

# PRINTER PERIPHERALS™

## ParallAx AT

(AT-846)  
PRINTER INTERFACE  
FOR ATARI COMPUTERS

- \*Connects any standard parallel-input printer to all models of Atari computers.
- \*Direct, plug-compatible replacement for Atari 850 parallel interface.
- \*Runs all software written for Atari 850 and printers.
- \*Includes printer cable and daisy-chain port for other peripherals.  
(eg: disk drive)
- \*Compact, easy to install.

# AXIOM®



# **ParallAx AT**

**(AT-846)**

## **ATARI GENERAL PURPOSE PARALLEL PRINTER INTERFACE MODULE**

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## INTRODUCTION

The Axiom ParallAx AT is a general purpose Printer Interface unit enabling the user of an Atari computer to connect any parallel printer to his system. The ParallAx AT functions the same way as the parallel port on the Atari 850 Interface Module, thereby providing an inexpensive alternative to using an 850 solely as a printer interface. This document will assist you in getting your new ParallAx AT printer interface working with your Atari computer system. It will supply the installation procedure and discuss the ways in which you can communicate with your printer. Packaged Software for Word Processing or Business Calculations, etc., will run immediately with your ParallAx AT; and your only concern will be whether they have a setup for the specific printer you're using.

## INSTALLATION

If you purchased both the ParallAx AT and a printer at the same time, you should follow the instructions provided by the printer manufacturer in unpacking and setting up your printer before unpacking the ParallAx AT interface. By setting up, we mean removing any shipping restraints, setting any switches, and installing the ribbon and paper. When you unpack your new ParallAx AT interface, you will notice that two cables protrude from it. Attach the large 36-position connector at the end of the shorter cable to the parallel connector on the back of your printer. The Atari cable with the familiar 13-pin connector should be plugged into any open socket in your Atari computer system. The open socket on the ParallAx AT may be used for "daisy-chaining" other Atari peripherals.

Plug the AC Adapter into the ParallAx AT and a wall outlet: it is not important whether you turn on the ParallAx AT and printer before or after your computer.

**CAUTION:** The AC adapter supplies 9V DC and is not interchangeable with Atari 9V AC units.

If your printer can supply 5 volts @ 250 mA for powering the ParallAx AT you can simplify the hookup by eliminating the transformer. To do this you need to change a jumper setting inside the ParallAx AT case: see the section on troubleshooting and jumper options.

Both the ParallAx AT interface and the Atari 850 Interface Module can be used in the same Atari system as long as the parallel port on the 850 remains unused. You must not connect a printer to the 850's parallel port while the ParallAx AT interface is hooked into your system since both devices would respond as the "P:" device, causing unpredictable results.

## **RUNNING PACKAGED SOFTWARE**

All Packaged Software which is designed to run with a printer, should work immediately with your ParallAx AT and a standard parallel printer. This is because the ParallAx AT uses the same conventions for talking to your computer as Atari's 850 interface and their printers with built-in interfaces. However, the control codes for setting up special features (character pitch, tabs, graphics, etc.) differ from one printer to another. You should try to match the settings listed in your printer manual to those pre-selected by the software. If all else fails, contact the software designers on how to transmit the correct codes for your printer.

## **USING YOUR PRINTER FROM BASIC**

This section discusses how an Atari user can communicate with his printer from the Atari BASIC programming language. The discussion becomes progressively more advanced. If you reach a section which you feel doesn't apply to you, feel free to skip over it. If you deem a section too advanced, come back to it later after you have become proficient at your current level. Atari machine language programmers should consult the appropriate Operating System User's Manual for a detailed explanation of I/O conventions and operating system subroutines.

If you need to plug in a cartridge to get BASIC, do so. Turn on your Atari system and your printer. From BASIC, type:

**LPRINT "THIS IS A TEST"**

and press the RETURN key. Watch your printer print out the specified text. If you get an error, check all of your cable connections.

