGN verb can be continued with R options to initialize several print files until the capacity of the input control record block is exhausted. There are about 60 input control block records available, depending on system configuration. Execution of the SP-ASSIGN verb without an R option will have the effect of closing all print files currently active. An example of Rn:

```
>SP-ASSIGN HSR0?

LINE    STATUS  COP    FORM
  #             IES      #

  5     H         1      0
```

This causes the print file which will be generated by a PRINT or PRINT ON 0 statement in a succeeding BASIC program to be made into a hold file which, for the moment, will generate 1 copy on form 0.

```
>SP-ASSIGN TSR1

TAPE ATTACHED BLOCK SIZE:  4000
BLOCK SIZE:   4000
```

This causes the print file which will be generated by a PRINT ON 1 statement in a succeeding BASIC program to go directly to tape or cartridge disk, without generating a print file on the fixed disk. It is necessary to have the tape or cartridge disk drive available when the BASIC program is run. The copy and form parameters are irrelevant in this case.

```
>SP-ASSIGN CIR2F3?

LINE    STATUS  COP    FORM
  #             IES      #

  5     CI        1      3
```

This causes the print file which will be generated by a PRINT ON 2 statement in a succeeding BASIC program to go to the printer allocated to form 3, to be enqueued during the execution of this SP-ASSIGN verb, and to choke the output by the BASIC program to this print file to the output rate of the printer. The copy specification of 1 is forced by the C specification, and the I specification is required by the C specification.

2.5 SP-CLOSE

This verb is superceded by the SP-ASSIGN verb, but is retained so that PROCs can declare a sequence of print jobs as one print file without having to know the other details of the current SP-ASSIGNment. The SP-CLOSE verb causes the print file close sequence to take place without disturbing the parameters of the SP-ASSIGNment except to turn off the open bit.

2.6 SP-EDIT

The SP-EDIT verb allows you to access print files that have been defined by SP-ASSIGN and retained on disk for future output. It allows you to obtain a print file, direct it to an output device, or delete it and release its storage space. The output devices available include any printer on the system, the tape or cartridge disk device, and data files. A print file is identified by the entry number that was displayed for it at generation time. (For example, "ENTRY #1".) It should then be specified by that entry number. Destination is specified by means of parameters stored at print file generation time, and by the current SP-ASSIGNment of the line. The general form of SP-EDIT is:

```
SP-EDIT {options}{'account-name'}
```

where:

'account-name'	Selects all print files generated by account named. SYS2 privileges required to use. Overrides U option.

The default is to select all hold files generated on account you are logged to.

Numerous options are available to modify and override the default specifications. A summary of the SP-EDIT options is given in the table below.

2.6.1 SP-EDIT OPTION SUMMARY

options

Fn	Selects only those print files going to output queue n (n = 0 through 125).
Fn-m	Selects only those print files going to output queues n-m, where m = > n. (Range = 0 through 125.)
H	Suppresses writing of tape or cartridge disk label with either SP-ASSIGN or SP-EDIT tape or cartridge disk assignment.
L	Allows you to look at print files in a queue but not being output.
LO	Allows you to look at the first 500 bytes of print files being output.
MD	Deletes all print files selected. Bypasses individual prompts.
MS	Spools all print files selected to device specified by either SP-ASSIGN or SP-EDIT. Bypasses individual prompts.

options (continued)

N Causes output to terminal to be continuous (no pause at top of each page).

n Selects print file number n.

n-m Selects print files n through m. where m = > n.
(Range = 1 through 600.)

P Sends print file to printer. Overrides line's current SP-ASSIGNment.

R Transfers number of copies specified and form number (output queue) from SP-ASSIGN to current SP-EDIT printer assignment.

T Sends print file to tape or cartridge disk. Overrides a P option.

TW Waits for tape or cartridge disk drive to be available and then sends print file to tape or cartridge disk.

U Selects all available hold files. (SYS2 privileges necessary for use.)

V Trailing blank lines not deleted from text. Used with F response to SPOOL prompt which transfers hold file to items in RUNOFF format to override deletion of trailing blank lines default.

2.6.2 PRINT FILE SELECTION OPTIONS

To select print files to SP-EDIT, the following specifications are used:

(default)	The default is to select all hold files generated on the account onto which you are currently logged.
'account-name'	Selects all print files generated on account 'account-name', which must be enclosed in single quotes. SYS2 privileges are required to use. The 'account-name' option will override the U option.

Selection Options

Fn{-m}	Selects all hold files whose output queue specification is n or is in the range n through m inclusive. Here, n and m must be in the range 0 through 125, inclusive, and m must be greater than or equal to n.
n	Selects print file number n for SP-EDIT.
n-m	Selects all print files whose entry numbers are n through m inclusive, within the range 1 through 600 inclusive. m must be greater than or equal to n.
U	Selects all hold files on all accounts. Requires SYS2 privileges to use.

When no selection options are used, the SP-EDIT process will return all print files generated on the account onto which the SP-EDITing process is now logged. This is the same group of print files whose control records are displayed by the LISTPEQS verb with the A option. Note that if a print file is already being output, it is not available for SP-EDIT even if it is a hold file.

User selection may be overridden by a user with SYS2 privileges, a condition normally limited to SYSPROG, the system manager. A SYS2 level user may specify the U (Universal) option, which will return any hold file which is SP-EDITable, or specify the account-name of the account on which the print file was generated. Note that the 'account-name' option will override the U option.

Hold file entries may also be referenced by entry number, n, or by a range of entry numbers, n-m. The numbers n and m must both be between 1 and 600 inclusive, and m must be greater than or equal to n, or an error message will be given, and the SP-EDITing process will terminate. Selection of print files by the SP-EDITOR in the presence of numeric options is in ascending order, starting with n and continuing through m. Each print file will be checked for admissability as an SP-EDITable hold file and then for admissability according to the generating account.

Selection may also be according to output queue specification. If the F (form) option is selected, then n or n-m are taken to be output queue numbers rather than entry numbers. In this case, n and m must be in the range of 0 through 125, with m greater than or equal to n. Selection will occur across all the available entries in the print file control block, using both output queue specification and generating account admissability as selection criteria. Examples of print file selection options:

SP-EDIT	Will select all available jobs generated by the account onto which you are now logged.
SP-EDIT U	Will select all available jobs. Must have SYS2 privileges to use.
SP-EDIT n	Will select print file n, if it was generated on your account.
SP-EDIT n-m	Will select print files between the numbers n and m inclusive, where n is greater than or equal to m, which were generated on your account.
SP-EDIT 'account-name'	Will select all jobs generated on account 'account-name'. Requires SYS2 privileges to use.
SP-EDIT Fn	Will select all print files marked for output queue n that were generated on your account.
SP-EDIT Fn-m	Will select all print files marked for output queues n through m, where m is greater than or equal to n that were generated on your account.

2.6.2.1 Print File Availability

In order for a print file to be SP-EDITable, its control block record must pass certain system admissability tests. There must be a print file associated with the control block record, and it must be marked as a hold file. The SP-EDITor will then test for account name, entry number, or output queue number admissibility. If the print file passes these tests, it will be checked to detemine whether it is available, or if it is locked. It is locked, not available, when it is being generated, when it is enqueued for output, when it is being output, or when it is being SP-EDITed. It is unlocked, or available, at the end of generation, at the end of output, or when it is removed from an output queue by the SP-KILL F verb, by the :STARTSPOOLER C verb, or by a coldstart.

If an admissible hold file is discovered which is locked, the following message will appear: "ENTRY * n IS NOT AVAILABLE", and the SP-EDITor will search for the next entry. When an available entry is encountered, the print file is retrieved, and the print file inspection and dispatch phase is entered.

2.6.2.2 SP-EDIT Termination Messages

The SP-EDITing process will normally terminate with one of the two following messages. If entry number specifications were included and they do not exhaust the print file control block, then the message will be:

```
END OF REQUEST PRINT FILES.
```

Otherwise the message will be:

```
END OF PRINT FILE CONTROL BLOCK.
```

2.6.3 FILE MANIPULATION OPTIONS

This section describes the SP-EDIT options that modify results of the SP-EDITing process. Summary of file manipulation options:

Print File Inspection Options:

L Lets you look at a print file that is in a queue but not being output. This option accepts all selection options and ignores all manipulation options.

O Lets you look at the first 500 bytes of a files which is being output. Must be used with the L option.

Hold File Manipulation Options:

R Uses the current SP-ASSIGNment specifications for the form number (output queue) and copy count in SP-EDIT assignment.

P Forces the print file to the printer. Overrides the file's current SP-ASSIGNment output specification.

T Forces the print file to tape or cartridge disk. Overrides P option.

Hold File to Tape Suboptions:

H Causes no label to be put on a tape or cartridge disk when the print file destination is tape or cartridge disk. The H option is effective with either the SP-ASSIGN T or SP-EDIT T option.

W Causes the SP-EDITing process to wait for the tape or cartridge disk drive to be available. Used in conjunction with the T option.

Force Option:

M Allows multiple hold file manipulations without intervention at each prompt, according to one of the two following options which must follow the M:
- S Spool each hold file selected.
- D Delete each hold file selected.

Hold File to Terminal Option:

N Causes output to the terminal to run continuously across page breaks. This option is equivalent to the "TN" response to the SPOOL? prompt (see the SP-EDIT Prompt Sequence). It has no effect with respect to any other destination.

Hold File to Data File Option:

V Trailing blank lines not deleted from text. Used with F response to SPOOL? prompt that transfers hold file item in RUNOFF format. Overrides deletion of trailing blank lines default.

The usual hold file manipulation will be discussed in the SP-EDIT Prompt Sequence. The following concerns the options which modify the results of the SP-EDITing process.

2.6.3.1 Hold File Destination Options

The usual process at SPOOL time is to transfer the device specification from the SP-EDITing line's SP-ASSIGNment block, and either queue the print file to a printer queue, if the printer is specified, or to send the print file to tape or cartridge disk under the control of the SP-EDITing process, if that is specified. In some situations under PROC control, it is inconvenient to reSP-ASSIGN the line for the purpose of SP-EDITing, however, and it is occasionally convenient not to reSP-ASSIGN while running interactively. For this purpose, the P (Print) and T (Tape or Cartridge Disk) options are available. The T option directs the output to tape or cartridge disk, and the P option directs the output to the printer. They both override the current SP-ASSIGNment specification, and the T option overrides the P option.

