Printing from an Athena Workstation

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1. What You Need to Know

Printing from an Athena workstation can be quite complex at times, but for most situations, all you need to know is how to print a file. To do this, you'd type:

`lpr -P`*printername filename*

where *filename* is the name of the file you wish to print, and *printername* is the name of the printer you want to send the file to. The printer must be able to handle the type of file you send it (see section 1.1 and 1.2 for more information). The *printername* can most easily be determined by checking the label on the printer. Most printers should have an identifying label, listing the name and capabilities of that printer. Section 10 contains a table of currently available printers.

Even if you don't have plans to print anything more complex than plain text files, you should read the section on saving the Athena printers, section 5. You can help cut down on the load on the printers, as well as reduce the amount of paper used.

If you are planning to print more than just plain text files, you must first know several things. If you want to print a file, you must know what type of file it is. If you are printing from a program, you must know how to configure it to work with our printers, and then you must know the correct sequence of commands to produce a printout. Lastly, you must be familiar with the different kinds of printers that Athena has, and what they can do for you.

1.1 Types of Files

Your file will probably fall into one of the categories listed below. If not, you will need to learn some method for converting your output into one of these forms (see section 7):

Plain Text These include program listings, files formatted with **@device(lptln)** in Scribe, and output from some programs (including programs you may have written).

PostScript These files are specially formatted using the PostScript language. This includes files formatted with **@device(PostScript)** in Scribe, and output from ProChart, PED (a drawing program), and Xmath. You can also write programs in PostScript to produce graphics on a printer (see section 8 for more information).

Window and Screen Dumps
These files are images of windows that can be displayed on your workstation's X display. Images of the screen or individual windows can be saved or sent directly to the printer.

1.2 Types of Printers

The following list describes the types of printers available on Athena.

LPS40 The LPS40 is a high-speed PostScript printer, capable of handling large print jobs. It can also print plain-text files. Currently, "linus" is the only available LPS40.

LN03R	The LN03R is a light-duty PostScript printer also capable of printing plain-text files. It is also able to print window and screen dumps, if done correctly. LN03R's are located in many clusters.
LN03+	The LN03+ is an LN03 configured with a large amount of memory, thus making it capable of printing window and screen dumps. However, it cannot print PostScript files. "Europa" is an LN03+.
3812 Page Printers	The 3812 Page Printer is a medium-duty window dump and plain-text printer. It cannot print PostScript files. 3812 Page Printers are available on a limited basis.

Most printers should have an identifying label, listing the name and capabilities of that printer. Section 10 contains a table of available printers.

2. Simple Printing Commands

The basic command for sending output to a printer is **lpr**. **lpr** sends your file or output to a *print server*, a machine that keeps track of printing requests in a list called a *print queue*. Since you will be sharing printers with other people, the *print server* takes the print jobs submitted to it, and, keeping them in order on the *print queue*, prints them out one by one. You can find out what print jobs are waiting to be printed by using the command **lpq**, and you can remove a print job from the *print queue* using the command **lprm**.

2.1 lpr

lpr is the basic command for sending output to a printer. The general form for sending a file to the printer is:

`lpr -P`*printername filename*

where *printername* is the name of the printer you wish to use (see section 10 for names of printers), and *filename* is the the file you wish to print. **lpr** is also capable of moderate print formatting — for more details, type: **`man lpr`**

2.2 lpq

lpq is the command to list the print queue for a given printer. To see whether a print job that you have submitted for printing has been printed yet, type:

`lpq -P`*printername*

When you type **lpq**, you should see something like this:

```
BLANKET.MIT.EDU...  linus is ready and printing
Rank   Owner      Job  Files                                Total Size
active joeuser    2    history.paper.PS                     8069 bytes
1st    janeuser   3    letter.PS                            12841 bytes
2nd    joeuser    3    english.paper.PS                     19942 bytes
```

lpq is also capable of giving limited information about the physical status of the printer. For example, typing **`lpq -Plinus`** might give back:

```
BLANKET.MIT.EDU...  Warning: linus is down: linus is ready and printing
```

The conflicting status messages would indicate that linus is not working correctly.