So, you see how easy it is to use your printer; just as you use PRINT statements to display text on the screen, you use LPRINT statements to send text to your printer!

LPRINT works best when you output complete lines to your printer. A statement which outputs only a partial line, such as

LPRINT "NAME.....";

will cause problems. The semicolon in the statement tells BASIC not to output a carriage return so that more text can be put on the same line later. Although semicolons work fine with PRINT, they do not work with LPRINT. LPRINT, expecting a complete line, will send out extra spaces after your text. In an LPRINT statement, you should list everything to be printed on that printer line, including text and variables:

LPRINT "Name.....";N\$;" Phone.....";P\$

An easier and more efficient way to send out information to your printer is to "open" the printer on a channel and then use special print statements.

The Atari operating system provides eight communications channels through which a program you write can communicate with various Atari peripherals. Channel #0 is usually used for screen and keyboard I/O, so you, as a programmer, can use channels #1 through #7.

To begin communicating with a peripheral over a channel, you need to "open" communications, accomplished with an OPEN statement. Likewise, the CLOSE statement is used to end communications. While a channel is open, you may use various statements such as PRINT # and INPUT # to send and retrieve information, respectively.

The PRINT # statement is used to send information over a channel. Here is an example of sending some text to the printer over channel #1:

```
10 DIM A$(40)
20 OPEN #1,8,0,"P:"
30 PRINT #1;"Name.....";
40 READ A$: PRINT #1;A$
50 CLOSE #1: END
60 DATA Smith
```

Go ahead and type in the program and RUN it. The OPEN statement in line 20 establishes the communications link between the program and your printer. The two PRINT # statements in lines 30 and 40 are responsible for sending the printed text. Note that with PRINT #, semicolons are allowed, just as they are with the normal PRINT statement.

Line 50 closes the communications channel to the printer. Always make sure that the last character sent to your printer before a CLOSE statement is a carriage return. You can do this by NOT appending a semicolon to the last PRINT # statement as in line 40 of the example above.

The familiar LIST Instruction can be told to list all or part of a program to your printer.

**LIST "P:"**

will cause the short program entered above to be printed out. Try it! Optionally, you can specify the range of program lines to be printed:

**LIST "P:",20,40**

will cause lines 20 through 40 to be printed out — certainly a convenient feature when working with large programs!

The appendix contains a comprehensive example of "printer programming." It contains a BASIC program which performs a "text screen dump" where what you see on the Atari's video screen is printed out on your printer surrounded by a frame. You may combine this program with one of your own by copying lines 10000 on, making sure that you don't overwrite existing lines. After you set F (0 for no border, 1 for border), you may then "GOSUB 10000" to print out the text screen as in line 190 of the example.

## **USING SPECIAL FEATURES OF YOUR PRINTER: CHR\$**

Most printers provide a myriad of special features such as double width characters, graphics, alternate and downloadable character sets, various line pitches, different colors, etc. You should consult your printer's manual on the ways to access and invoke your printer's special features.

However, some manuals assume a certain level of programming expertise and never discuss BASIC's CHR\$ function. All computers, including your Atari, think and talk in binary numbers. Naturally, you are normally unaware of this since you are working through many levels of human-engineered hardware and software. When your Atari wants your printer to print a character, it has to send a binary number representing that character. Your printer may recognize the incoming number as the ASCII character to print, as a control code representing a command or part of a command, or as data following a command. The statement:

```
PRINT #1;CHR$(37);
```

sends the character corresponding to ASCII code 37 (the CHR\$ function works with decimal numbers; the corresponding binary number is 00100101, and it is 25 in hexadecimal) to the printer, assuming the printer has been opened up on channel #1. ASCII is a standard code of characters which has been adopted by most computer and peripheral manufacturers to ensure communications compatibility. Every character that the printer can print has an ASCII code. Some ASCII codes are "control codes" — that is, they are commands to the printer rather than characters to print. Carriage returns, line feeds and form feeds are control codes. Typically, your Atari sends a sequence of codes to your printer indicating which characters should be printed. A table of ASCII codes can be found in your printer manual. If you look up value 37 decimal, you will see that it corresponds to a percentage sign. So, the BASIC statement above is equivalent to:

```
PRINT #1;"%";
```

and you could have entered it this way because you have a % key.

