```
       echo “‘date‘ $PROG: Aborted print job for
${name}@${host}”>&2
   fi
done
exit $status
```

```
ABORT=2

name=unknown
host=unknown
#####
# Extract base name of this shell program
#####
OLDIFS=”$IFS”
IFS=/
set $PROG
IFS=”$OLDIFS”
PROG=`eval echo \\\$$#`

status=0
trap “rm -f $TMP/tfile$$; rm -f $TMP/tlog$$; exit \$status” 0

$MODEL “$ARG1” “$ARG2” “$ARG3” “$ARG4” “$ARG5” $FILES | ${NFILTER}
> $TMP/tfile$$

status=0
finished=0
while [ “$finished” -eq 0 ]
do
    $RSH_CMD $XTERM $OPENDEV $DEV < $TMP/tfile$$ > $TMP/tlog$$ 2>&1
    status=$?
    if fgrep ‘opendev’ $TMP/tlog$$ > /dev/null
    then
        if fgrep ‘EBUSY’ $TMP/tlog$$ > /dev/null
            then
                sleep 10
            else
            echo “`date` $PROG: `fgrep ‘opendev’ $TMP/tlog$$`” >&2
            status=$ABORT
    fi
 else
    finished=1
fi

if [ “$status” -gt 0 ]
    then
        status=$ABORT
        finished=1
```

```
TMP=/tmp
OPENDEV=opendev
#RSH_CMD=/usr/bin/rsh
RSH_CMD=/usr/bin/remsh
#####
# Set DEV=/dev/pp0 (parallel port)
# DEV=/dev/tty1 (serial port 1)
# DEV=/dev/tty2 (serial port 2)
# for ViewStation FX;
#
# Set DEV=printer
# for older ViewStation
#####
DEV=/dev/pp0
#####
# Set the X terminal name.
# XTERM=<ViewStation hostname>, or XTERM=<ViewStation IP address>
#####
XTERM=mshfx
#####
# Set MODEL equal to the path of the normal model script for the
# printer, e.g. MODEL=/usr/spool/lp/model/HPDeskJet500. MAKE SURE
# THE MODEL FILE ie. HPDeskJet500 is executible by everyone
#####
MODEL=/usr/spool/lp/model/standard
NFILTER=”cat -”
#####
# Uncomment the next line to map NEWLINE characters
# to RETURN-NEWLINE.
#####
#NFILTER=”sed -e s/$/^M/g”
#####
# Get arguments passed to this script and save away to reconstruct
# them when calling the ‘MODEL’ script.
#####
PROG=$0
ARG1=$1
ARG2=$2
ARG3=$3
ARG4=$4
ARG5=$5
shift 5
FILES=$*
```

NEWLINE characters should be replaced with CARRIAGE RETURN / NEWLINE characters (NFILTER). All of these configurations are at the beginning of the model script.

For example:

```
RSH_CMD=/usr/bin/remsh
DEV=/dev/pp0
XTERM=mshfx
MODEL=/usr/spool/lp/model/HPDeskJet500
NFILTER="cat -"
```

- Add the printer with the 'lpadmin' command. Specify the printer device as '/dev/null' using the '-v' option. Specify the model as <printername> using the '-m' option. Specify the printer as <printername> using the '-p' option. Also specify any other desired options, such as '-o nobanner'.

Check the 'lpadmin' manual page for supported options and meanings, as well as spacing and syntax.

For example:

```
/usr/lib/lpadmin -p hdsfx1 -v /dev/null -m hdsfx1
```

- Start the new printer with the "accept" and "enable" commands.

For example:

```
accept hdsfx1
enable hdsfx1
```

- Print some test files to the printer.

For example:

```
lp -d hdsfx1 /etc/motd
```

You can monitor the printing with the ViewStation's local Console 'ports' command.

3.5.2.4 HDS-Model File

This is a copy of the hds-model.sh file.

```
#!/bin/sh
#####
# hds-model.sh: Sample model file for use with System V printing
# facilities to allow ``lp'' to print to a device connected to an
# HDS ViewStation's parallel or serial ports.
# This script is a wrapper that calls the normal printer 'model'
# script and then sends the output to the ViewStation.
#####
# Copyright (C) 1994, 1995 HDS Network Systems, Inc. All rights
# reserved.
# ident: SCCSID = "@(#)hds-model.sh 1.1 6/9/94"
#####
PATH=/bin:/usr/bin:/usr/etc; export PATH
```

tures the output. This output is then transferred to the ViewStation via remote shell execution of an "opendev" task. The HDS printer model logs any errors generated to the standard error channel.