2.3 lprm

If you send a print job to the printer, and later decide that you do not want the printout, you can use **lprm** to remove that print job from the queue. To remove a single print job from a printer queue, you need to know the print job number. Referring to the sample queue in section 2.2, let's suppose "joeuser" wanted to remove his file "english.paper.PS" from the queue. Noting that the job number associated with "english.paper.PS" is 3, he would type:

`lprm -Plinus 3`

Note that even though "janeuser" has a print job numbered 3, "joeuser" is only allowed to remove his own print jobs.

To remove *all* of your print jobs from a printer queue, type:

`lprm -P`*printername* **`-`**

The minus sign ("`-`") at the end of the command line is necessary in this command. If you send a print job to a printer and later discover the printer is not working, please remove your print jobs from that printer. Otherwise, when the printer is fixed and resumes service, it will begin printing all of the print jobs remaining on the queue.

Note that you can only remove print jobs from the queue by using **lprm** on the same workstation that you sent the print job from.

3. Sending Output Directly to the Printer: Using Pipes

If the information you want to print does not happen to be in a file, one of the things you can do is send the information directly to the printer. For example, suppose you want a printed list of the files in your directory. You could type:

`ls >` *filename*
`lpr -P`*printername* *filename*

However, rather than saving the information in a file, which uses up space and takes time, you can send the output directly to the printer by using a "pipe":

`ls | lpr -P`*printername*

The vertical bar symbol ("|") is a "pipe". A pipe simply takes the output from one program and sends it as the input to another program. In this case, the output from **ls** becomes the input to **lpr**.

You can use this technique for many things. If you have written a program and want to send the output of the program to the printer, type:

programname **`| lpr -P`***printername*

4. Window and Screen Dumps

It is possible to print an image of a window or an image of the entire workstation screen. There are several ways you can do this.

Window and screen dumps can be sent either to a PostScript printer or an LN03+ laser printer. The methods for both are similar, but confusing them will result in a garbled printout.

You may send a window that is on the screen directly to the printer with one command, **xdpr**. For example, to send a window dump to the PostScript printer "linus", type:

```
xdpr -device ps -Plinus
```

You must specify device "ps" for this to work. If no device is specified, **xdpr** assumes that you are printing on an LN03+. Since "europa" is an LN03+, it is not necessary to specify a device when sending a window dump to "europa":

```
xdpr -Peuropa
```

In either case, after you type **xdpr**, the mouse cursor will change into a plus-sign ("**+**"). Click any mouse button on the window you wish to print. To print the whole screen, click on the "root window" (the grey background). You will hear a beep as **xdpr** begins, and two beeps when it has finished sending the window dump to the printer.

The second method involves saving window and screen dumps into files using the command **xwd**. These files can then be sent directly to the printer, or may be displayed on the screen. To save a window dump into a file:

xwd -out *windowdumpfilename*

Again, when the mouse cursor changes into a plus-sign ("**+**"), click any mouse button on the window you wish to save. If you wish to save an image of the whole screen, click on the "root window" (the grey background). You will hear a beep as **xwd** begins, and two beeps when it has finished writing out the file. Then, if you wish to redisplay that window, use the command **xwud** (type: **man xwud** for details). To print a window dump file on a PostScript printer, type:

xpr -device ps *windowdumpfilename* **| lpr -P***printername*

Where *printername* is the name of a PostScript printer, such as "linus".

To print a window dump file on an LN03+, type:

xpr -device ln03 *windowdumpfilename* **| lpr -P***printername*

Where *printername* is the name of an LN03+ printer, such as "europa".

5. Save the Printers!

The Athena printers get a lot of use, often much more than they are able to handle successfully. Near the end of the term, printing averages over *60,000* pages per week. This heavy use results in poor print quality and printer failure.