In the case of the T option or SP-ASSIGNment T, the SP-EDITing process sends the print file to the tape or cartridge disk, and, as usual, the process checks for tape or cartridge disk attachment. If the tape or cartridge disk is already attached, the process will proceed. If the tape or cartridge disk is not attached, the process will attempt to attach it. If attachment is successful, the process will proceed. If the tape or cartridge disk is attached to some other line, the attachment will be impossible, and, in the normal course of events, processing will terminate with a TAPE NOT AVAILABLE message. In the case that the SP-EDITing is under PROC control, it may be preferable to wait until the tape or cartridge disk is available and then proceed. For this purpose, the W (Wait) option is supplied. It will cause the process to wait until the tape or cartridge disk is available, spool the hold file to tape or cartridge disk, and then return. The W option may be used any time that a hold file is being sent to tape or cartridge disk. It has no effect otherwise.

2.6.3.2 Print File to Tape or Cartridge Disk - Block Size

Specification of tape block size is available for all print file to tape operations. If there is no prior attachment by means of the T-ATT verb, the SP-EDIT process will attach the tape on initiation. The tape block size will be the last tape block size used by the line, if tape has been used since logon time, or it will default to 4000 bytes. If there is a preferred size, use the T-ATT verb with the desired size parameter. Note that the cartridge disk block size is always 1024 bytes.

2.6.3.3 Print File to Tape or Cartridge Disk - Labels

In the normal course of events, a print file on tape or cartridge disk will be preceded with a label which includes the header "SPOOLER". If you do not want the print files on tape or cartridge disk to be preceded by a label, use the H (Header-Suppress) option. This will avoid having labels between each of several contiguous print files on a tape or cartridge disk. However, it is recommended that if you change tape block size between tape files, you include a label at the beginning of the tape file with the new block size.

2.6.3.4 SP-EDIT Look, or Print File Peek

It is possible to peek at the first 500-odd bytes of any print file which is locked but not being output, or any print file also marked as a hold file which is being output. This allows you to inspect the print files in an output queue in order to identify them. It is activated by specifying the L (Look) option. The L option operates under the print file selection criteria discussed under Print File Section Options. It does not allow any manipulation of print files.

2.6.3.5 Output Queue and Copy Count Specification Replacement

The multiple printer spooler processor has several different output queues into which a print file may be enqueued, and it has the ability to output several copies of a report on a single activation. These are specified by the SP-ASSIGNment in effect when the print file control record was created. In the normal course of events, they are probably what is desired at output time. Therefore, they are the default output queue and copy count specifications. You may change them, however. In this case, the SP-EDITor will obtain the new output queue and copy count specifications from the SP-ASSIGNment of the SP-EDITing process at SP-EDIT time. In order to cause the transfer of the new specifications to the print file control record, the R (Replace) option is used.

2.6.3.6 General Hold File Manipulation

The SP-EDIT process allows precise manipulation of print files. Sometimes less precision is necessary and more speed and less work are desired, such as when you wish to either spool or delete all the available hold files which can be selected under the selection techniques noted above. For this purpose, there is the M (Manage) option, which enables the S (Spool) and D (Delete) options. When the M option is in effect and the S option is selected, all selected print files will be spooled according to the destination options and specifications active at the time. When the M option is in effect and the D option is specified, all print files passed by the selection criteria will be deleted and their storage space returned to overflow. It is recommended that you use the LISTPEQS verb before you use these options.

The MD option may be safely used when an account-name or an output queue specification defines the intended group of print files uniquely, although it can be used on print files identified by entry number by using the n or n-m selection options.

The entry number of each deleted print file will be sent to the terminal doing the SP-EDITing process.

2.6.3.7 Hold File to Data File Option

There is a further option associated with the hold file to data file capability which runs under the SPOOL prompt (see SP-EDIT Prompt Sequence). In the normal case, the print file is transferred to a data file with one page per item, such that the trailing blank lines on each page are deleted from the data file. If the trailing blank lines are desired, there is a V (Vanilla) option which will cause all trailing blank lines on each page to be kept.

2.6.3.8 File Manipulation Option Examples

Examples of file manipulations are:

SP-EDIT — The default is to output the hold file to tape or cartridge disk if the current SP-ASSIGNment so specifies, or to enqueue the hold file for output to a printer. The hold file is enqueued in whatever output queue was specified by the entry in the print file control block record, which may or may not be the current SP-ASSIGNment. The number of copies printed will be the number specified in the control record.

SP-EDIT L — Will allow you to peek at jobs which are enqueued for output but are not being output. This option overrides all other destination specifications and options.

SP-EDIT LO — Will allow you to look at the first 500-odd bytes of print files which are being output and are also marked as hold files.

Options related to printer output:

SP-EDIT R — Will function as SP-EDIT and transfer the copy count and form number in your current assignment specification to the print file control record and enqueue the print file accordingly. This option has no effect if the destination of the print file is tape or cartridge disk.

SP-EDIT P — Force the print file to be enqueued for output to the printer.

Options related to tape or cartridge disk output:

SP-EDIT T — Force the output to the tape or cartridge disk if the tape or cartridge disk drive is available. Otherwise, the process will terminate with an error message.

SP-EDIT W — If the output assignment is to tape or cartridge disk, waits for the tape or cartridge disk drive to be attached. Otherwise, the W option has no effect.

Options related to tape or cartridge disk output: (Continued)

SP-EDIT H If the current output assignment is to tape or cartridge disk, then the standard label will not be written. The default is to write the label. If the destination of the print file is not to tape or cartridge disk, then the option is irrelevant.

SP-EDIT TW Like the T option, except that the process will continue to attempt to attach the tape or cartridge disk rather than terminating if the tape or cartridge disk is not attached. It will continue to attempt attachment indefinitely.

SP-EDIT TH Forces output to tape or cartridge disk, does not write a label.

SP-EDIT THW Forces the print file to tape or cartridge disk, waits for the tape or cartridge disk drive to be available, does not write a label.

Forcing options:

SP-EDIT MS Forces all selected print files to be spooled to the device specified by the current SP-ASSIGNment specification, or by the options in effect.

SP-EDIT MD Forces all selected print files to be deleted. The process is breakable only between deletions.

Hold file to terminal option:

SP-EDIT N Causes the T response to the SPOOL? prompt (see SP-EDIT Prompt Sequence), to behave like the TN response, which means that output at terminal will not pause at page breaks. The N option has no other effect.

Hold file to data item option:

SP-EDIT V When used in conjunction with an F response to the SPOOL? prompt, this option will override the default deletion of trailing blank lines at the end of each page.

2.6.4 PROC CONTROL OF THE SP-EDIT PROCESS

The SP-EDIT process can be executed from PROC with stacked input in the same way that any other process which requests input is executed. Note that the PH command will not avoid the prompts normally sent to the screen, which will generate at least some audit trail. The problem with the use of SP-EDIT under PROC control is to determine that the PROC is able to correctly identify what it is to SP-EDIT. For this purpose, each time a print file control record is created and its entry number is sent to the screen, the entry number is also placed in the PROC secondary input buffer. This allows a process running under PROC control to generate a hold file, and then immediately obtain the hold entry number or numbers from the secondary input buffer. The process may either pass an entry number to the SP-EDITor, or it may pass a collection of entry numbers to a BASIC program to file for future reference. The normal technique is to set the PROC input pointer to the secondary input buffer with an SS command, and then inspect and transfer the entries to either the primary or secondary output buffer.

Note that there may be error message numbers intermixed in the secondary output buffer, and that the SP-EDIT process does not allow a list of entry numbers. The intermixture is particularly likely to occur if the print file generating process is the result of an instruction stream introduced from the secondary output buffer after a SELECT or SSELECT introduced from the primary output buffer. The instability of secondary input buffer entries is one of the reasons for the P, T, and TW options.

If you wish PROC control of the spooler structure, then there are two protocols which are recommended, and which depend on the selection options noted above.

First, print files or print file classes should be identified by the generating account name. This must be a real system file account name rather than a CHARGE-TO name. It may be implemented either by a LOGTO the generating account in order to spool the results of that account, or by logging the PROC to a SYS2 account to spool the results of named accounts in an orderly manner. Second, each print file class should be assigned a specific output queue number so that each class can be selected and output together.

Note that in each case, the print files will be enqueued in ascending entry number sequence, which is not necessarily the sequence in which they were generated, or the sequence in which they are desired to be output.

2.6.5 SOURCE OF HOLD FILES

Hold files usually result from generating print files under an SP-ASSIGN H assignment specification.

There are other conditions under which a print file directed to a printer may become a hold file. All existing print files that are not hold files and are directed to a printer either are already enqueued for output to a printer, or are in the process of generation and will be enqueued at the termination of generation under any completion state other than catastrophic failure of the system. Any of these may be disenqueued before being output by the use of the SP-KILL F verb.

Upon disenqueuement, the print file will be returned as a hold file that is available for later SP-EDITing.

If a print file is already being output, there are conditions under which it may be disenqueued and retained as a hold file. (See SP-KILL F.)

If a cold start is executed, all salvageable non-hold files will be returned as hold files, and all output queues will be cleared. If :STARTSPOOLER with the C option is executed, the same result will occur.

2.6.6 SP-EDIT PROMPT SEQUENCE

The SP-EDIT verb is interactive. Depending on the SP-ASSIGN and SP-EDIT options chosen, the sequence and nature of prompts may vary. This will be discussed under the individual prompts. First, a list of the prompts and the basic meaning of the responses is given.

```
ENTRY #  nnn
DISPLAY  (Y/N/S/D/X/(CR))?-

           Y      Display.
           N      Skip to STRING.
           S      Skip to SPOOL.
           D      Skip to DELETE.
           X      Terminate SP-EDIT.
           (CR)   Skip to next print file.
                  Any other response will skip to STRING.

STRING:-

           (CR)   Skip to SPOOL.
           text   Scan print file to 'text'.

SPOOL (Y/N=CR/T/TN/F)?

           Y      Enque for output to a printer
                  or output to tape or cartridge disk directly.
           N      Skip to DELETE.
           (CR)   Skip to DELETE,
           T      Output to user's terminal.
                  Pause at end of each page.
           TN     Output to user's terminal without pause.
           F      Convert to data file item set.

DELETE (Y/N=CR)?-

           Y      Release remaining storage to overflow
           N      Skip to next print file.
           (CR)   Skip to next print file.
                  Any other response will skip to
                  the next print file.
```

2.6.6.1 DISPLAY Prompt

The SP-EDITor will display the first entry number:

ENTRY # nnn

which will be followed by:

DISPLAY (Y/N/S/D/X/(CR))?-

The responses have the following meanings:

Y Yes. The processor will now display as many lines as are required to output the first 500 bytes of the hold file. It will go beyond the 500th byte in order to complete the last line of the display. It will display the whole file if the file is less than 500 bytes.