The sample printer model included in this directory, "hds-model.sh", is written as a Bourne shell script, which may be customized as needed. As it appears here, it is hardcoded to send its output to a specific ViewStation hostname (or IP address) and to a specific hardware port. (The ViewStation can connect to printers on its parallel port or to printers on its two serial ports.) If you want to set up a system with a single host controlling printers connected to more than one ViewStation, you will have to create separate printer model entries for each printer.

Note that the ViewStation will not abort the print job if the printer is off-line or out-of-paper. Instead, the ViewStation will stop accepting data on its "shell" TCP port, which in turn will cause the LP process executing the printer model script on the controlling host to block until the ViewStation resumes accepting data. Print jobs may be aborted either by "killing" the opendev process on the ViewStation, or by using print spooler administration tools on the controlling host.

3.5.2.3 Adding a ViewStation Printer to the LP Print Service

Follow these steps to add a ViewStation printer to your LP Print Service.

- Attach the printer to the desired ViewStation's serial or parallel port. If using a serial printer, make sure the communications settings and cable are correct.

- Make sure there is a host name corresponding to the ViewStation's IP address in the host's IP database. (For example, */etc/hosts*)

- Choose a name for the printer. This probably should be the same as the host name of the ViewStation, but need not be.

  For example, your ViewStation name might be: hdsfx1

- Copy and rename the hds-model.sh script to the *lp/model* directory. There should be a separate copy and name for each ViewStation printer. Set the owner and execute permission on each model script.

<path> is the path to the *lp/model* directory, usually */usr/spool/lp/model*

```
cp hds-model.sh <path>/<printername>
cd <path>
chown lp <printername>
chmod +x <printername>
```

For example:

```
cp hds-model.sh /usr/spool/lp/model/hdsfx1
cd /usr/spool/lp/model
chown lp hdsfx1
chmod +x hdsfx1
```

- Set the X terminal name (XTERM), the parallel or serial port (DEV), and the printer model (MODEL) variables for the printer in each of the model scripts. Also set the path to the remote shell command (RSH_CMD) and whether or not

```
:if=/usr/local/bin/hds65-spool.sh:\
:sh:lp=/dev/HP-LJ:
```

The hds65-spool.sh script would have variables "DEV=/dev/pp0" and "xterm=nancyfx" set.

Add this entry to your */etc/printcap* file with other network printer entries. Remember to create the :lp file (by "touch /dev/HP-LJ") when you add the entry.

3.5.2 The LP Print Service for UNIX System V Printing

Printing with the ViewStation on UNIX System V computers uses a slightly different process and different files, but the procedure is very similar. Descriptions and sample files for LP Print Service are distributed with HDSware software (Version 3.0.3 or higher) in the */hds-fx/config/lp-support* directory.

3.5.2.1 Using LP Print Service with the ViewStation

HDS has generated a sample printer model that lets you take advantage of the local printing capability of the ViewStation. Printing is generally a system-wide function, so this file will have to be modified or adapted to your particular situation. This printer model is intended as a sample only.

Your system may be different, use different commands or syntax, so you will have to make the necessary adjustments.

On UNIX System V systems, printing support is handled by the LP print service. The shell command to print a file is usually "lp". The LP print service is responsible for opening the path to the printer requested, passing the file through various filters, maintaining the print queue, etc.

The LP print service supports both local and remote printers. If a printer is a remote printer, then the print file is sent to the remote printer host's print service. In this case, the remote host is responsible for temporarily storing the print file in its local file system until it can be sent to the printer.

Since the HDS ViewStation may not have any local disk memory for this temporary storage, one host's LP print service should store and maintain the print job queues for the printer attached to the ViewStation. To make this arrangement, the system administrator should configure the ViewStation's printer as if it were locally connected to that controlling host. This is done by adding a new printer model to the controlling host's *lp/model* directory.

3.5.2.2 Sample Printer Model File

A sample printer model file entry, hds-model.sh, is included in this */hds-fx/config/lp-support* directory.

The key to making this arrangement work is the use of a printer model, such as the hds-model.sh file included in this directory. This HDS printer model is specified in the "lpadmin" command when adding a new printer or modifying an existing printer. When printing a file, the LP print service calls the HDS printer model script with multiple arguments, including the file names to print. The HDS printer model calls the normal printer model (configured by the user) and cap-

(such as PS, or LJ) rather than a name associated with the ViewStation, unless there are multiple printers of that type connected to ViewStations.

• The ":sd" entry is the spool directory and contains the printer's filter file */usr/spool/hdsVS*; again, its name should reflect the printer name or type rather than the ViewStation name.

• The ":lp" entry on the last line is the network name of the printer. This line acts as a "lock" mechanism to see if the device is currently in use. You have to create this file with the "touch" command when you add this entry to your printcap file (do "touch /dev/hdsVS-1").

• The ":if" entry is the input filter path and name for the ViewStation's input filter, which specifies the ViewStation's name and the port for the printer connection. Make sure this path and name are correct for each ViewStation and printer.