You can help relieve the load on the printers by following a few simple suggestions. First, don't print lots of copies of the same file; use a photocopier instead. Second, if you send a print job to the printer, then decide you don't want it, please remove your job from the print queue. You can also preview most files on the screen using **viewdoc** or **more** before printing, thereby limiting your printouts to final copies. Lastly, it is possible to print out only selected pages of a PostScript file using **psrev**; if only one page in your file has changed, you need only print that one page.

5.1 Printers are not Photocopy Machines!

Printing identical copies of a document ties up the printer, and makes everybody wait. If you want more than one copy of your printout, please use a photocopier. **Graphic Arts** (1-252, 2-217, 11-004, and E52-5203) only charges 3 cents per page to make copies.

5.2 lprm

If you have sent a printout to a printer queue and then decide that you don't want it, or discover that the printer is not working, please remove the print job with **lprm**. Details on how to use **lprm** are in Section 2.3.

5.3 viewdoc

You should view your Scribe documents on-line before sending them to the printer. To view documents formatted by Scribe for PostScript printers, you must **`attach athenadoc`**, then you can type:

`/mit/athenadoc/viewdoc` *filename*

For example:

`/mit/athenadoc/viewdoc final_paper.PS`

would allow you to view the file "final_paper.PS". You can move through the document by clicking on the menu boxes provided by **viewdoc**, or, to go to any particular page, type the page number and press <RETURN>. For more information about using **viewdoc**, you can type: **`more /mit/athenadoc/README`**

5.4 more

You may have Scribe documents that you have formatted for the device "lptln". You can view these with **more**. To view the file "draft_paper.lpt", you'd type:

`more draft_paper.lpt`

By default, **more** compresses multiple blank lines into one. If you are viewing .lpt files with multiple blank lines and this creates problems, ask a consultant for information on changing the default behavior.

You can also use **more** to view the output of a program you have written. Use a "pipe", as described in section 3:

programname **| more**

5.5 psrev

If you only need to print selected pages from your PostScript document, use **psrev**. This is an excellent way to save time and paper if you just need a few pages from a long Scribe document. For example, if you wanted to print only pages 3 to 6 of a PostScript file, then you would type:

psrev -R -s 3-6 *filename* **| lpr -P***printername*

where *filename* is the name of the file, and *printername* is the PostScript printer you'd like to send it to.

The options you can specify with "**-s**" are:

N-M	print pages **N** through **M**
-N	print from the beginning to page **N**
M-	print from page **M** to the end
A, B, C	print only pages **A**, **B**, and **C**

NOTE that you need to specify the *actual* page numbers, not the numbers that Scribe prints on the top or bottom of each page. For documents that have a title page, the number you give to **psrev** for a desired page is one greater than the number printed on that page.

6. But it didn't work: Troubleshooting

There are many things that can potentially go wrong. Here are a few suggestions for tracking down the cause of the problem before asking for help or calling Hardware Hotline.

6.1 Checking the Queue

One of the first things to check if you think there is trouble with a printer is the print queue (see also section 2.2). Sometimes, **lpq** can give you useful information that will help in the diagnosis of the problem. Most error messages are fairly self-explanatory. However, if you need help figuring out what's wrong, please ask a consultant by calling the Consulting Hotline (253-4435) or ask a question in OLC (type: **olc**).

6.2 Physical Problems

When there is something physically wrong with a printer, usually there is a flashing red light on the front of the printer. A list of error codes should be attached to the top of the printer. If a printer needs more toner or needs a service call, please phone the Hardware Hotline (253-1410) and let then know the name of the printer, its location, and the error code. Often, an error indicator will simply show that the printer is out of paper (see section 6.3), or the paper cartridge is not inserted properly.

Many times, a printer will appear to be broken when it is actually receiving data to be printed. Pages that contain a lot of detail may take some time to print out. Please check the indicator panel before assuming a printer is broken.