If the S-EDIT L option is in effect, only the DISPLAY prompt will be presented. The Y response will cause the first 500 bytes of the first entry # file to be displayed. This will be followed by the prompt: NEXT? A carriage return should be entered to bring the DISPLAY prompt for the next file entry # to the screen. This process will be repeated until the files are exhausted or an X is entered to exit the process and return to the TCL. You may also use the (CR) carriage return response to step through the files until you find the one you wish displayed.

If a print file that is also a hold file is being output and the LO option is in effect, then the first 500-odd bytes of the file will be displayed. Otherwise, the message:

BEING OUTPUT

will be displayed, and the process will continue to the next selected hold file or to TCL.

N No. Will cause the processor to skip the display routine and proceed directly to the STRING:- prompt.

S Skip. Will skip both the display and string routines and proceed directly to the SPOOL? prompt.

D will skip all of the above and proceed directly to the DELETE? prompt.

X will leave the SP-EDITing process immediately.

(CR) will skip to the next requested hold file, if any.

2.6.6.2 STRING Prompt

If you respond with 'Y' or 'N' to the DISPLAY? prompt, you will receive the following prompt:

```
STRING:-
```

The purpose of the STRING:- prompt is to allow you to continue to print a listing which has been interrupted, (e.g., by a paper jam) without having to reprint what is already printed. A carriage return will skip the function. Any other input from the prompt to the carriage return is construed as a literal string, including blanks.

The processor will scan the hold file, starting from the top, until it encounters the first instance of the specified string. It will then set the beginning-of-report address to the beginning of the line in which the string was found, and deliver the result to the SPOOL prompt.

If the listing in question was paginated by the standard system output processor (any case other than line-counting in BASIC, an assembler routine written by a user, or a print file generated with a page length of zero as specified by TERM), then it is sufficient to align the paper to the standard top-of-form for the printer and initiate output from the SPOOL prompt in order to obtain proper alignment. This will work if the string sought is on a page prior to the desired output.

When the printer encounters the top-of-form byte at the top of the next page, the printer will eject paper to the top of the page, yielding alignment of the paper and the text.

If the job was generated without top-of-form characters, the paper will have to be aligned to the correct relative location on the paper. See the STARTPTR verb for the alignment procedure.

2.6.6.3 SPOOL Prompt

The SPOOL prompt has the form:

```
SPOOL (Y/N=CR/T/TN/F)?
```

The responses to the SPOOL prompt, in conjunction with the process's current assignment and the options on the SP-EDIT verb, cause the print file to go to the specified destination.

Y Yes. The Y response enqueues the job for output by a printer if the SP-ASSIGNment is for a print job or the P option of SP-EDIT is in effect, or sends the print file to tape or cartridge disk under the control of the SP-EDITing process if the SP-ASSIGNment process so specifies or the T option of SP-EDIT is in effect.

Note that SP-EDIT options override SP-ASSIGNment specifications, and the T option or specification overrides the P option or specification. Also note that the SPOOL Y may be forced by the use of the MS option. If neither the P nor the T option nor an SP-ASSIGNment specification to printer or tape or cartridge disk is in effect, then the following message will be output to the terminal:

```
YOUR OUTPUT SPECIFICATION IS NO OUTPUT,
REASSIGN YOUR LINE IF YOU WISH TO OUTPUT A HOLDFILE.
```

and the process will return to TCL. When a job is enqueued, the SP-EDITing process executes the enqueuement, alerts the spooler, and returns to the next desired hold file, if any. The print file is enqueued in the output queue specified in the print file control record as specified in the SP-ASSIGNment FN (form number) option in effect at print file generation time. This may be overridden by the SP-EDIT R option, which will transfer the SP-ASSIGN's current form number specification to the print file control record, and enqueue the print file in that output queue. The changed form number will persist. The next time that the print file is SP-EDITed without an R option in effect, the print file will be enqueued in the output queue specified by the new form number specified in the latest SP-ASSIGN by the last SP-EDIT operation with the R option in effect.

If the SPOOL process is to copy the hold file to tape or cartridge disk, the following sequence will occur. The process will attempt to attach the tape or cartridge disk. If this is not possible, the message:

```
TAPE ATTACHED TO LINE nn
```

will be output to the screen and the process will return to TCL. If the W option is in effect, the process will wait until the tape or cartridge disk becomes available. If the tape or cartridge disk is not attached already and it is available, the SP-ASSIGN T will attach the tape or cartridge disk, and the following message will be output:

```
TAPE ATTACHED BLOCK SIZE:  nnnn.
```

If cartridge disk is being used, the block length will be 1024 bytes. If tape is being used, the block length will be the system default 4000 byte records. If the tape was already attached by means of the T-ATT verb, the same message will be output, and the block length will be that set at T-ATT time. See the discussion of tape or cartridge disk block size for further information.

The SP-EDITing process will then put a label on the tape or cartridge disk which will include the text field "SPOOLER". If the tape or cartridge disk is to have no label, then use the H option with the SP-EDIT verb. This will suppress the label. Note that this is the HDR-SUPP option in ACCESS, and that the use of the H option with any verb which generates a print file in conjunction with a T assignment will cause label suppression. If the verb is an ACCESS verb, the HDR-SUPP option will achieve the same result.

The SP-EDITing process will then proceed to copy the hold file to tape or cartridge disk, and will return to the DELETE prompt upon completion of the tape or cartridge disk output.

N No. If answer is N or [CR], the process will skip to the DELETE? prompt.

T Terminal. The T response will cause the contents of the hold file to be printed on the terminal of the SP-EDITing process, and will request a carriage return at the end of each page in order to continue to the next.

In place of the carriage return, the characters U, T, or X may be used. The U will cause the current page to be repeated. Use of the U at the end of the current page will cause the previous page to be displayed. (Its predecessor is not immediately available.) The T will cause the report to start again from the top. The X will cause spooling to the terminal to terminate and return to the SPOOL prompt. Note that a carriage return may be necessary to obtain the first page, and that occasionally page p-2 may appear instead of p-1 on the second U command. The SP-EDITing will return to the SPOOL prompt.

TN Terminal No Pause. The TN Response will cause the contents of the hold file to be output to the terminal, but will not pause at the end of each page, and as a result, the control characters noted above are not available in the no pause case.

It is possible to emulate a serial printer using a normally-logged-on terminal by giving the TN response. The processor will count lines and execute line-feed to the bottom of the current page when it encounters a form-feed character. Successful execution of this technique requires the execution of the TERM verb in order to specify the actual page length of the paper onto which the print file is to be spooled. In other words, if you have 11 inch long paper, and the printing terminal is set for 6 lines per inch, the TERM verb must be used to tell your process that there are 66 lines per page. For example:

```
TERM ,66
```

The SPOOL TN process will not send form-feed characters to a printing terminal in the way that the serial printer process does. Be sure to reset the TERM before you commence to do normal processing. The SP-EDITing process will return to the SPOOL prompt.

F File. The F response will allow the transfer of a hold file to an item or a series of items in a file in RUNOFF format. This can only be accomplished when the account doing the SP-EDIT is the one which created the hold file.

The process will prompt with FILE NAME?-, at which time the name of the file into which the item or items are to be inserted is input, and then with INITIAL ITEMNAME?-, at which time the name of the first item of the string of items to be generated from the hold file is to be input. An incorrect file name will cause the process to terminate with the error message ' ' IS NOT A FILE NAME. The item name may be an existing item at which time the existing item will be overwritten.

The system accomplishes the hold file to file translation by putting a leading .BP .NF into the head of the item, and then copying the contents of the hold file into the item, with two modifications. First, carriage return, line feed sequences are removed and an attribute mark is inserted in their place.

Second, upon a page break, the processor will terminate the current line with a .CHAIN ITEM-NAMEnnnn, file the current item, and initialize the next item.

The sequence "nnnn" concatenated to ITEM-NAME is a member of the sequence 0001, 0002, 0003, ... The first item in the string has the name ITEM-NAME and chains to ITEM-NAME0001; the second item in the string has the name ITEM-NAME0001 and chains to ITEM-NAME0002, and so on.

The terminal item has no chain statement in it since this set of item ids will sort into sequence. Hold files which do not have top-of-form characters in them or which have very long pages will be blocked into items about 12000 bytes long.

The SPOOL F facility gives you the ability to merge anything printable into documentation, to merge ACCESS reports into RUNOFF reports within the body of the RUNOFF text, and to retain any output file as part of the saved files in the system.

The procedure does not modify the print file itself except to delete any trailing blank lines in the text. These trailing blank lines may be retained if the V option is selected when initiating the SP-EDIT verb. Upon completion, the process returns to the DELETE prompt in the SP-EDIT process.

It is necessary to be logged onto the account which created the print file in order to execute this process.

2.6.6.4 DELETE Prompt

The DELETE prompt has the following form:

```
DELETE (Y/N=CR)?-
```

The only action which will cause deletion of the print file is the execution of the "Y" response. Any other response will obtain the next hold file desired, if any.

Deletion is executed by the SP-EDITing process. Once it is initiated, it is not breakable, since it is necessary to protect the overflow table. Upon completion of the release of storage to the system and the reinitialization of the print file control block, the process will proceed to the next desired hold file, if any.

Note that the reinitialized print file control block will be unchanged when listed using the LISTPEQS L verb, except that its status indicator will show that it is available, until such time as it is reused. This gives some chance of discovering that a print file that seemed to have disappeared, did so because it was deleted.

Print files may be systematically deleted by the use of the MD option on the SP-EDIT. The prompts will not be seen, but the print files will be deleted. The process is not breakable during the deletion of a print file, but it will respond to the BREAK key between print files.

2.7 SP-KILL

The SP-KILL verb is used to terminate various elements of the spooler structure. It can terminate print jobs immediately, disenqueue print files, and remove printers from the spooler system.

The general form of the SP-KILL verb is:

SP-KILL {options}

The SP-KILL verb is controlled by options The option strings may be used with or without parentheses. A table of SP-KILL options follows:

options

A{n}{-m}	Terminates the output from each printer which is outputting a print file that was created on the account onto which you are logged. A print number n or range of printer numbers n-m, with m>n (range 0 through 19) may be specified and only the job(s) being output on the specified printer(s) will be terminated.
B	Terminates all jobs on all printers. Also used with other options to specify all elements of the option.
Dn{-m}	Deletes a printer or range of printers from the system. At least one printer must be specified. Printer numbers are n-m (range 0 through 19) with m>n. Or a 'B' may be used to specify "all printers".
Fn{-m}	Dequeues print file(s) specified. At least one print file must be specified. Print file numbers are n-m (range 0 through 600) with m>n and m<= last active print file on system. A 'B' may be used to specify "all print files".
n{-m}	Terminates print file(s) currently being output on specified printer(s). Printer numbers are n-m (range 0 through 19) with m>n. If a printer number is not specified, and options B, D or F are not specified, printer number defaults to 0.
N	No "ABORT!" message will be printed on the job(s) that are terminated on printers. (However, "JOB ABORTED ON PRINTER #n" will appear on the terminal cancelling the job(s).)
O	Dequeues a print file even if it is being output, if the storage release process has not started.

