

Connecting a Laserwriter to just about any computer; custom keyboards; a hot Postscript BBS . . .

By Don Lancaster

Every now and then, I'll find the answer to a hacker help-line question long after I have misplaced who asked it. So, let's pick up a few loose ends.

One reader wanted a good way to measure the speed of a pitched baseball. After consulting with the coach who lives across the street, I find that an ordinary hand-held police speed radar works like a champ. So good, in fact, that there doesn't seem to be anybody making anything else to do the job.

No, you don't have to cover the ball with foil or anything like that. In fact, a pitched ball a few feet from the unit has a much larger radar cross section than does a vehicle way down the street.

Since it is good public relations for your local police, the chances are you can pick up the use of both a radar and an operator for free if you just ask.

Incidentally, the actual speed of a ball thrown by a high-school pitcher typically varies from 60 to 95 mph. College and professional baseballs, of course, travel even faster.

Another reader wanted to build a custom calculator-style keyboard. The obvious thing to do here is check out the usual surplus sources, including the fine advertisers here in *Modern Electronics*. You can often pick up surplus calculator keyboards for a dollar or less, and then easily rework them into your own application.

If you want a fully professional first-rate custom keyboard, the *KB Denver* people do have all sorts of options available, ranging from snap-dome through full travel. They also have custom do-it-yourself kits.

Yet another reader needed great heaping bunches of LED lamps, cheaply and in a hurry. Two obvious hacker sources for this would be *Jameco* and *Mouser Electronics*.

The people at *Fairchild Semiconductor* just came out with a new free *Power Products Data Book*. This beauty includes several ap notes on switching pow-

er supplies and on the use of power MOSFET devices.

As per our usual reminder, this is your column and you can pick up technical help per the end box. On to this month's feature attraction.

How do I Hook Up the Laserwriter?

There's a lot of misinformation being circulated on this, so let's set the record straight.

You most definitely do *not* need either a Macintosh or the Appletalk network to use a Laserwriter. Just about any personal computer and virtually any word processor or telecomm program will work just fine. In fact, the Mac/Appletalk route can be slow and expensive.

The Laserwriter does speak Postscript, a very powerful and newly standard typesetting language. The Postscript code can be gotten from an internal Diablo 630 daisywheel emulator, from any of hundreds of canned application programs, or from your own custom Postscript routines, created on any old word processor or editor utility.

Postscript is easy to learn and use, has outstanding documentation, is fun, and is extremely addictive. You will nearly always get the best-looking final results with your own custom Postscript code, written your way for your use. On the other hand, with "pure" Postscript, all you see on the screen is your own Postscript code. Many canned application programs will instead give you a crude screen approximation of your page images. But note that there is no video monitor available anywhere at any price that can give you an accurate picture of all those nine-million dots on the final Laserwriter page. Thus, and contrary to many of those ad claims, "what you see is what you get" simply does not exist for the Laserwriter. For true "what you see is what you get," you print the image on paper and then look at it. This is the only way to do it.

At any rate, there are four ways to operate the Laserwriter, depending on the setting of a 4-position switch labeled 1200, 9600, Special and Appletalk.

The 1200 mode is the least used. This is permanently configured to allow serial data communications from either an RS-232 25-pin connector or else an RS-422 or RS-423 9-pin connector. The baud rate is 1200, with 7 data bits and no parity. XON/XOFF handshaking is used, but this becomes important only with extremely long or extremely slow routines.

The 1200 position is useful for direct modem communication. It also gives you a way to "undo" erroneous programming of the more powerful 9600 and Special modes, even if these modes have been bombed beyond belief.

Note that 1,200 baud is ridiculously slow for most other uses.

The 9600 mode is initially set up for 9,600 baud, 7 data bits, 1 stop bit, no parity and XON/XOFF handshaking activated. Handshaking becomes extremely important on any input file longer than 5,000 or so characters.