If a printer appears to be functioning, but is still not printing, there may be something wrong with the *print server*. If the queue keeps growing, but nothing is printing and the printer is not receiving data, please report this to the Hardware Hotline (253-1410) or the Consulting Hotline (253-4435).

6.3 Inserting More Paper

To insert more paper into a printer, please check the instructions attached to each printer. Paper should be located near the printer. When adding more paper, make sure that you insert it with the correct side up. The package the paper comes in should have an arrow on it indicating which side goes up when inserting paper into a printer. The paper has been treated on that side so that the toner will burn onto the paper more easily.

Adding paper upside-down can potentially jam the printer, and at best, the print quality will not be as good as if the paper were inserted correctly. Always use the paper supplied; substituting other kinds of paper can jam the printer. Never re-insert paper that has already been through the printer.

If there is no more paper located near the printer, or when supplies begin to run very low, please call the Hardware Hotline (253-1410) to have more delivered to that site.

6.4 Errors from lpr

Sometimes, when trying to print a file, you will receive an error message immediately, and the file will not be sent to the printer. Some common errors and their causes are listed below. If you need further help, please ask a consultant for help (Consulting Hotline 253-4435, or type **`olc`** for on-line help).

unknown printer The name of the printer was misspelled. Check the name and try again.

cannot stat ***filename*** The *filename* specified does not exist, or does not exist in your current directory. Check to make sure that you are spelling the *filename* exactly as it appears when you list the directory. Also, check which directory you are in by typing **`pwd`** and, if necessary, change to the correct directory by using **`cd`**

cannot open ***filename***
The protections on the file make the file unreadable by you. If you own the file, you can change the protections with **chmod**.

filename **is an empty file**
The file you sent was empty, or the program you used to generate the output sent no data. Check to make sure that the file is not zero-length; if it is zero-length, you may be over quota, and the file was not written out by whatever program you were using. Also, check to make sure that you are using the correct commands to generate output from that program (see section 9).

You may also receive this error, printed on a page when you pick up your printout:

spooled binary file rejected
Either you have tried to send a file to a printer that is not equipped to handle it (such as sending an LN03 window dump to a PostScript printer), or there is something wrong with your PostScript file.

If you try to print out a PostScript file and instead get a printout of the PostScript commands, check to make sure that you are sending the file to a printer capable of printing PostScript. Also, all PostScript files should begin with the characters "`%!`". There cannot be any blank lines or spaces before these two characters. The percent-sign and exclamation-point tells a PostScript printer to execute the commands in that file rather than print out the text of those commands. If your file is missing these two characters, you can edit the file with **emacs** and insert them. Or, if the PostScript file was generated by a software package, try regenerating the file.

7. Translating from One File Type to Another

Occasionally, you will have a file you wish to print, but can't print it because it is in a format that our printers cannot handle. Some examples include files produced by LaTeX and Tektronix window graphics commands. The next few sections contain directions for translating these and other files into ones that are printable on Athena printers.

7.1 Tektronix graphics to PostScript

Tektronix graphics files are most commonly generated on Athena through the use of a "pull-down menu" in the Tektronix window. Holding down the CTRL key and the middle-mouse-button in a Tektronix window will give you a menu; dragging the mouse down the menu and selecting "COPY" will save an image of the window in a file. The file will be placed in the directory that you were in when you started up the Tektronix window, and will have the name "COPY" followed by the date and time (i.e. COPY89-01-23.22:18:56).

These graphics files can be converted to PostScript for printing through the use of the **ps4014** command. In general, all you need to do is type:

`ps4014` *tekfile* **`>`** *newfilename.PS*

This would create a PostScript file *newfilename.PS* from the graphics commands in *tekfile*. You could then print the PostScript file on any PostScript printer. Alternatively, you could send the output of **ps4014** directly to the printer through the use of a "pipe" (see section 3):

`ps4014` *tekfile* **`|`** **`lpr`** **`-P`***printername*

ps4014 is also capable of manipulating Tektronix graphics file in many ways, including rotation and scaling of the image.
For a complete description of **ps4014**, type: **`man ps4014`**

7.2 Text files to PostScript

enscript is a program that will take plain-text files and convert them to PostScript. It is also capable of scaling, rotating, and changing the font of the text, as well as producing two-columned text and adding headers to a page. For a full description of **enscript** and its options, type: `man enscript`

To convert a plain-text file *filename* to PostScript and save the output in a file *newfilename*, type:

`enscript -p`*newfilename filename*

Sending output from **enscript** directly to the printer is easy:

`enscript -P`*printername filename*

Note that the option for sending a file to a printer is a capital "P" versus a lowercase "p" for sending output to a file.