2.7.1 PRINT FILE TERMINATION

The SP-KILL verb is most often used to terminate the print file being printed on a given printer. The general form of SP-KILL for this function is:

SP-KILL{n}{-m}{options}

A number or range of numbers (0 through 19) specifying the logical number of the printer to which that job is going, or the range of printers, or the B option to specify the termination of print files going to all printers may be specified. If they are not, and the D or F option is not specified, the job going to printer 0 will be terminated. The user with SYS1 or lower privileges can kill only print files generated on the account onto which he is currently logged. SYS2 privileges allow termination of any print file. Examples of the normal form of print file termination with SP-KILL:

SP-KILL 3	This will cause termination of the print file going to printer #3 and will leave the message ABORT! at the end of the output.
SP-KILL 3-5	This will cause termination of the print files going to printers 3, 4, and 5 with ABORT! messages on output.
SP-KILL B	This will cause termination of the print files going to all the printers with ABORT! messages on output.
SP-KILL BN	As above, but without the ABORT! messages at the end of the jobs.
SP-KILL (NB	The same as above.
SP-KILL A	Will terminate output from each printer which is outputting a print file which was created on the account onto which you are now logged.
SP-KILL A2	Will terminate the output on printer 2 if it is outputting a print file created on the account onto which you are now logged.

After the execution of the SP-KILL verb, the printer will terminate the print file with the message ABORT!, release non-hold print files and make hold print files available for SP-EDITing. The printer will then proceed to the next print file in its assigned queues which is available for output, commence to output the print file, unless the STOPPTR verb has been executed for this printer, in which case the printer will stop and await reassignment. The suboption N suppresses the message ABORT! which is normally placed one line after the point where the text of the job was terminated.

Note that executing SP-KILL n on print file n will cause its control record to be marked as aborted, which will appear on the status displayed by the LISTPEQS verb for print file n as an X.

2.7.2 DEQUEUING PRINT FILES

The SP-KILL verb is also used to dequeue print files which have been spooled either in the normal course of the generation of the print file, or by means of the SP-EDIT process. The general form of SP-KILL for these functions is:

SP-KILL Fn{-m}{options} and SP-KILL A {n}{-m}{options}

Dequeuing is indicated by the F or the A option. Print files which are to be dequeued are addressed by their print file identification number, which is the ENTRY # number sent to the screen when the print file was initiated, and is also used when a file is SP-EDITed, and when the LISTPEQS information is listed. Print files are not identified by the number of the output queue onto which they are linked, which means, among other things, that if something should happen to the links in the output queue chain, individual print files can be retrieved and then reSP-EDITed onto an output queue. Examples of dequeuing with SP-KILL:

SP-KILL F5	Will dequeue print file 5 if it is enqueued, and if the account executing the verb has SYS2 privileges or is the account which generated the print file.
SP-KILL F5-10	Will dequeue print files 5 through 10, inclusive, if they are enqueued, or any which are enqueued, and report the status of each, with the limitations noted above.
SP-KILL 05-10F	The same as SP-KILL F5-10.
SP-KILL FB	Will dequeue all print files currently enqueued, subject to the conditions noted above.
SP-KILL F7O	Will dequeue print file 7 even if it is being output, so long as it is not being released to overflow during output, and subject to the considerations noted above.
SP-KILL (7FO	The same as above.
SP-KILL AF	Will dequeue all enqueued print files created on the account onto which you are now logged.
SP-KILL 5-9AF	Will dequeue all enqueued print files with entry numbers 5 through 9 inclusive that were created on the account onto which you are now logged.

When a print file is enqueued, it is marked as being spooled; and the mark will show up in the LISTPEQS display of the print file control record as an "S". If print file is not enqueued, it can not be dequeued.

When a print file is dequeued, it is set to hold file status and made available for SP-EDITing. A print file which is marked as being output, indicated by an "O" in the LISTPEQS display, will not be dequeued, except under certain conditions when O suboption is used.

The O suboption will dequeue print files which are either hold files, or are specified for multiple copies and are not on the last copy, or are open and not choked. In none of these cases has the storage release process started. If the storage release process has started, as in the other cases, the print file will not be dequeued.

When the printer completes output of a print file which has been dequeued, it searches the expected queue, and upon not finding the expected control record goes to its next task.

There are assorted reasons for dequeuing print files. They may be enqueued unintentionally, due to an incorrect SP-ASSIGN specification, or mistakenly, into the wrong output queue. If there is more than one printer available, it may be convenient to move some work from a full output queue being serviced by one printer to the printer with less work load.

If a report contains errors, instead of waiting to execute an SP-KILL when it starts printing, you can dequeue and delete it now. Generally, any change in plans or system protocols may make it advantageous to move print files about.

When making decisions as to what print file to move where, you may wish to use LISTPEQS, which will show the size of each element in the queue, and its account, line, and time of generation, or use the SP-EDIT with the L option, which allows you to inspect files in the output queue which are not being output.

Note that any print file can be dequeued by an account with SYS2 privileges, but accounts with lesser privileges can only dequeue print files generated on the account onto which they are now logged.

2.7.3 DELETING A PRINTER FROM THE SYSTEM

The SP-KILL verb with the D option is used to delete a printer from the system. The general form is:

SP-KILL Dn{-m}

This action will clear the printer control block to its initial state, and clear the task control block used by the printer to its initial state. The printer, at this point, reacts in the following manner.

If the printer is outputting a file when it is deleted, that print file will remain in an output state and be unavailable until an SP-KILL Fn 0 is executed on it. If the printer process was releasing space to overflow when the deletion occurred, the rest of the space used by the print file is now lost, and the control record is retrievable only by execution of the :STARTSPOOLER verb.

With a serial printer, the printer deletion process sends the line occupied by the printer to LOGON, so that it may then be used as a normal communication port.

Note that only accounts with SYS2 privileges may delete printers from the system, and that the A option is not applicable.

Examples of deletion of printers by SP-KILL D:

SP-KILL D1	Will delete printer 1.
SP-KILL D7	Will delete printer 7.
SP-KILL 3-5D	Will delete printers 3 through 5, inclusive.
SP-KILL BD	Will delete all printers from the system.

2.7.4 SP-KILL MESSAGES

General Messages.

ILLEGAL PRINTER NUMBER. MUST BE BETWEEN 0 AND 19 INCLUSIVE.
ILLEGAL SPECIFICATION NUMBER nnn.

Incorrect specifications may yield one of the above.

YOUR SYSTEM PRIVILEGE LEVEL IS NOT SUFFICIENT FOR THIS STATEMENT.

An attempt to execute a procedure restricted to SYS2 privileged accounts when logged onto an account with a lower privilege level will yield the above message and return to TCL.

PRINTER # n CONTROL BLOCK HAMMERED. CLEARED TO NULL.

A printer control block which is in an ambiguous state will yield the above. This means that the printer cannot be accessed. It should be restarted with the initialization form of the STARTPTR verb, and then either used or deleted. If it is active and printing a real report, it should finish. It will then go to sleep. If it is reinitialized while printing a report, that report and its storage will be lost.

SP-KILL Messages. These messages may result from the execution of SP-KILL:

JOB ABORTED ON PRINTER # n.
Indicates successful completion of the SP-KILL.

PRINTER # n IS INACTIVE.
THE JOB BEING OUTPUT ON PRINTER # n IS NOT YOUR PRINT FILE.
Indicates unsuccessful execution.

SP-KILL F Messages.

PRINT FILE # nnn WAS NOT UNLINKED BECAUSE IT IS BEING OUTPUT.
PRINT FILE # nnn WAS NOT UNLINKED BECAUSE IT IS UNUSED.
PRINT FILE # nnn WAS NOT UNLINKED BECAUSE IT WAS NOT SPOOLED.
PRINT FILE # nnn WAS NOT CREATED ON THE ACCOUNT ONTO WHICH YOU ARE NOW LOGGED.

Unsuccessful execution of the SP-KILL F verb will yield one of the above.

PRINT FILE # nnn WAS UNLINKED AND IS AVAILABLE AS A HOLD FILE.

Indicates successful dequeuement.

SP-KILL D Messages. Execution of the SP-KILL D verb will yield the following:

SERIAL PRINTER # n HAS BEEN DELETED, AND ITS PROCESS SENT TO LOGON.
PARALLEL PRINTER # n HAS BEEN DELETED, AND ITS PROCESS SENT TO LOGON.

2.8 SP-OPEN

This verb is superceded by the SP-ASSIGN verb, but is retained so that PROCs can declare a sequence of print jobs as one print file without having to know the other details of the current SP-ASSIGNment. The SP-OPEN simply turns on the bit associated with the "O" option of the SP-ASSIGN verb without disturbing any of the other parameters in the assignment.

2.9 SP-STATUS

The SP-STATUS verb displays the current status of the spooler and of printers defined for the system. The SP-STATUS verb also has the effect of awakening the spooler if asleep. The general form of an SP-STATUS statement:

```
SP-STATUS {options}
```

When used without options, the status of the spooler and all allocated printers will be displayed. The options are:

options

B	The status of the spooler and all printers, allocated and unallocated, will be displayed.
n	The status of the spooler and the status of allocated printer n will be displayed. The n must be between 0 and 19, inclusive.
n-m	The status of the spooler and the status of allocated printers n through m will be displayed. The m must be between n and 19, inclusive.
P	The SP-STATUS results will be printed.

2.9.1 SP-STATUS VERB AS A SYSTEM INFORMATION DISPLAY

The purpose of the SP-STATUS verb is to give a general overview of the system. The message will indicate whether the spooler is active or inactive. Activity normally implies that one or more of the serial printers which run as subtasks of the spooler are attempting to output. However, the spooler may be active because it is executing one of its administrative tasks.

The SP-STATUS message process will then report on each allocated printer. It will specify the type and status of each printer, its form and page skip specifications, and if the printer is active, it will note the print file entry (element) number, line number, account name of the generating process, and number of frames if closed.

2.9.2 SP-STATUS VERB AS A SPOOLER AWAKENER

All processes which request activity from the spooler will awaken it, but there may be times when it continues to sleep. In these cases, the use of the SP-STATUS verb will awaken the spooler and cause it to look for work. Therefore, if it appears that the spooler is neglecting a task, it may be encouraged by the use of the SP-STATUS verb. If this does not have the desired effect, then various other approaches should be taken. For instance, check to see if the printer is on line, that the printer is allocated to the intended output queue, and that the desired print file exists, is enqueued and is enqueued in the correct output queue. The side-effect of the SP-STATUS verb awakening the spooler is that the messages generated by the verb may be transiently spurious. Because the spooler is looking for work, if the system load is relatively constant, several executions of the SP-STATUS message may encounter exactly the same transient condition several times in succession without actually finding an error condition, even though it is reported. Further investigation is recommended before anything drastic is done.