The 9600 mode is programmable. You can set the baud rate up to 57,600 or less; you can change the parity, data bits, and stop bits. You can also switch to a "DTR," or a "hard-wire" handshake should XON/XOFF be positively not available on your host computer.

The Special mode is initially set up to do a Diablo 630 daisywheel emulation for quick and dirty dumping of routine 12-point text with no graphics. Once again, the initial values are set up for 9,600 baud, 7 data bits, 1 stop bit, no parity, and XON/XOFF activated.

While convenient and fast, the 630 emulator is like buying a Porsche motor car only to listen to its radio. Most users outgrow this mode after approximately 12 minutes of use—well, perhaps 15 minutes on the outside.

Finally, the Appletalk position allows use of the Appletalk network, providing one way to let several users access the same Laserwriter. But note that a Laserwriter is vastly more useful, and infinite-

HARDWARE HACKER...

ly more convenient if you can reach out and touch it from your work station.

In addition, Appletalk requires expensive cables, is often much slower than is 9,600 baud and can very severely and unnecessarily limit your choice of host computer and applications packages.

Presently, the four most popular computers for laserwriter use are the Apple IIc/IIe/IIgs and Macintosh, the PC and clones, and the Atari ST. As details vary, let's see how to use each of these.

- *To A Macintosh.* With the Mac, you first have to decide whether or not to make use of Appletalk. While Appletalk is often a poor, expensive, and slow choice, politics or your chosen application program may force this decision upon you. If you do go the Appletalk route, you buy a special \$150 cable from Apple and plug it between the Mac and Laserwriter. The printer is switched to the "Appletalk" position, and then the Printer Chooser desk accessory is used on the Mac to set up the proper connection protocols.

If you intend using a canned application program, just follow the instructions given.

Contrary to popular belief, you can easily run your own Postscript routines over the Appletalk network. This first requires a piece of special but low-cost software, such as the Adobe Font Downloader or Send PS, the latter available for \$10 from Adobe Systems.

To use either of these code downloaders, you must have your Postscript code on-disk in a standard ASCII text file format. Note that a MacWrite document can *not* be used here. Instead, you can use MacWrite to create and edit your file. You then select "Save as," give the code a new file name, and then save to disk as an unformatted and standard ASCII text file. The downloader then will automatically select your file and report error messages.

For direct Laserwriter operation on a Mac, just connect a plain old Imagewriter printer cable between the Mac and the Laserwriter, and select a telecomm pro-

```
% DTR.ON.XON.OFF (Laserwriter 38 Handshake changer)
%.....
```

```
% This routine will PERMANENTLY change a Version 38.0
% or higher Laserwriter from XON/XOFF handshaking to
% DTR (hard wire "pin 20") handshaking.
```

```
% DO NOT USE ROUTINE UNLESS IT IS ABSOLUTELY NECESSARY!
```

```
% The process can be reversed by running XON.ON.DTR.OFF.
% Note that the default Laserwriter handshaking is XON/XOFF.
```

```
% Always wait 45 seconds or repower after running this code.
```

```
% This routine must NOT be used more than 5000 times over
% the life of the Laserwriter.
```

```
% .....
```

```
serverdict begin 0 exitserver
```

```
statusdict begin
```

```
25 9600 4 setsccbatach
```

```
25 9600 4 setsccinteractive
```

```
end
```

Fig. 1. Postscript code to select Laserwriter DTR handshaking.

gram capable of both 9,600 baud and XON/XOFF handshaking. Switch to 9600 and communicate away.

To check out serial data communications, always start with a file consisting of the single word *showpage* all in lower case. If you cannot eject a Laserwriter page, then something is wrong with your comm setup. But note that some telecomm programs are extremely slow when purportedly communicating at 9,600 baud. MacTerminal is especially atrocious. Try Red Ryder or something else better written.