7.3 Window and Screen Dump files to PostScript

Window and screen dump files created with the command **xwd** may be converted to PostScript for printing. The command to convert a file is **xpr**, and the output may be saved in a file for later printing, or sent directly to the printer through the use of a pipe (see section 3 for more on pipes, and section 4 for more on window dumps). To convert a window dump to PostScript and save it in a file "newfilename.PS", type:

`xpr -device ps` *windowdumpfilename* **`> newfilename.PS`**

This file could then be printed on any PostScript printer. To "pipe" the window dump file directly to a PostScript printer, type:

`xpr -device ps` *windowdumpfilename* **`| lpr -P`***printername*

Where *printername* is the name of a PostScript printer, such as "linus".

xpr is also capable rotating, scaling, and adding margins to the window dump file before printing, as well as many other things. For a complete description of **xpr** and its options, type: `man xpr`

7.4 LaTeX .dvi files to PostScript

LaTeX is a text formatter, similar to Scribe, that is provided and supported by the Student Information Processing Board (SIPB). For questions about LaTeX and how to use it, go to the SIPB office, room 11-205, or call them at 253-7788. The LaTeX software provided on the SIPB NFS locker includes a "dvi to PS" converter. To run it, first you must **`attach sipb`**, then you can type:

`/mit/sipb/vaxbin/dvi2ps` *filename.dvi* **`>`** *newfilename.PS*

or, if you are on an RT workstation, type:

`/mit/sipb/rtbin/dvi2ps` *filename.dvi* **`>`** *newfilename.PS*

This produces a PostScript file *newfilename.PS* from the Device-Independent file *filename.dvi*. The PostScript file could then be printed on an Athena printer.

Alternatively, you could send the output of **dvi2ps** directly to the printer through the use of a "pipe" (see also section 3):

`/mit/sipb/vaxbin/dvi2ps` *filename.dvi* **`| lpr -P`***printername*

or, if you're on an RT workstation:

`/mit/sipb/rtbin/dvi2ps` *filename.dvi* **`| lpr -P`***printername*

7.5 Printing Macintosh files on Athena

The Macintosh uses a version of PostScript that is slightly different than the version we have on Athena printers. For this reason, it is difficult, if not impossible, to print Macintosh files on Athena without first formatting the files using Scribe. Macintosh picture files are even less likely to work. If and when a reliable method for printing these files is found, this document will be changed to reflect this.

Information Systems provides a Macintosh Laserwriter print service. For more information, go to the Dispatch Desk, room 11-226.

7.6 Printing WordStar (and other programs) files on Athena

Word processing programs (such as WordStar) that run on other machines (IBM-PC's, Apples, Macintoshes) generally use formatting commands that are not compatible with Athena printers. To print out these files, save the file in text or ASCII format only. Copy the files to Athena, either transferring the file over a modem or reading the disk in on an Athena workstation. Athena workstations are capable of reading IBM-PC DOS disks; ask a consultant for details (Consulting Hotline 253-4435, or type **`olc`** for help).

Once you have the file on Athena, you can print the file as it is, or convert it to PostScript using **enscript** (see section 7.2). You could also add Scribe formatting commands to the file and process it using Scribe. Then the file can be printed on any Athena PostScript printer.