• The file reads as if it were a single line, so use the backslash characters to end lines. The ":" character separates the variables and their values from each other.

3.5.1.5 ViewStation Print Spooler Example

The following example shows how these files should be customized for a ViewStation printing on a network. Both the input filter file and the printcap file need to be modified.

Modifying the Input Filter File

1. You must have a separate input filter file for each ViewStation with a printer, or even a separate file for each port used for printing on a single ViewStation. Name these files in a way convenient for your system, such as:

    hds64-spool.sh
    hds65-spool.sh

2. Enter the ViewStation's name (not IP address) as the "xterm" variable.

3. Enter the ViewStation's printer port as the "DEV" variable.

4. If necessary, change the RSH_CMD command line to reflect your system's remote shell command (rcmd for SCO systems, for instance).

Modifying the Printcap File

You must make an entry in your printcap file (usually */etc/printcap*) for each network printer. You must make these changes to the sample printcap entry:

1. Enter the network printer name for the printer attached to the ViewStation.

2. Enter the input filter filename and path you created for the ViewStation on the "if=" line in the printcap entry.

Sample Printcap File

If your ViewStation's name was "nancyfx" and you wanted the printer's network name to be "HP-LJ", and you had named the input file with the nancyfx settings in it "hds65-spool.sh", you would make these modifications to the printcap entry.

```
1|HP-LJ|Test of printer spooler to HP-LJ on ViewStation65:\
:sd=/usr/spool/HP-LJ:lf=/usr/adm/lpd-errs:\
```

```
            fi
        else
            finished=1
    fi
 if [ “$status” -gt 0 ]
    then
        status=$ABORT
        finished=1
        echo “‘date‘ $PROG: Aborted print job for ${name}@${
        host}”>&2
    fi
done
exit $status
```

3.5.1.4 Printcap File

This is a sample printcap file. You need to customize this for your environment.

```
#
# This is a sample of printcap entries used to print to HDS
# ViewStations.
#
# The spool directory must be created in /usr/spool/, and you
# must also “touch” the “lp” file for each printer attached
# to a ViewStation. The “lp” file is used simply to lock each
# printer during printing. The input filter “if” must be
# unique for each separate printer, since it specifies which
# ViewStation to print to. You could get fancy and embed the
# ViewStation name in the input filter name, and use links to
# a single input filter, but this seems overkill unless you
# plan to support very many printers connected to
# ViewStations.
#
# SCCSID = “@(#)printcap 1.2 6/22/93”
#

1|hdsVS-1|Test of printer spooler to HDS ViewStation:\
 :sd=/usr/spool/hdsVS:lf=/usr/adm/lpd-errs:\
 :if=/usr/local/bin/hds-spool.sh:\
 :sh:lp=/dev/hdsVS-1:
#
```

There are several things to note:

- The “hdsVS-1” on the first line is the network name of the printer. It is the destination name you give for your print job. It should probably be the printer name

```
       shift
        name=”$1”
   fi
       ;;
    -h)
   if [ $# -gt 1 ]
   then
       shift
        host=”$1”
   fi
       ;;
 -*)
       echo $PROG: Filter flag $1 not supported. >&2
       exit $ABORT
       ;;
   esac
   shift
done
# Extract base name of this shell program
OLDIFS=”$IFS”
IFS=/
set $PROG
IFS=”$OLDIFS”
PROG=‘eval echo \\\$$#‘
status=0
trap “rm -f $TMP/tfile$$; rm -f $TMP/tlog$$; exit \$status” 0
cat - > $TMP/tfile$$
status=0
finished=0
while [ “$finished” -eq 0 ]
do
   $RSH_CMD $xterm $OPENDEV $DEV < $TMP/tfile$$ > $TMP
   /tlog$$ 2>&1
 status=$?
   if fgrep ‘opendev’ $TMP/tlog$$ > /dev/null
       then
          if fgrep ‘EBUSY’ $TMP/tlog$$ > /dev/null
          then
          sleep 10
          else
          echo “‘date‘ $PROG: ‘fgrep ‘opendev’ $TMP/
          tlog$$‘” >&2
          status=$ABORT
```

jobs may be aborted either by “killing” the opendev process on the ViewStation, or by using “lpc” or other print spooler administration tool on the controlling host.