But isn't 9,600 baud 9,600 baud? Not really, since there is overhead and disk access involved, before, between, and after the actual sending of each character. To measure the virtual baud rate of any program, just send out 10,000 characters

and see how long it takes. A true 9,600-baud link will finish the job in a tad under 10 seconds.

The usual way to send Postscript on the Mac is to create and edit your file with a word processor, save it to disk as a standard ASCII text file, and then send it out with a separate disk-based telecommunications program.

- *To An Apple IIc, IIe and IIgs.* One of the real surprises is that it is far faster, far cheaper, and far more convenient to use an Apple IIe as a Laserwriter driver than it is to use the Mac to send your own Postscript code to the Laserwriter. The two main reasons for this are that IIe telecommunication does 9,600 baud or higher communication must faster than the Mac does (with or without Appletalk, and that you can easily have a single pro-

gram that edits and sends RAM-resident Postscript code, while at the same time reporting and recording the return error messages, without any need for repeated trips to the disk or clipboard.

A Super Serial Card is best used with the IIe, set to S1: 4, 6, 7 on; S2 1, 4 on, terminal mode, arrow down. Connect an ordinary RS-232 printer cable between the Super Serial Card and the Laserwriter. Switch the Laserwriter to 9,600.

Once again, if you are using a canned applications program, just follow the instructions that came with it.

To activate the handshaking on your own Postscript routines, place an [I] X E [I] Z at the beginning of your files. As with the Mac, you can use any word processor or editor, save to disk as a standard unformatted ASCII text file, and then send that file with your favorite telecomm program.

As before, to check the serial communications, always start with a file consisting of the single word *showpage* all in lower case. If you cannot eject a Laserwriter page, then something is wrong with your comm setup. But there is a much better way than all this. ProDOS Applewriter 2.0 or 2.1 will simultaneously let you create, edit, and send Postscript code, while at the same time receiving and optionally *recording* error messages—all without program switching or mandatory disk access.

Other benefits of Applewriter include its powerful self-prompting macro glossaries and its superb WPL supervisory programming language. The latter can actually write Postscript code for you, in addition to handling user prompts, doing help screens, handling fancy mailing list manipulations, and much more.

You have to get sneaky to get single program write/transmit/report/record operation from a stock Applewriter. First you create a glossary entry that, on a single keystroke, prints and then will immediately switch to the [Q]-I modem receive operation just as soon as printing is through. To record the error messages at the end of your current document, just

follow this with a manual [esc]-R. This is really only half-duplex operation, but you can easily get it to behave as if it were true full-duplex, catching all error messages all the time. The simplest way to do this to write or call me for a free and short Postscript error handler that you append to the beginning of your routines or download on your first power up. Otherwise, a simple delay loop of 3500-{37 sin pop} repeat at the beginning of your file will catch all errors on short files and most errors on longer ones. Those few that remain can be trapped out with creative use of .epo and .epl.

Yes, you can use Appleworks, especially when doing Diablo emulation. But the many hassles involved with those short line lengths, the lack of glossaries, no WPL supervisor, or error messages

and the inability to embed control characters, etc. makes Applewriter a vastly better choice for serious Postscript work.

Appleworks also does not lend itself very well to proportional and fill justified fonts, especially with tabbed fields.

The IIc is nearly as useful as the IIe as a Laserwriter driver, but you have to pay close attention to one particular detail. If you have a new IIc with the 3.5 monitor ROM, XON/XOFF handshaking will work the same way it does when using a IIe. Namely, placing a [I] X E [I] Z at the beginning of the document will turn on the handshaking for you. On the other hand, if you have an old IIc and a newer (version 38.0 or higher) Laserwriter, use Fig. 1 to make a simple patch that lets you switch your Laserwriter to DTR or hard-wire handshaking. This patch may

```
% XON.ON.DTR.OFF (Laserwriter 38 Handshake changer)
%.....

% This routine will PERMANANTLY change a Version 38
% or higher Laserwriter from DTR handshaking back to
% its default XON/XOFF handshaking.

% This code undoes a previously run DTR.ON.XON.OFF, returning
% the Laserwriter back to its normal mode of operation.
% Always wait 45 seconds or repower after running this code.

% This routine must NOT be used more than 5000 times over
% the life of the Laserwriter.

% .....

serverdict begin 0 exitserver

statusdict begin

25 9600 0 setsccbatch

25 9600 0 setsccinteractive

end
```

Fig. 2. Postscript code to restore Laserwriter XON/XOFF handshaking.

prevent other users from accessing the Laserwriter in their intended way.