8. PostScript, the Language

The PostScript language was designed by Adobe Systems to provide a device independent description of virtually any printed page. It has a large number of graphics operators that can be combined to form nearly any image. These operators are used to manipulate three types of graphics objects:

- **Text** in any position, size, and orientation
- **Geometric figures** including straight lines, curves, and filled areas
- **Sampled images** of digitized photographs [1] and free-hand sketches [2]

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[1] Although PostScript can manipulate **digitized photographs**, Athena does ***not*** have a digitizer.

[2] PostScript Language Tutorial and Cookbook, page 1, Adobe Systems Incorporated

PostScript is also an extremely flexible programming language, most closely resembling FORTH, but if you have had experience with nearly any language, you should be able to pick it up quite quickly. It utilizes a stack for storing working data, and has a complete set of stack operators, as well math, array, string, and file operators. PostScript is also a recursive language, and so can do some very powerful things.

To get started programming in PostScript, look for the blue PostScript Language Tutorial and Cookbook, found in most cluster documentation racks. It should be accompanied by a red PostScript Language Reference Manual. There is also an NFS locker that contains a good number of interesting PostScript programs. To explore it:

```
attach  postscript
cd  /mit/postscript
ls
```

9. Getting Output from Popular Athena Software Packages

Almost every software package has a different procedure for getting printouts, and many packages themselves have several different options. Here are the directions for getting printouts from some of the more popular packages.

Note: Some kinds of printing can only be done on certain types of printers. Be sure that the type of printer you are using (DEC LPS40, DEC LN03R, or DEC LN03+), is appropriate for the kind of printing you are doing.

9.1 RS/1

The directions given below are for printing from RS/1 Release 3 (the new version). If you are using RS/1 Version 12 (the old version), these instructions will not work. For those instructions, please ask a consultant for help by calling the Consulting Hotline (253-4435) or ask a question in OLC (type: **olc**). We strongly encourage you to switch to Release 3, however, as Version 12 will eventually become unavailable.

RS/1 Release 3 has several features that facilitate getting hardcoyp output. If you have never done so before, you should perform some initialization inside RS/1 by typing:

```
call  $set_athena_env
```

when RS/1 prompts you. RS/1 uses a number-sign ("#") as a prompt. You only need to do this once, since RS/1 saves the variables between login sessions.

Since there are currently no default printers for Athena clusters, you need to specify a PostScript printer for RS/1 to queue output to. At the RS/1 prompt ("#"), type:

```
call  $set_printer_queue
```

Hitting return will give the previous printer used, if any. This is not necessarily the most appropriate printer to use! You should also call this procedure each time you wish to change printers.

The general procedure for getting hardcopy output from RS/1 is to create a temporary file from within RS/1, then print it out. These commands are analogous to the RS/1 command "DISPLAY", and take all the same options (norownumbers, bottomkey, etc.). If you specify the argument `on file`, it will place the output in a permanent file but NOT send it to the printer. The file is a valid UNIX filename, hence it is case sensitive and also must be enclosed in quotes.

9.1.1 RS/1 tables (up to 80 characters wide)

To get a UNIX file of a table, use the RS/1 command "PRINTOUT". It takes several optional arguments that affect the appearance of the output (nocolnumbers, norownumbers, noheader, bottomkey, nokey). For example, to send the table named *data* to the printer, without any row numbers, type:

```
printout table data norownumbers
```

To put the same table in a file called *datafile*, without a header, type:

```
printout table data noheader on file "datafile"
```

These files and printouts can be printed on a DEC LPS40, DEC LN03R, or DEC LN03+ printer.

9.1.2 RS/1 wide tables (up to 132 characters wide)

You can print extra large tables by specifying 132 columns and then use the **enscript** command from UNIX. Note that you need to use an intermediate file, and the RS/1 command "CHAIN" to use UNIX commands. At the RS/1 prompt ("#"), type:

```
set printer to "lpt132"
printout table tablename on file "filename"
chain "enscript -r -Pprintername filename"
set printer to "lpt80"
```

You need to change the variable "PRINTER" back to "lpt80" for regular tables. These tables can be printed on a DEC LPS40 or DEC LN03R printer.