2.9.3 ON-LINE AND OFF-LINE CONDITIONS

Note that the ON LINE and OFF LINE in the SP-STATUS message are often imprecise. If the printer is inactive, it necessarily had to complete the last job successfully, at which time the printer was on line. However, there is no specific check for the current condition of the physical printer if the logical printer is inactive. The SP-STATUSing process checks only what the printer output control block thinks the status of the printer is.

2.9.4 SP-STATUS EXAMPLES

SP-STATUS verb with all printers displayed:

```
    >SP-STATUS B

    THE SPOOLER IS ACTIVE.

    PRINTER # 0 IS SERIAL, ACTIVE, AND ON LINE.
    THE PRINTER IS RUNNING ON LINE 4.
    PRINT FILE BEING OUTPUT IS ELEMENT 2, A CLOSED FILE FOR LINE # 0
      GENERATED ON ACCOUNT DP, WHICH IS 13 FRAMES LONG.
    ASSIGNED OUTPUT QUEUES:  0.
    THE NUMBER OF INTER-JOB PAGES TO EJECT IS 0.

    PRINTER # 1 IS UNALLOCATED.
    PRINTER # 2 IS UNALLOCATED.
    PRINTER # 3 IS UNALLOCATED.
    PRINTER # 4 IS UNALLOCATED.
    PRINTER # 5 IS UNALLOCATED.
    PRINTER # 6 IS UNALLOCATED.
    PRINTER # 7 IS UNALLOCATED.
              .
              .
              .
    PRINTER #19 IS UNALLOCATED.
```

Normal form of the SP-STATUS display:

```
    >SP-STATUS

    THE SPOOLER IS ACTIVE.

    PRINTER # 0 IS SERIAL ACTIVE, AND ON LINE.
    THE PRINTER IS RUNNING ON LINE 2.
    PRINT FILE BEING OUTPUT IS ELEMENT 8, A CLOSED FILE FOR LINE # 6
      GENERATED ON ACCOUNT SYSPROG, WHICH IS 8 FRAMES LONG.
    ASSIGNED OUTPUT QUEUES: 0.
    THE NUMBER OF INTER-JOB PAGES TO EJECT IS 0.
```

SP-STATUS with a range and only one allocated printer:

```
    >SP-STATUS 4-7

    THE SPOOLER IS INACTIVE.

    PRINTER # 7 IS SERIAL, INACTIVE, AND ON LINE.
    THE PRINTER IS RUNNING ON LINE 11.
    ASSIGNED OUTPUT QUEUES: 8, 9.
    THE NUMBER OF INTER-JOB PAGES TO EJECT IS 1.
```

SP-STATUS with an erroneous transient:

```
>SP-STATUS 0-2B

THE SPOOLER IS INACTIVE.
PRINTER # 0 IS UNALLOCATED.
PRINTER # 1 IS UNALLOCATED.

THE CONTROL BLOCK FOR PRINTER # 2 IS IN AN AMBIGUOUS STATE.
DELETE THE PRINTER FROM THE SPOOLER SYSTEM.
```

The example above was taken precisely when printer 2 was checking to see if there was more work for it to do. There are various transient cases when the condition of the spooler may be reported to be strange. When the timings on the system change due to changed work loads, the transients will become invisible, and the message will be normal.

On the other hand, the message may be telling the truth, in which case, use of the LISTPTR verb, or sending a test print file to the printer, or using the STOPPTR verb should generate an irregularity. In this case, the use of the SP-KILL D verb, followed by the use of the full STARTPTR verb is called for. Should this not prove sufficient, see the discussion of :STARTSPOOLER verb.

2.10 SP-TAPEOUT

The SP-TAPEOUT verb moves print files on magnetic tape or cartridge disk to print files on disk. They are handled as though they were generated by any other system processor. The general form of the SP-TAPEOUT verb is:

```
SP-TAPEOUT {(options)}
```

The SP-TAPEOUT verb executes T-ATT and inputs the contents of a tape or cartridge disk file to the spooler. Disposition of the file input to the spooler is according to the current SP-ASSIGNment of the user's line. It may be printed immediately, at the completion of input, or as choked input. It may be saved as a hold file. It may then be returned to tape or cartridge disk from the hold file through the facilities of the SP-EDIT verb. The SP-TAPEOUT verb options:

options

A	Causes conversion from EBCDIC to ASCII between tape or cartridge disk and the print file.
L	Causes print files which have been transmitted with one line per tape or cartridge disk record, right padded with blanks, and without carriage return, line-feed sequences embedded in them to be transferred to SPOOLER print files directly, if the tape or cartridge disk record length is less than or equal to 140 bytes. The option causes each tape or cartridge disk record to be treated as a line. Trailing right blanks are removed, and a carriage-return, line-feed sequence is inserted.
U	Causes conversion of all lowercase alphabetic characters to uppercase.

The U option causes all alphabetic information to be masked to uppercase. The A option causes an EBCDIC to ASCII conversion to occur. The A option is executed before the U option; and both can be executed on the same tape or cartridge disk file. All SP-TAPEOUT manipulations will assume process print file 0. Each print file on tape or cartridge disk is normally moved to the disk as a distinct print file; if several print files are to be placed into one disk print file, then the SP-ASSIGN 0 option should be used. To concatenate several print files into one print file, send them to the tape or cartridge disk by way of SP-EDIT, and then return them under SP-ASSIGN 0 using SP-TAPEOUT.

SP-TAPEOUT will fail under SP-ASSIGN T. Note that the SP-ASSIGN CI process is available to limit disk usage by the print file.

Examples of SP-TAPEOUT:

SP-TAPEOUT	Spools the file at the current location of the tape or cartridge disk to the destination specified by the user's current output assignment.
SP-TAPEOUT U	Spools the print file on tape or cartridge disk to the specified destination, converting lowercase to uppercase in the process.
SP-TAPEOUT A	Converts the print file on tape or cartridge disk from EBCDIC to ASCII and spools the converted print file to the specified destination.
SP-TAPEOUT UA	Converts the print file on tape or cartridge disk from EBCDIC to ASCII, then converts the ASCII to uppercase, and spools the print file to the specified destination.
SP-TAPEOUT L	Causes each tape or cartridge disk record to be treated as a line. Trailing blanks are removed, and a carriage-return, line-feed sequence is inserted.

2.11 STARTPTR

The STARTPTR verb defines a printer, allocates it to specific output queues, and starts it.

The STARTPTR verb is the primary control processor of the spooler. It can be executed either upon initiation of the spooler, or after a STOPPTR has been executed and the printer has stopped.

The STARTPTR verb specifies 1) the printer number of a device, 2) the output queue or output queues upon which it is working, 3) the page skip to execute at the end of each print file, 4) the type of printer, P for parallel or S for serial, 5) the device number for parallel printers or the line # for serial printers, and 6) whether this is an alignment, which is no longer in the SP-EDIT process. If the target printer is a serial printer which does not recognize a X'0C' as a page-eject command, then the X option is available to specify this, and the number of lines per page may be specified as a numeric option.

The general form of the STARTPTR verb is:

```
STARTPTR n,f,p,tm,A {(options)}
```

where:

- n is the printer number. The range for n is 0 through 19.
- f is the output queue number. The range for f is 0 through 19. For multiple queues, use the form (f1,f2{,f3}). The same output queue may be assigned to different printers. A maximum of 3 output queues may be assigned to each printer.
- p is the number of pages to skip. The range for p is 0 through 9.
- t is the printer type. Specify P for parallel printer or S for serial printer. Note that a serial printer runs off an octal board.
- m is the line number for serial printers or the physical device ordinal for parallel printers, where m is one of the legal port numbers for serial printers, or 0 for parallel printers.
- A initiates the alignment process. A STOPPTR must be used first.

options

S suppresses initial form-feed at initiation of print file on a serial printer. Best used when the inter-job page-eject count is non-zero. Not available for parallel printers.

X{n} indicates that this serial printer does not recognize a X'0C' as a page-eject command. The printing process will count lines within the page, and emit the correct number of blank lines when each page-eject command occurs. The optional n indicates the number of lines per page. If n is not specified, the page length defaults to 66 lines.

The syntax of the STARTPTR verb requires that the printer number be specified each time the verb is used. At initialization, after a :STARTSPOOLER (I) or a cold start, you must include the page skip, type of printer, and line number when you use the verb. Once printer type, address, and page skip are specified, they will persist until changed. Note that the device ordinal controls the printer number in the case of parallel printers. The printer allocated P0 will consume the forms specified in the control block for printer 0 without respect to the printer ordinal specified.

To use the ALIGN option A, first stop the printer with a STOPPTR. Then list your file to the printer and STARTPTR with the A option. This will produce the prompt LINES?>, which is asking for the number of lines to output on each alignment attempt. (For example, if you specify 10, the printer will print the first 10 lines of your file and then stop.) After each trial, the prompt AGAIN(Y/N/T) will be forthcoming. A Y response will cause another alignment attempt. An N response (or any response other than Y or T) will cause the actual print file to be printed. A T response will cause the alignment attempt to be terminated, and will leave the printer stopped. Any modified printer parameters will be stored in the printer control block, however. During the course of the alignment, the printer is not attached to the line which is doing the alignment, but the printer may not be used for anything else at this time.

Examples of STARTPTR verb follow.

STARTPTR verb to be used for a default system:

```
>STARTPTR 0,0,1,S5
          | | | |--specifies serial printer on line 5.
          | | |--eject one page after each job.
          | |--specifies that the printer will print jobs in output queue 0
          |--this is printer number 0 in the LISTPTR printer assignments.
```

Minimal form of the STARTPTR verb:

```
>STARTPTR 1
          |--specifies printer 1.  This is a restart without parameter
             changes after a stop.
```

Minimal form of the STARTPTR verb with two output queues to be printed:

```
>STARTPTR 3,(2,4
          | |--specifies output queues 2 and 4.
          |--specifies printer 3.
```

Printer restart with alignment:

```
>STARTPTR 1,2,,,A
          | |   |--alignment
          | |--of job on output queue 2
          |--on printer 1.
```

Form of the STARTPTR verb to be used for serial printers which do not recognize X'0C' as a form-feed character:

```
>STARTPTR 7,12,2,S23  (X 51
          | |  | |     | |--Page length is 51 lines.
          | |  | |     |--Specifies line count since this serial printer
          | |  | |        does not recognize the X'0C' character as a
          | |  | |        form-feed.
          | |  | |--Specifies serial printer on line 23.
          | |  |
          | |  |--Eject two pages after each job.
          | |
          | |--Specifies that printer will print jobs in output queue 12.
          |
          |--This is printer number 7 in the LISTPTR printer assignments.
```

2.11.1 PRINT FILE SCHEDULING ALGORITHM

It is possible to allocate several printers to a single output queue as well as to assign up to three output queues to a single printer. In either case, the order of execution of jobs within an output queue and amongst output queues becomes a matter of interest.