A patch to return you to XON/XOFF handshaking is shown in Fig. 2. Either of these patches can also be used to change the baud rate, simply by replacing the 9,600 with the selected rate. Maximum standard rate allowed is 57,600. Do *not* use any commas in the baud rate!

Another gotcha: Do not use either of these patches more than 5,000 times over the life of the printer. Plan your work.

I know of no way to use an old IIC on an old Laserwriter, short of doing the free IIC monitor upgrade. Note that this is a new upgrade done for 3.5-inch disks; the old "modem fix" upgrade is no help at all here.

Oh yes, there's one other IIC detail. Instead of flipping switches on a Super Serial Card, you change the baud rate and such by using the IIC utilities diskette.

The IIGS is presently marginal as a Laserwriter driver, but it very shortly should get considerably better. Eventually, the IIGS has the potential to become far and away the best Laserwriter driver.

There is now a built in Appletalk driver. Unfortunately, this driver presently lets you run only in a new Imagewriter emulation mode. While fine for internal Appleworks documents, this is otherwise nearly useless.

Presumably a Postscript/Appletalk print driver will shortly become available. You can also run most IIE software on a IIGS by adding your own Super Serial Card and running in the 9600 mode.

I have available some patches that let Applewriter print on a IIGS without the Super Serial Card. At the present time, though, the key patches for error communication and maximum possible throughput are not quite ready.

• *To An IBM PC or Compatible.* As with the other machines, if you have a canned applications program, follow the instruction when hooking the Laserwriter to an IBM PC or compatible computer.

For your own Postscript code, you have to get around two fundamental incompatibilities: Some PCs may not offer

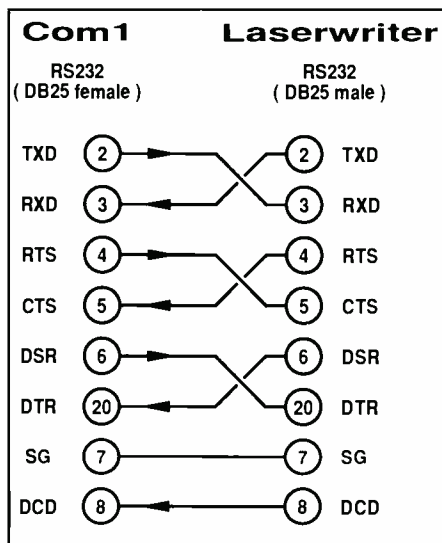


Fig. 3. Cable wiring scheme to connect a Laserwriter to an IBM PC or compatible computer.

serial ports, and the stock PC does not offer any XON/XOFF handshaking, while the stock Laserwriter does not allow DTR handshaking.

Kits are available that provide the serial COM1 port for a PC or clone. You absolutely *must* have one of these to use a Laserwriter. Beyond that, you have to use comm software that allows properly activated XON/XOFF handshaking, or a software patch must be made to semi-permanently change the Laserwriter to DTR handshaking, as in Fig. 1.

A special cable is needed to get from

the COM1: port over to the Laserwriter and is shown in Fig. 3. You can easily build this out of a modem eliminator and an RS-232 extension cable.