The CHR\$ function should be used whenever you cannot type characters directly. Let's say you want to send to the printer (1) a command to enter double-width print, (2) some text, and (3) a command to turn-off double-width print and return to normal character size. Let's also say that the ASCII codes which enter and leave the double



width print are 14 and 15, respectively. A BASIC line like:  
`PRINT #1;CHR$(14);"DOUBLE-WIDTH";CHR$(15)`  
would be the appropriate line to put into a program. If your printer supports graphics, then you will use statements like:

`PRINT #1;CHR$(V);`

where V is a variable whose value you have to get from a calculation or a data table. Of course, the syntax for all commands depends on your printer.

## **ATARI "END OF LINE" OR CHR\$(155)**

The Atari computer systems work in a modified character code of ASCII called ATASCII, for Atari ASCII. As a result, an Atari end-of-line code (155) does not correspond to the printer's carriage return code (13). So, all Atari printer interfaces, including the Parallax AT and Atari 850 Interface Modules, blindly convert all 155's to 13's. All other characters are passed on to the printer unchanged. If the 155 coming out of the Atari was not meant to be an end-of-line code but graphics data instead, it is still converted to a 13. Advanced programmers should be aware of this phenomenon so that 155 codes in graphics can be avoided. A simple but "unclean" fix is to change the 155 to some other value, usually 153, which won't be converted. Some printers have alternate ways of passing the same data which could always be used, or used when a graphics 155 code is encountered. Jumper position J4 within the Parallax AT can be installed to suppress the 155 conversion, but this should be done only by experienced Atari programmers for specific applications where other control codes can be used to advance the paper and perform carriage returns.

## **TROUBLESHOOTING AND JUMPER OPTIONS**

When you have a problem with your printer, first check that all the proper connections are made. If your printer works fine except with a certain software product, contact the manufacturers of that product since the problem lies within their software. If your printer works fine and suddenly fails, review your printer manual's trouble-

shooting section. Since a printer is relatively more complex than the Parallax AT, we suggest that you first contact the printer manufacturer for assistance. If your printer works but not perfectly (e.g. if you have system errors or the printer doesn't line-feed), see if you can correct the problem as described below. If not, contact Axiom Corporation for assistance.

Some solutions to the problems listed below require a jumper connection to be made inside the Parallax AT case. Check out the problem thoroughly (can you repeat it exactly?) before proceeding with the modifications.

- If your printer doesn't **LINE-FEED** the way you expect, then first check your printer's manual. Your printer may contain a switch that determines whether or not to advance the paper when a "carriage return" [CR=CHR\$(13)] code is received. If it does, make sure the switch is set for advancement of paper. You might have to open up your printer to gain access to the switch; always turn off the power when changing switch settings.
- If your printer requires a space before a **CARRIAGE RETURN** on blank lines (the Centronics Microprinter does), you must install jumper J6.
- If your computer returns **ERROR 138** and your printer is powered-ON and on-line and the Parallax AT is being powered, then you might need to install jumper J3 to tie your printer's fault line high. The fault signal is on the printer connector at position #32; check your printer manual to see if a signal is present there. This jumper makes the Parallax AT believe it is connected to a working printer, and it cannot sense printer problems or offline status once the modification has been made.
- If your computer returns an **ERROR 139**, then either one of the AUX values in a printer OPEN statement was not zero or the printer isn't operating properly.
- If you get an **ERROR 140, 142 or 143** then the problem lies within the Parallax AT or another peripheral in your Atari system. Try to isolate the fault by disconnecting each component in turn and checking out the rest. If the Parallax AT is causing the problem, you should first check

the AC adapter hookup, and if that fails you should follow the Factory Return Policy on the back of the warranty statement.