9.1.3 RS/1 Graphs

Graphs are done in the same way as tables, except that you use the RS/1 command "PLOT" to print them out in PostScript. For example, to send the graph named *qikpict* to the printer, without any row header, type:

```
plot graph qikpict noheader
```

To put the same graph in a file called *picture.PS*, type:

```
plot graph qikpict noheader on file "picture.PS"
```

Pictures saved into files can be included in Scribe files with suitable modification. These graphs can be printed on a DEC LPS40 or DEC LN03R printer.

9.2 Prochart graphs

One-time configuration on the Setup menu:

```
Hardcopy Device        [ postscript ________ ]
Hardcopy Connection    [ | lpr -Pprintername  $  ______________________ ]
```

Make sure you include the dollar-sign ("$"). With the cursor on "Hardcopy Connection", press the **Space bar** once to establish the hardcopy connection.

To print your current graph, press the "+" key. These files can be printed on a DEC LPS40 or DEC LN03R printer.

9.3 Tektronix windows

While holding down the **Ctrl** key, press and hold down the middle mouse button, move to the *COPY* selection in the menu, and release.

Then, at the Unix prompt:

```
ps4014 COPY* | lpr -Pprintername
rm -i COPY*
```

These files can be printed on a DEC LPS40 or DEC LN03R printer.

9.4 X window dumps

To print X window dumps on a PostScript printer, at the Unix prompt, type:

```
xdpr -device ps -Pprintername
```

to print an X window dump on an LN03+ printer (such as "europa"), use:

```
xdpr -Pprintername
```

When the mouse cursor changes into a plus-sign ("+"), click any mouse button on the window you wish to print. To print the whole screen, click on the "root window" (the grey background). For more information, see section 4.

9.5 Xmath

Plot the graph in the Xmath window. Make sure it is what you wish to print. Do not use the "Print" button in the plotting window, as it does not work correctly. Instead, save the graph in a PostScript file, by typing:

```
print "filename"
```

at the "xmath>" prompt. Make sure that Xmath was started from a writable directory, such as your own. A full path may also be used in place of a *filename* (eg. */mit/username/gnuplots/filename* or */tmp/filename*). To print the graph on a PostScript printer, type this command outside Xmath (at the Unix prompt):

```
lpr -Pprintername filename
```

These files can be printed on a DEC LPS40 or DEC LN03R printer.

10. Printers Currently Available

The table below lists the printers available as of the printing of this document. However, Athena hopes to provide a much larger number of printers in the near future. Please look at the printer nearest you — it should be labeled with its name and printing capabilities.

Name	Printer Type	Location	Hours of Operation	Comments
linus	PostScript (LPS40)	11-226 (IS Dispatch Desk)	8 am - 11:30 pm, Mon-Fri; 10 am - 5 pm, Sat	Large printing jobs
thesis	PostScript (LN03R)	11-226 (IS Dispatch Desk)	8 am - 11:30 pm, Mon-Fri; 10 am - 5 pm, Sat	Final copy thesis ONLY
europa	Screen Dumps (LN03+)	11-226 (IS Dispatch Desk)	8 am - 11:30 pm, Mon-Fri; 10 am - 5 pm, Sat	Screen dumps and plain text
bias	PostScript (LN03R)	11-116	24 hours	
plato	PostScript (LN03R)	1-142	24 hours	
pandora	PostScript (LN03R)	4-035	24 hours	
medea	PostScript (LN03R)	4-035	24 hours	
helios	PostScript (LN03R)	16-034	24 hours	
homer	PostScript (LN03R)	66-080	24 hours	
ajax	PostScript (LN03R)	W20-575B	24 hours	
ceres	PostScript (LN03R)	W20-575B	24 hours	
python	PostScript (LN03R)	W20-575B	24 hours	
electra	PostScript (LN03R)	37-324	24 hours	
picus	PostScript (LN03R)	E51-007	24 hours	

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