Once you have the serial port, the comm cable, and the handshaking resolved, you can use any word processor to create your Postscript code and then transmit it with your favorite telecomm program. You can also use DOS to directly send a Postscript file. This is fast, cheap, and convenient, but it does not provide return error messages or let you work interactively with the Laserwriter. Instead, to send a stock ASCII textfile on disk, just do a . . .

```
mode com1:9600,n7,1,p
mode lpt1:=com1:
copy filename lpt1:
```

As with all other machines, always start with a simple *showpage* file. If you cannot eject a page, there is no point in trying anything else.

One expert at PC to Laserwriter connections is Woody Baker, who can be reached by dialing (512) 837-2679. He welcomes user calls.

• *To An Atari ST.* The Atari 512ST or 1040ST are quite easy to use as Laserwriter drivers, since XON/XOFF handshaking is readily available under the GEM operating system. As with the other machines, select 9,600 baud, 7 data bits, 1 stop bit, and XON/XOFF handshaking activated. Since handshaking is done by the operating system, no special handshake commands have to be inserted into each Postscript file.

NAMES AND NUMBERS

Adobe Systems
1870 Embarcadero Rd. S120
Palo Alto, CA 94303
(415) 852-0271

Fairchild
4300 Redwood Hwy.
San Rafael, CA 94903
(415) 479-8000

Jameco Electronics
1355 Shoreway Rd.
Belmont, CA 94002
(415) 592-8097

KB Denver
PO Box 719, 451 Oak
Frederick, CO 80530
(303) 833-3500

Mouser Electronics
2401 Hwy. 287 North
Mansfield, TX 76063
(817) 483-4422

PostScript BBS
2504 Sycamore Street
Bay City, TX 77414
(409) 244-4075

NEED HELP?

Phone or write your **Hardware Hacker** questions directly to:
 Don Lancaster
Synergetics
 Box 809
 Thatcher, AZ 85552
 (602) 428-4073

The usual way to handle your Postscript code here is to create and edit it with a word processor, saving to disk as a standard ASCII text file. The text file is then sent to the Laserwriter using either the GEM operating system or your favorite telecomm program. Always start with a simple *showpage* file and get that to work first.

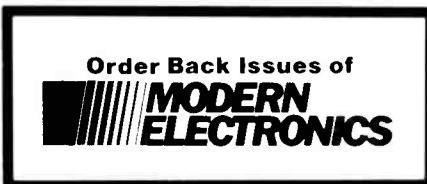
• *To Other Computers.* The Laserwriter can be used with *any* word processor or editor on virtually *any* computer that has a standard serial data communications ability. For any computer not mentioned above, set up your machine so that you are doing serial communications at 9,600 baud, 7 data bits, 1 stop bit, and no parity, using a typical printer cable. If XON/XOFF handshaking is available, use it, either by activating it in your operating system or telecomm program or adding the needed prefix to each Postscript file or routine. If XON/XOFF is not available, switch to DTR handshaking per Fig. 1. Do not do this unless absolutely necessary.

Create standard ASCII text files with a word processor or editor, save them to disk, and send them with the operating system or comm program. Should XON/XOFF not be available, use the patch to provide the DTR communications. As before, always start with a simple *showpage* test.

By the way, there is a new and independent *Postscript* bulletin board at (409) 244-4704. Although there are no user charges, advertisers and sponsors

are urgently needed. 24 hours, 300/1200/2400 baud.

I have bunches of stuff that can help you with all your Laserwriter communications. Besides my free helpline (602) 428-4073 and my free listings, I have an *Introduction to Postscript* VHS videotape, along with my open and unlocked *Postscript Show and Tell* that runs on all major personal computers. We also stock both the *Adobe* Postscript books. Just write or call for a free list of all the other goodies. **ME**



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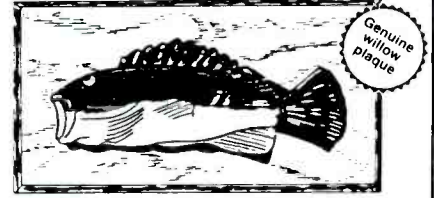
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