- If you get any **OTHER ERRORS**, then the problem does not lie within the ParallAx AT or your printer: check programming and operating manuals for the rest of your system.
- If you want to do away with the transformer and power the ParallAx AT directly from the printer, you can shift jumper J7 to the right (looking at the ParallAx AT board with the cable facing towards you). The +5V is expected on pin 18 of the printer connector. If it appears elsewhere, you should cut pin 18's wire and solder the proper pin to the jumper. Be aware that +5V is not supplied on every printer and can appear on different pins for different printers. Some printers cannot supply the 250 mA required by the ParallAx AT. If you later use the ParallAx AT with another printer, you might have to switch back to using the transformer or make another solder connection.
- Some old Atari software sent characters out to the printer with their high bits (DATA 8 or b7) set. On some printers, the text would appear as Japanese, European, Greek, or "mathematical" characters. If you have this problem, you can jumper J5 to tie data bit 7 to ground and make it zero. However, the jumper will affect any special printer features which use all eight data bits such as bit-graphics and downloadable character sets.

To make the jumper connections described above, open up the ParallAx AT by removing the four corner screws using a Philips-head screwdriver. Lift out the circuit board after removing the two side screws attaching the board to the plastic case. Locate the proper jumper by looking at Figure 1. Double-check! Then solder a wire to the jumper's two pads. If you do not know how to solder, find someone who does. Do not learn to solder here. Alternately, Axiom Corporation can perform the modifications for a small fee. See the Factory Return Policy on the back of the warranty statement for information on how to return your unit for modification or repair.

To put the Parallax AT back together, reattach the board to the lower portion of the plastic case with the two side screws. Leave the screws loose; do not tighten them as this will cause the board to rest against the case improperly. Join the two parts of the case together tightly using the four corner screws. Go back and tighten the two side screws.

Some older Atari 400 and 800 computer systems have a problem which will occasionally cause your printer to "double print" — that is, your printer will sometimes print out a block of characters or graphics twice. All Atari computers manufactured after January 1, 1983 have this problem corrected. If, when you do a PRINT PEEK (58383), a value of 0 is printed, you have the new ROM set (revision B), and you will not experience the double-print problem. If, however, a value of 56 is printed, you have the old operating system ROM set (revision A) which should be replaced. Contact your local Atari service center.

## FINAL THOUGHTS

Consult your Atari BASIC Manual for more information on the BASIC statements presented here. You may wish to subscribe to some of the excellent Atari magazines which provide helpful articles and programs concerning the inner workings of Atari computer systems.

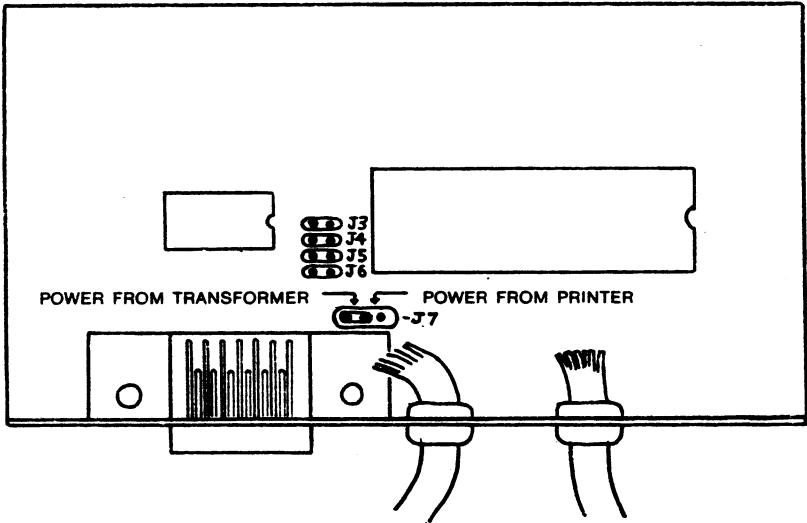
Some companies specialize in developing text and graphics software to work with certain printers. If you have a well known printer, then it is likely that you can find fancy software that will support it. Keep your eyes open for magazine articles and advertisements which pertain to your printer.