When a printer locates a print file available for output, the printer process marks the print file as being output, but leaves it enqueued for output until the task is complete. Print files are left enqueued for output so that, if there is a system difficulty which requires the use of the :STARTSPOOLER verb, the spooler system can restart from a point prior to whatever problem occurred. A discussion of the disposition of print files under :STARTSPOOLER and coldstart conditions will be found in the section on the :STARTSPOOLER verb actions.

When a printer completes a print file task, it will remove the print file control record from the output queue. Completion is defined as either normal completion, or termination under STOPPTR conditions, or termination under SP-KILL conditions.

The print file scheduling algorithm searches the output queue specified first in the STARTPTR verb until it encounters the first job not being output. If there are no print files available to be printed in the first-named output queue, the printer will search the second-named output queue in order, and then go to the third.

It is, therefore, possible to set priorities on print jobs using a single printer. The highest-priority jobs are sent to the first-named output queue, the second-priority jobs to the second-named output queue, and the lowest-priority to the third-named output queue. The priority structure can be reset by stopping and then restarting the printer. Jobs sent to other output queues will not appear until the printer is allocated to those output queues. Only one printer can look in the output queues at a given time.

2.11.2 STARTPTR ERROR MESSAGES

The STARTPTR process has a full set of error messages. In the order in which they are encountered, they are:

NULL PRINTER NUMBER
This will occur when the first parameter, the printer number, is either null or non-numeric.

PRINTER NUMBER TOO BIG
This will occur when the printer number is larger than 19.

NO FORM NUMBER
This will occur when the second parameter, form number, is null or non-numeric. It is required for initialization.

ILLEGAL CHARACTER
This will occur when the parser encounters an unexpected character in one of several different circumstances.

PRINTER MUST BE STOPPED
This indicates that the printer which is being started either has not been stopped by the use of the STOPPTR verb, or has been set to stop but is still outputting a job. If it is desired to stop the printer immediately, use the SP-KILL verb. If it appears that the printer is unstoppable, then use the SP-KILL verb with the D option.

FORM NUMBER TOO BIG - EXCEEDS 125
This may apply to any of the output queue specification parameters.

TOO MANY PAGES IN THE PAGE SKIP - EXCEEDS 9
A maximum of 9 pages may be skipped.

NEGATIVE NUMBER
A typing error may have occurred, but probably indicates an aberration of some sort.

TOO MANY OUTPUT QUEUES
A maximum of three output queue forms may be specified. Note again, that if there is more than one form specified, the group of forms must be placed in parentheses, that the right parentheses may not be omitted, and that the parentheses are to be placed within commas. The exceptional case occurs upon restart, in which case, the trailing parenthesis and comma may be left off if the page skip parameter is not to be changed.

ILLEGAL PRINTER TYPE - NOT P OR S
The printer type may only be P for parallel or S for serial.

ILLEGAL LINE NUMBER OR PARALLEL PRINTER NUMBER
Serial printers may be allocated only to legal ports on the system. The spooler process may not be used as a serial printer. Parallel printers must be specified as physical device 0.

ILLEGAL PARALLEL PRINTER NUMBER
Must be 0.

ILLEGAL SERIAL PRINTER NUMBER
Must be between 0 and 19, inclusive.

ALLOCATION ATTEMPTED ON UNINITIALIZED PRINTER
The printer has not been fully started yet. Tell it what its page skip is, what type it is, and what its line number specification is.

YOU ARE ATTEMPTING TO START PRINTER nn ON LINE mm, WHICH IS NOT STOPPED
The printer control block, nn, is allowable in this case, but the line, mm, is still active, indicating that the stop/active flags are not set the same way in the two control blocks. You may wish to use the SP-KILL verb with the D option in this case.

YOUR ALIGN WAS JUST ABORTED BY SOMEONE.
YOU MUST START THE ALIGN PROCESS OVER.
An SP-KILL was executed on the printer which is the object of the align.

THERE IS NO JOB ENQUEUED FOR OUTPUT ON THE FORMS YOU SPECIFIED.
THEREFORE, ALIGNMENT IS IMPOSSIBLE.
In this case, execute an SP-STATUS or a LISTPTR n, where n is the logical address of the printer specified as the first parameter in the STARTPTR verb, to see what forms were specified. Then use the LISTPEQS verb with the F option to see what is enqueued in which queues and what their statuses are. If all appears correct, disenqueue them with the SP-KILL verb with the F option, and reenqueue them with the SP-EDIT verb.

THE PRINTER CONTROL BLOCK HAS BEEN INITIALIZED.
This indicates success for the STARTPTR process.

THE LINE WHICH YOU SPECIFIED IS BEING USED
AS ANOTHER PRINTER ON THE SYSTEM.
Another printer control block has control of the line you specified.

2.12 STOPPTR

The STOPPTR verb flags the specified printer that it is to stop at the end of the print job for the current print file. The general form of this verb:

STOPPTR n{-m}{options}

where:

n and m are legal printer numbers between 0 and 19, inclusive.

options

B will stop all printers.

W will cause the process to wait until the printer has completed printing any print file and is inactive.

The STOPPTR verb is intended to stop a printer, rather than the spooler. It requires a numerical argument in the same way that the SP-KILL verb does. The STOPPTR verb sets a flag which causes the printer to stop after it has completed outputting its current print file. The process can be expedited by executing an SP-KILL to that printer to complete the print file sooner. If the current print file is specified to print multiple copies of the report, then SP-KILL will cause the printer will stop at the completion of the current copy.

If the STOPPTR verb is being used under PROC control with the STARTPTR verb, the STARTPTR verb will terminate unsuccessfully if the printer is still active when the start is attempted.

Two facilities are available to control the timing of the execution of the STARTPTR verb. First, there is the W option, which causes the STOPPTR verb to wait until the printer has become inactive before it returns to TCL and then to the initiating PROC. If the W option is used, the printer will be stopped and inactive when control returns to the user.

Second, the messages which the verb sends are from the ERRMSG file and have error numbers which are conveniently stored in the PROC secondary input buffer. Error message number 1171 says that the printer is inactive and error message number 1172 says that the printer is still active. The E form in PROC cannot, in general, be used in this case, because it references only the first element of the PROC secondary input buffer.

To access the PROC secondary input buffer, execute an SS to set the PROC input pointer to this buffer, and then execute a scan of the buffer. The intent of the scan is to test for the ERRMSG number indicating the state of the printer process of interest to the PROC.

Using the error message numbers rather than the W option allows the PROC to continue with other processing, and then to return to start the printer at a later time. Keep in mind that the PROC secondary input buffer is evanescent. It will disappear at the next verb execution.

Note that SYS2 privileges are required for the STOPPTR verbs.

Examples of the use of STOPPTR:

STOPPTR 1	will set printer 1 to stop at the completion of its current job.
STOPPTR 3-5	will set printers 3 through 5, inclusive to stop on completion of their current jobs.
STOPPTR B	will set all printers to stop as above.
STOPPTR 1W	will set printer 1 to stop but will wait until printer 1 becomes inactive before stopping it and returning the process to TCL.
STOPPTR	default is to set printer number 0 to stop at end of current job.

2.12.1 STOPPTR ERROR MESSAGES

The following error messages will occur upon successful completion:

PRINTER # nn SET TO STOP AND IS INACTIVE.
In this case, the STARTPTR verb may be executed on this printer.

PRINTER # nn SET TO STOP BUT IS STILL ACTIVE.
In this case, the stop flag has been set, but the printer is still outputting a job. The printer will go to inactive status upon completion of the job, a condition which will be specified by the SP-STATUS and LISTPTR verbs in their normal course, as well as the STARTPTR verb as an error message.

The following messages indicate errors:

ILLEGAL PRINTER NUMBER. MUST BE BETWEEN 0 AND 19 INCLUSIVE.
This will occur if n lies outside of the legal range.

PRINTER # nn CONTROL BLOCK HAMMERED. CLEARED TO NULL.
This message will occur if the contents of the printer control block does not pass certain validation requirements. The message and variations of the message can be caused by other verbs which utilize the printer control block, because it is checked for validity upon each use.

The effect is not to deallocate the printer control block, but to ignore the printer entirely. In this case, the process or subprocess which is acting as the printer may continue to sleep, print, or it may go astray. It cannot be stopped by means of the STOPPTR and SP-KILL verbs, or even with the SP-KILL verb with the D option. It can be reinitialized with the initialization form of the STARTPTR verb, however; or the :STARTSPOOLER verb can be used to clear all printer processes and clean the output queues.

An attempt to execute the STOPPTR verb when logged onto an account with a privilege level lower than SYS2 will yield the following message, and a return to TCL.

YOUR SYSTEM PRIVILEGE LEVEL IS NOT SUFFICIENT FOR THIS STATEMENT.

2.13 :STARTSPOOLER

:STARTSPOOLER is a utility verb provided to assist you in getting your system operating again if the printer functions are not working as they should. The spooler is started as a normal part of coldstart (see PICK Operator Guide), but sometimes, for a variety of reasons, it can get thrown off track and needs to be restarted.

The general form of this verb is:

:STARTSPOOLER {option}

where options are:

options	
(No options)	The spooler initializes the control data and waits for something to do.
C	Initializes control data and deletes all nonhold files. After use, all lines must reset their SP-ASSIGNments and all printers must be redefined.
-	No print files should be generated or be output when this option is used.
I	Initializes control data and deletes all print files including the hold files. After use, all lines must reset their SP-ASSIGNments and printers must be redefined.
	No print files should be generated or be output when this option is used.
L	The spooler links up the extended work space for all lines not logged on at the time.

2.13.1 VERB ACTION

The :STARTSPOOLER verb allows the execution of these option processes selectively and without cold starting. Execution of the :STARTSPOOLER verb without any options will cause the spooler to reinitialize certain global pointers and control data and then send the spooler to a normal sleep. Generally, this will be necessary only if the spooler seems to have stopped, which should not be the case.

The next level is the C option, which clears all the control blocks except the permanent print file control record area. This should not be executed when any spooler-related tasks are live, such as generating or printing print files.

The global level is the I option, which reinitializes everything the way the F-level cold start does, except that the storage contained in any extent print files is lost until the next file restore.