3.5.1.3 Spooler Shell Script

This is the hds-spool.sh script. It is written as a Bourne shell script to let the host’s LPD process to write to an HDS ViewStation. It is a sample input filter which you need to customize. Each ViewStation with a printer should have one of these files, with a unique name, with its variables set appropriately.

```
# !/bin/sh
# hds-spool.sh: Sample input filter to allow lpd to print to
# an HDS ViewStation
# Copyright 1992, 1993, 1994, 1995 HDS Network Systems, Inc.
# All rights reserved.
# SCCSID = “@(#)hds-spool.sh 1.3 6/22/93”
PATH=/bin:/usr/bin:/usr/etc:/usr/ucb; export PATH
TMP=/tmp
PROG=$0
OPENDEV=opendev
# Set RSH_CMD as needed for your system (RSH, RCMD, or REMSH, etc.)
RSH_CMD=/usr/ucb/rsh
# Set DEV=/dev/pp0, DEV=/dev/tty1, or DEV=/dev/tty2 for
# ViewStation FX models;
# Set DEV=printer for older ViewStation models
DEV=/dev/pp0
# Set     xterm=<hostname of ViewStation>
xterm=hdsfx
ABORT=2
name=unknown
host=unknown
while [ $# -gt 0 ]
do
    case “$1” in
     -w*)
       ;;
     -l*)
       ;;
     -i*)
       ;;
     -n)
    if [ $# -gt 1 ]
    then
```

sages to the LPD daemon indicating the names of the files to print, the number of copies, etc. The LPD daemon process is then responsible for opening the path to the printer requested, passing the file through various filters, maintaining the print queue, etc.

The LPD process is started by the system administrator. At startup, it reads a file called */etc/printcap* which lists the printers available to the LPD daemon and whether those printers are local or remote. If the printer is a remote printer, then transfering the print file also involves the LPD on the local host communicating with the remote host's LPD. In this case, the remote host is responsible for temporarily storing the print file in its local file system until it can be sent to the printer.

Since the HDS ViewStation may not have any local disk memory for this temporary storage, one host's LPD should store and maintain the print job queues for the printer attached to the ViewStation. To make this arrangement, the system administrator should configure the ViewStation's printer as if it were locally connected to that controlling host. This is done by adding an entry into the controlling host's */etc/printcap* file. A sample printcap file entry is included in this LPD directory.

The key to making this arrangement work is the use of an input filter, such as the hds-spool.sh file included in this directory. This input filter is specified in the */etc/printcap* file as "if=<filter pathname>". The LPD daemon writes the contents of the print file to the standard input of this filter. The filter then performs several tasks; it opens a remote shell on the ViewStation and transfers the print file to an "opendev" task, which routes the data to the device specified on the opendev command line. It also logs any errors generated to the filter's standard error channel and appends them to the log file (which was specified in the */etc/printcap* entry "lf=<log file pathname>".

On a system with multiple ViewStations, you would make a copy of the input filter, hds-spool.sh, each with its own name and variables, for each ViewStation. Each ViewStation would also have its own printcap file.

3.5.1.2 Sample Input Filter File

The sample input filter is shown below. The script is "hds-spool.sh" and is written as a Bourne shell script, which may be customized as needed. As it appears here, it is hardcoded to send its output to a specific ViewStation hostname (or IP address) and to a specific hardware port. (The ViewStation can connect to printers on its parallel port or to printers on its two serial ports.) If you want to set up a system with a single host controlling printers connected to more than one ViewStation, you will have to create separate */etc/printcap* entries for each printer, and the input filter script specified for each printer must be modified so it connects to the correct ViewStation and hardware port on the ViewStation.

Note that the ViewStation will not abort the print job if the printer is off-line or out-of-paper. Instead, the ViewStation will stop accepting data on its "shell" TCP port, which in turn will cause the lpd process executing the input filter shell on the controlling host to block until the ViewStation resumes accepting data. Print

Network Printing Operations

This section describes the HDS ViewStation's Print Spooler and Print Model, host-based scripts to enable network printing to the ViewStation. Sample files for both BSD and System V UNIX systems are included.

Section 3.0 - Network and Host System Operations

3.5 Network Printing Operations

The HDS ViewStation is designed as a network device with full operational capability for network printing. This is managed by host-based programs, called the Print Spooler or LP Print Service, which permits the host's print capability to manage the ViewStation and its ports, including the parallel port and both serial ports.

Network printing is handled by a "print spooler" on UNIX BSD systems and a "lp print service" on UNIX System V systems. Both are supported and are described, with sample files, in the material below.

These scripts and sample files are found in the HDSware distribution in the */hds-fx/config/lpd-support* and */hds-fx/config/lp-support* directories.

3.5.1 The LPD Print Spooler for BSD Systems

HDS has generated a sample print spooler that lets you take advantage of the local printing capability of the ViewStation. Printing is generally a system-wide function, so these files will have to be modified or adapted to your particular situation. This print spooler is intended as a sample only. Your system may be different, or use different commands or syntax, so you will have to make the necessary adjustments.

3.5.1.1 LPD Daemon

On BSD UNIX systems, print spooling is handled by a daemon process known as LPD. The shell command to print a file is usually "lp" or "lpr", which sends mes-