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**FIGURE 1**  
**Board Layout for Jumpers**



- J3: Tie printer's fault line high.
- J4: Pass CHR\$(155) through unmodified
- J5: Tie printer's DATA 8 line to 0 volts.
- J6: Extra space inserted on blank lines.
- J7: Power from Transformer/Printer (250 mA, 5V).

**TABLE 1:**  
**Connections To Printer**

**Standard 36-Position Parallel Connector**

Pin 1	To Printer	$\overline{\text{STR}}$ : Negative-going strobe of 50 $\mu\text{s}$ duration
Pin 2	To Printer	DATA 1 : Least significant bit of data
Pin 3	To Printer	DATA 2 :
Pin 4	To Printer	DATA 3 :
Pin 5	To Printer	DATA 4 :
Pin 6	To Printer	DATA 5 :
Pin 7	To Printer	DATA 6 :
Pin 8	To Printer	DATA 7 : Most significant bit of 7 bit data
Pin 9	To Printer	DATA 8 : Most significant bit of 8 bit data
Pin 11	From Printer	BSY : Busy signal to control data transmission
Pin 16	- Both -	0V : Logic ground
Pin 17	- Both -	Chassis ground
Pin 18	From Printer	+5 V : If 250 mA available from printer, and jumper J7 changed
Pin 19	- Both -	Signal return ground
Pin 32	From Printer	$\overline{\text{FAULT}}$ : Must be high for data transfer.

## APPENDIX

### Text Screen Dump Program

```

10 REM
20 REM User's Program goes here.
30 REM
100 PRINT CHR$(125):REM CLEAR SCREEN
110 PRINT :PRINT :PRINT
120 PRINT :PRINT "All the text on this screen will be"
130 PRINT :PRINT "sent to your Printer. This"
140 PRINT :PRINT "Procedure is called a 'text screen"
150 PRINT :PRINT "dump'. The dump routine which"
160 PRINT :PRINT "begins on line 10000 may be used by"
170 PRINT :PRINT "one of your own Programs!"
180 REM
190 F=1:GOSUB 10000:REM DUMP SCREEN
200 END
210 REM
10000 REM *****
10001 REM * TEXT SCREEN DUMP *
10002 REM * by Harry L. Tarnoff *
10003 REM * for Axiom Corporation *
10004 REM * March 2, 1983 *
10005 REM * *
10006 REM * ENTER WITH: | Uses A, D, F, *
10007 REM * F=0 FOR NO BORDER | I, J, and *
10008 REM * F=1 FOR BORDER | channel #1. *
10009 REM *****
10010 A=PEEK(88)+PEEK(89)*256:REM GET SCREEN START ADDRESS
10020 OPEN #1,8,0,"P:"
10030 IF F THEN PRINT #1;" ";;FOR I=1 TO 40:PRINT #1;"-";:
      NEXT I:PRINT #1
10040 FOR I=0 TO 23:IF F THEN PRINT #1;"|";
10050 FOR J=0 TO 39:D=PEEK(A+I*40+J):D=D-128*(D>127)
10060 PRINT #1;CHR$(D+32*(D<96));:NEXT J
10070 IF F THEN PRINT #1;"|";
10080 PRINT #1:NEXT I
10090 IF F THEN PRINT #1;" ";;FOR I=1 TO 40:PRINT #1;"-";:NEXT I
10100 PRINT #1:PRINT #1:CLOSE #1:RETURN

```

```

-----
:
:
:
: All the text on this screen will be
:
: sent to your Printer. This
:
: Procedure is called a 'text screen
:
: dump'. The dump routine which
:
: begins on line 10000 may be used by
:
: one of your own Programs!
:
:
:

```









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