There is also the L option, which causes the spooler to link up the extended work spaces for all lines which are not logged on at the time. In this case, the spooler will also execute a minimal initialization of its control data.

Note especially that the :STARTSPOOLER with the C option should be executed when no processes are generating print files, that afterwards all users will have to reexecute the SP-ASSIGN verb before any further output is attempted, and that the printers must be initialized.

2.13.2 WHEN TO USE :STARTSPOOLER

In general, the :STARTSPOOLER verb should not be used until all other resources have been exhausted, and then only if the spooler is asleep or in the debugger. For instance, the spooler may not be responding to a request to print because it is logging disk errors, which is a priority task. If the printer is not printing when it appears that it should be, first try some of the following approaches.

1. Is the printer on line? If not, that could be the whole problem.

2. Try LISTPEQS with the F option. Is there a file enqueued to be printed? If not, that's the problem.

3. If there is a file ready to be printed, what is its form number?

4. Try LISTPTR. Is there a printer on line set for that "DEV OR LINE" number? If not, use the STARTPTR verb and set it for the right device or line number.

5. Try SP-STATUS. Does everything look right here?

6. The next step is to do an SP-ASSIGN SHF5 (or using another unused form number) and generate a small print file. Kill the printer with SP-KILL and then use STARTPTR to restart it to form number 5. Use SP-EDIT to examine the file and send it to the spooler. If it doesn't begin printing, use SP-STATUS. If it is not being printed and does not appear as enqueued in the SP-STATUS report, you must now look to the spooler.

If all of the above has been tried including executing the SP-STATUS verb to encourage the spooler to attempt output, then the printer is possibly assigned to the incorrect hardware address. This might occur if the printer has just been serviced, or due to an incorrect execution of the STARTPTR verb.

If there is no progress so far, create a small hold file using a file you know well. Inspect it using the SP-EDIT verb. Enqueue it onto an output queue with no other occupants. Start the printer on this output queue only. If nothing happens, that is, if nothing is printed, the print file stays enqueued, it is not marked as being output, and it does not appear in the SP-STATUS message, then you must inspect the spooler process to see if it is confused.

2.13.3 SPOOLER INSPECTION

Inspection of the spooler process starts with the execution of the WHERE verb. The spooler is conventionally the last line on the system, so that if you have a 20 line system, 0-19 are communication lines and the spooler is line 20, the twenty-first process.

You should be concerned with two things. First, to know if the spooler has an abnormal status; second, to know if and where it is processing. The spooler status is indicated in the third column of the WHERE listing by:

BF or 3F indicates that the spooler is not busy or is waiting for a block of copy to be printed out on the printer. The frame number should be 170 (look in the fourth column of the WHERE listing).

5F indicates that the spooler is waiting for disk access.

7F indicates that the spooler is waiting for CPU status. This is a rare occurrence.

Abnormal status is normally 7B40 or 7D40 indicating that the spooler is in the debugger and trying to talk to a non-existant terminal.

There are three reasons this could happen:

1. The system code which runs the spooler has possibly become changed. Execute the VERIFY-SYSTEM verb and, if the system doesn't verify, you will have to do an ABS load followed by a COLD-START.

2. The control data which the spooler uses has picked up some garbage. Use the LISTPEQS, LISTABS, LISTPTR, and SP-STATUS verbs again. Familiarity with these reports will help you to spot something amiss. Even if you see nothing wrong, try SP-KILL Dn again to kill the printer, and reinitialize it using STARTPTR. If that still doesn't get things started, it is probably the next reason.

3. There is an illegal forward link in the file. The forward link is normally to a frame beyond the range of disk storage on the system, because a forward link of zero is the normal mode of termination of a print file. The system will occasionally go astray. If there is no recent history of similar spooler problems, cataloged production BASIC programs which seem to degrade over time, group format errors which reappear, or chains which seem to cross, then the best course is to execute the :STARTSPOOLER verb with no options. It is relatively innocuous and will get things stated again. If they stop suddenly again, SP-KILL the print file which the spooler is attempting to print. It probably has a bad link. Deleting the print file will probably result in a REFERENCING ILLEGAL FRAME message being returned to the deleting process, in which case, you are probably in the debugger and will have to END the process. If the spooler attempts to return the storage, it will retire to the debugger and need to be restarted. Normally, the :STARTSPOOLER verb without options will discard print files which are being output concurrent with storage release because their storage retention is unknown.

If for some reason the control block area of the spooler is obviously incorrect, but the system verifies, then execute the :STARTSPOOLER with the C option. If the permanent print file control record area has apparent trash in it which is found to be admissible by the :STARTSPOOLER C, then delete all print files whose storage is reasonably trustworthy, and execute the :STARTSPOOLER with the I option.

ASCII codes A

The ASCII codes used by the PICK System are:

DEC	Hex	Character	DEC	Hex	Character
0	0	NULL	36	24	$
1	1	SOH	37	25	%
2	2	STX	38	26	&
3	3	ETX	39	27	'
4	4	EOT	40	28	(
5	5	ENQ	41	29	)
6	6	ACK	42	2A	*
7	7	BEL	43	2B	+
8	8	BS[1]	44	2C	`
9	9	HT[1]	45	2D	-
10	A	LF[1]	46	2E	.
11	B	VT[1]	47	2F	/
12	C	FF[1]	48	30	0
13	D	CR[1]	49	31	1
14	E	SO	50	32	2
15	F	SI	51	33	3
16	10	DLE	52	34	4
17	11	DC1	53	35	5
18	12	DC2	54	36	6
19	13	DC3	55	37	7
20	14	DC4	56	38	8
21	15	NAK	57	39	9
22	16	SYN	58	3A	:
23	17	ETB	59	3B	;
24	18	CAN	60	3C	<
25	19	EM	61	3D	=
26	1A	SUB	62	3E	>
27	1B	ESC	63	3F	?
28	1C	FS	64	40	@
29	1D	GS	65	41	A
30	1E	RS[1]	66	42	B
31	1F	US[1]	67	43	C
32	20	SPACE	68	44	D
33	21	!	69	45	E
34	22	"	70	46	F
35	23	#	71	47	G

DEC	Hex	Character	DEC	Hex	Character
72	48	H	104	68	h
73	49	I	105	69	i
74	4A	J	106	6A	j
75	4B	K	107	6B	k
76	4C	L	108	6C	l
77	4D	M	109	6D	m
78	4E	N	110	6E	n
79	4F	O	111	6F	o
80	50	P	112	70	p
81	51	Q	113	71	q
82	52	R	114	72	r
83	53	S	115	73	s
84	54	T	116	74	t
85	55	U	117	75	u
86	56	V	118	76	v
87	57	W	119	77	w
88	58	X	120	78	x
89	59	Y	121	79	y
90	5A	Z	122	7A	z
91	5B	[	123	7B	{
92	5C	\	124	7C	:
93	5D	]	125	7D	}
94	5E	^	126	7E	~
95	5F	_	127	7F	DEL
96	60	`	.		
97	61	a	.		
98	62	b	.		
99	63	c	251	FB	SB[2]
100	64	d	252	FC	SVM[2]
101	65	e	253	FD	VM[2]
102	66	f	254	FE	AM[2]
103	67	g	255	FF	SM[2]

[1]For special use on LSI-11 and -12 terminals:

BS	Cursor Backspace	FF	Cursor Forward
HT	Cursor Tab	CR	Cursor Carriage Return
LF	Cursor Down	RS	Cursor Home
VT	Cursor UP	US	Cursor New Line

[2]For special use by PICK:

SB	Start buffer
SVM	Secondary value mark (displays \)
VM	Value mark (displays])
AM	Attribute mark (displays ^)
SM	Segment mark (displays _)

error messages B

B.1 SPOOLER ERROR MESSAGES

Spooler condition error messages and numbers are:

Error Message	Number
THE SPOOLER IS INACTIVE.	1200
THE SPOOLER IS ACTIVE.	1201
NEEDS TO START PRINTERS.	1202
NEEDS TO LOG DISK ERRORS.	1203

The messages 1200 and 1201 refer to the spooler process rather than a single printer. If it is INACTIVE, it is asleep and using no CPU resources; if it is ACTIVE, it is operating one or more of the serial printers, starting printers, or logging disk errors.

Messages 1202 and 1203 refer to flags set by other processes to activate the spooler process. The spooler is flagged to start printers and awakened when a print file is enqueued, when a printer is started by the STARTPTR verb, and when certain options of the :STARTspooler verb are in effect. The spooler is flagged to log disk errors and is awakened if a process encounters a disk error. The spooler is also awakened by the SP-STATUS verb.

If messages 1202 and 1203 persist, there may be problems with the system. Normally, the spooler process turns the flag off when it executes the necessary activity. If the flag which causes message 1202 stays on, various forms of :STARTSPOOLER should be executed, although there are cases of timing where the message will be fairly persistent when there is no problem. If message 1203 persists, either the spooler has a problem, as above, or the system has a hard disk error. See PICK Operator Guide for disk error log retrieval.

B.2 PRINTER ERROR MESSAGES

Printer error messages are shown below. Note that, unlike the LISTPTR verb messages, the numeric arguments which are inserted into the text of these messages are not sent to the PROC secondary output buffer.

Error Message	Number
THE CONTROL BLOCK FOR PRINTER # 'A' IS IN AN AMBIGUOUS STATE DELETE THE PRINTER FROM THE SPOOLER SYSTEM	1209
PRINTER # 'A' IS	1210
UNALLOCATED	1211
SERIAL	1212
PARALLEL	1213
INACTIVE	1214
ACTIVE	1215
STOPPED	1216
AND ON LINE	1217
AND OFF LINE	1218
THE PRINTER CABLE IS OFF	1219
THERE IS NO CONTROLLER FOR THIS PRINTER	1220
THE PRINTER IS RUNNING ON LINE 'A'	1222
PRINT FILE BEING OUTPUT IS ELEMENT 'A, A'	1229
AN OPEN FILE FOR LINE # 'A'	1230
A CLOSED FILE FOR LINE # 'A'	1231
GENERATED ON ACCOUNT 'A'	1232
WHICH IS A FRAMES LONG	1233
AND THE OUTPUT IS CHOKED	1234
NO OUTPUT QUEUES ASSIGNED TO PRINTER	1239
ASSIGNED OUTPUT QUEUES: 'A'	1240
THE NUMBER OF INTER-JOB PAGES TO EJECT IS 'A'	1243

Error message 1209 usually means what it says, but it is possible to obtain the error message if the SP-STATUS verb is executed at just the wrong time.

Reexecute the verb to see if the message persists, and, if it does, see the discussion of Messages 1202 and 1203 in Section B.1, SPOOLER Error Messages.

Error message 1219 means what it says: If it occurs, there is a discontinuity in the cable between the printer controller and the printer.

Error message 1222 refers to serial printers, and the argument will be the line, channel, or port number.

Error message 1232 gives the account on which the print file was generated, if there is a print file being output.

Error messages 1229 through 1234 are applicable only to active printers. Error message 1234 refers to print files generated under SP-ASSIGN CI, and which have the C indicator under a LISTPEQS display.

Error message 1239 indicates that something is amiss. Stop the printer and restart it, or delete it and retart it. If there is still a problem, a COLDSTART is probably in order.

Error message 1240 refers to the display of the form numbers to which the printer is allocated, and error message 1243 to the inter-job page eject specification.

PROC control of the spooler C

The spooler system may be controlled to some extent from PROC by making use of the information which appears in the secondary input buffer from the error message handler and from certain exceptional information transfers executed by some informational elements of the spooler.

The string of parameters which are left in the secondary input buffer after the execution of a verb, which occurs after the ? in the PROC, may be seen by inserting an SS instruction in the PROC after the P, and then a DO. This will display the PROC secondary input buffer. It is of use when debugging PROCs which use the buffer, and during consideration of designs which might use the buffer.

Retrieving the information from the secondary input buffer for use by PROC is related to the E command in PROC, except that the spooler system may occasionally deliver more than one piece of information. The E command will inspect only the first data field in the PROC secondary input buffer. Therefore, the strategy is to point the PROC input pointer at the secondary input buffer by executing an SS command, and then execute a search.

There are three things which may be done. You may search for a number within certain limits of admissability, you may search for a specific number, or you may transfer all or part of the buffer to an output buffer. Note that the only thing which may be done with the secondary input buffer is to inspect it or to transfer it to an output buffer, and that it will disappear at the execution of each PROC verb execution. Therefore, if the information affects more than one verb execution, or if it is to affect a verb execution after the next immediate verb execution, the contents of the buffer must be saved. It may be saved by moving it to the secondary output buffer, which is then fed to a BASIC program, which then inspects, files, or returns it through a DATA or CHAIN statement. If particular pieces of information are expected, conditional statements may be defined which write a field to the primary input buffer when they encounter the specified information.

Information which is passed by means other than the ERRMSG processor are the entry number for each print file control record at print file initialization time, a large volume of data on the condition of the printers from the LISTPTR verb, and tape ownership data from any process which attempts tape attachment. All verbs which use the ERRMSG file leave residues in the form of error message numbers as well. These error message numbers will be left at error message printing time.

C.1 CASES OF PROC INTERACTION

The principle cases that use PROC interaction are hold file acquisition, tape control, and printer control.

C.2 HOLD FILE RECOGNITION

Processes running under PROC control which have an SP-ASSIGNment specifying that print files are to be held, will leave a mark and the print file number in the PROC secondary input buffer at the time when the ENTRY # is being displayed. The mark is the error message number 1099. The print file number is the parameter that follows the 1099.

If the process generates the message:

```
HOLD ENTRY # 17
```

then the PROC secondary input buffer will contain at least:

```
1099 17
```

It will also contain any other error message numbers which may have been generated during the execution of the verb.

What is not contained in the string is the print file identification number referenced in BASIC in the PRINT ON statement, in RUNOFF in the .PFILE statement, and by the R parameter in the SP-ASSIGN statement. Control in these cases must be by a well-known order of initialization of print files, either within the verb activation, or by execution of a sequence of SP-ASSIGN Rn's prior to the verb's activation.

An example of a fragment of a PROC to retrieve the hold file entry number for an SP-EDIT is:

```
                    <verb which generates a print file>
P                   Execute the verb.
SS                  Set the buffer pointer to the secondary input buffer.
B
5 IF # A G 99       End of buffer - entry not found.
IF A = 1099 G 15    Test for mark.
F                   Advance the pointer to the next argument.
G 5                 Test the next parameter.
15 F                Advance the pointer to the print file number.
IF A # (ON) G 98    Absent or spurious data.
HSP-EDIT            Go SP-EDIT the print file.
A                   Move the print file number to the primary output buffer.
STON                Turn on the stack for the prompts, as necessary.
P                   Go process the SP-EDIT.
                    <Process next or exit>
98 XBAD DATA.       Exit error message.
99 XNO DATA.        Exit with error message.
```

C.3 PRINTER CONTROL UNDER PROC

Since the PICK spooler subsystem is both flexible and fairly complex, it is preferable in a normal application environment to retain most or all of the spooler manipulation under control of PROCs written by the application system programmer. It is also important because the printer control verbs allow considerable facilities management opportunities.

The principle devices to be used to manage the flow to the printer are the output queues to which the generating tasks are assigned under the SP-ASSIGN verb, and the STOPPTR and STARTPTR verbs which consume the print files according to installation management plans.

It is trivial to control the flow of print files onto output queues. What is more delicate is the reallocation of printers, since a printer must have completed its current task before it can be reallocated using the STARTPTR verb.

It is generally unsatisfactory to use the SP-KILL verb indiscriminately, because necessary reports will tend to be truncated.

The verb which interrogates the condition of the printers and which communicates to PROC is the LISTPTR verb. See LISTPTR verb for details of the display and the string which is returned to the PROC secondary input buffer.

The LISTPTR verb will return information about the condition of the desired printer, and about the other possible printers on the system.

You will need to know whether the intended printer is allocated; if so, to what forms, whether it is active or inactive, and whether it is stopped.

You must also know whether any other printers are allocated to the contemplated output queue number. If one or more is allocated, then the print file may go to one of them instead of the intended printer.

To discover the condition of the intended printer (for example, printer 3), execute a procedure like the following:

```
HSTOPPTR 3              Issue a stop command.
P                       Execute it.
SS                      To the secondary input buffer.
B
5 IF # A G 20           Out of data
IF A = 1171 G 80        Stopped and inactive; go start.
IF A = 1174 G 80        Unallocated; go start.
IF A = 1172 G 15        Go pause
F                       To next buffer element
G 5                     Go test next.
15 HSLEEP 1             Pause
20 HLISTPTR 3           Execute the LISTPTR verb.
P
SS                      Set the pointer to the secondary input buffer.
B
25 IF A = 1034 G 10     Check for the correct initial mark.
IF # A G 99             Not there.
F                       To the next element.
G 25                    Test it.
10 F                    To the condition
IF # A G 99             Nothing there.
IF A = 1074 G 80        Not allocated; can be used.
IF A = 1171 G 80        Inactive; go start.
IF A = 1172 G 40        Active
C                       The buffer contains illegal data.
XBAD DATA.              Error exit.
40 OTHER PRINTER IS ACTIVE; DO YOU WISH TO WAIT (Y/N)+
SP                      Set the pointer to the primary input buffer.
IP?                     Input the answer.
IF A = Y G 15           Go pause.
X                       Else exit.
80 HSTARTPTR 3,7,0,S9   Start the printer as per the standard.
P                       Execute the verb.
X
99 X NO DATA.
```

A more complex case is probably best handled using a BASIC program, which inspects the data and constructs verb strings to which the process then chains.

verb options handler D

Many of the verbs in the spooler process share a common options handler and, therefore, share the same option handling protocols. The following spooler verbs share the options handler:

SP-EDIT	SP-KILL	STOPPTR	:STARTSPOOLER
LISTPEQS	LISTPTR	LISTABS	SP-STATUS

All of the options specified for these verbs could be placed in parentheses as per the normal form for the system. Since there are no file specifications used with these verbs, it is not necessary to use the parentheses. The following rules hold:

1. It is possible to place some of the options within parentheses and others prior to the parentheses, as long as there is no numeric argument within the parentheses. If there is a numeric argument in the string, then either it must precede the parentheses, or all of the options must be to the right of a left parenthesis. Further, if dual numeric arguments are used, they must have the form n-m with nothing but the hyphen between them. If they are otherwise separated, then the options handler will return the last numeric found as a single parameter. If two numbers are used in the proper way, they return a range, which is taken to be inclusive in all cases where it has meaning. In general, each processor checks the numbers for legality, and sets up a default value for each where possible. In Table D-1, the defaults are indicated by DN and DM.

2. If there is more than one number or legal pair of numbers in the option string, then the last number or number pair will be retained. If there is a legal number pair n′-m′ early in the string which is loaded into N and M, such that N = n′ and M = m′, and there is a single number n′′ later in the string, the options handler will return N = n′′ and M = n′′. Similarly, if there is a second legal number pair, n′′-m′′, in the string after a first pair, n′-m′, then the options handler will return N = n′′ and M = m′′. Do not, therefore, put more than one numeric element, n or n-m, in an options string.

3. The 'accountname' parameter used with the SP-EDIT and LISTPEQS verbs must be surrounded by ', ", or , like the item specification rules of ACCESS. If there are other options specified, they must either be to the right of the parenthesis, or proceed the 'accountname' specification. They can be scattered between the two places, but they will disappear if they are between the 'accountname' specification and a left parenthesis. Note that the 'accountname' specification must precede all left parentheses, and that only one 'accountname' specification is allowed. Below are legal and illegal examples.

4. Any alphabetic or numeric option or 'accountname' may be used with any processor, but it will be ignored by the processor if it has no meaning.

5. It is syntactically legal to make the second operand smaller than the first, but the processor will trap to an error because all of the processors that operate with a range operate in ascending order.

Table D-1. Spooler Options Processor Alternatives

Option Set	Options	N	M	Acct Name	Error
>VERB ABC	ABC	DN	DM	No	
>VERB CD (E	CDE	DN	DM	No	
>VERB (EFG	EFG	DN	DM	No	
>VERB G H I	GHI	DN	DM	No	
>VERB I,J,K	IJK	DN	DM	No	
>VERB 3KLM	KLM	3	DM	No	
>VERB 4 M(NO	MNO	4	DM	No	
>VERB (OP5Q	OPQ	5	DM	No	
>VERB Q (R5S	RS	5	DM	No	Error
>VERB STU (6		6	DM	No	Error
>VERB UVW 7-8	UVW	7	8	No	
>VERB 8-9(WXY	WXY	8	9	No	
>VERB YZ (9-10A	A	9	10	No	Error
>VERB (ABC1-2	ABC	1	2	No	
>VERB 1-CZDE	CDE	2	DM	No	Error
>VERB 2-E(FG3	FG	3	DM	No	Error
>VERB GHI 4 'accountname'	GHI	4	DM	Yes	
>VERB 'accountname' (IJK5-6	IJK	5	8	Yes	
>VERB K7-8 'accountname' (LM	KLM	7	8	Yes	
>VERB 'accountname' M8-9 (NO	NO	DN	DM	Yes	Error
>VERB 'accountname' (OPQ9-10	OPQ	9	10	Yes	
>VERB Q1-2 (RS 'accountname'	QRS	1	2	No	Error

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