

SERIALTM **USER'S MANUAL**

Physical manual provided by Leeland Heins
Scanned and OCR/Formatting by



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When this manual was scanned in, the text bent around curved pages, and a thumb showed up on a lot of the images, so it was decided to perform OCR and reformat the pages. As a result the following has changed from the original format of the manual:

- Table of Contents is not the original. Instead, it has been updated to reflect the contents of manual reformatted in this document.
- The ASSEMBLY code for VisiCalc drivers was reformatted and verified from the PDF to be correct.
- Many sections, where it made sense, I tried to replicate the “Table” format they used in the manual, except for the use of TABs to align text and wrap-around.
- Where possible; reformatted some of the text to utilize bullet points and numbered lists to help clarify options and features.
- Fixed numerous obvious spelling errors and typos throughout the document from the original text. The original wording and grammar were preserved for historical purposes.
- The black and white picture of the seriALL card was replaced with a color version.
- All troubleshooting tables were completely reformatted using the “tables” feature of the Microsoft Word. All text was preserved, but tables were redone. OCR and scanning of these tables were not successful.
- OCR was a complete failure on the Appendix information. Instead re-inventing the wheel, pages were copied and pasted as images into the appendix section. A majority of curved pages and scanning errors were corrected in Photoshop.

Manual was scanned in February 2022.

It is assured that not all OCR errors were corrected. *If you find errors in the document, please report them to Greg Jewett and they will be corrected, and a new document will be published and sent to you.*

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1. INTRODUCTION

seriALL is an intelligent serial interface for Apple II, Apple II+, and Apple //e microcomputers. seriALL uses a standard RS-232C serial interface, and is fully hardware-compatible with Apple's Super Serial card.

A total of 27 formatting commands provides versatility for text printing with any serial dot matrix or daisywheel printer.

In addition, the extensive graphic command set offers compatibility with 35 of the most popular serial printers. These commands permit a variety of graphic screen dumps including side-by-side, top-to-bottom, double-size, inverse, emphasized, rotated, and mixed text and graphics.

As a communication interface, seriALL provides a complete range of functions, including baud rate selection from 50 to 19,200; word length selection (5, 6, 7, or 8 bits), and setting of stop bits and parity.

seriALL also has a built-in terminal mode for modem use.

Designed to fit in a slot inside the Apple. seriALL is easy to install and easy to use.

seriALL is completely compatible with Apple DOS 3.3 (Disk Operating System), PRODOS, and with Apple CP/M and Pascal programs. Additionally, seriALL supports the Apple //e 80-column screen.

2. CONFIGURING THE seriALL CARD

You will need to configure the seriALL card to work with your particular computer system. Please refer to Figure 1 to find the two banks of DIP switches at locations S1 and S2 on the seriALL board. Each bank has eight individual switches numbered 1 through 8.

Before attempting to configure seriALL, you should have the following information handy:

1. The type of handshaking used by your system. seriALL supports x-on/X-Off and ETX/ACK software handshaking as well as hardware handshaking. If your system uses hardware handshaking, you will need to know which line in the serial DB-25 connector is used for the handshake signal.

2. Whether your system requires a line feed after a carriage return.
3. The number of stop bits used by your system.
4. Whether your system uses a 7-bit or 8-bit word length.
5. If your system check, and if even or odd. so, performs whether a parity parity is

Figure 1 THE seriALL Board



If you are uncertain about any of the required information, please refer to the manual which came with your printer or other serial device.

In order for seriALL to work, it must be properly configured for your particular computer system.

Note: The following switch settings are summarized in Table 3 at the end of this section. Also, seriALL's output pin configuration is shown on the inside cover of this manual.

HANSHAKING (Switch 1-1)

Switch 1-1 should be On (Closed) for X-On/X-Off software handshaking, hardware handshaking, or when no handshaking is being used.

Switch 1-1 should be Off (Open) for ETX/ACK software handshaking.

Setting The Handshake Berg Jumper

Look on the seriALL board to find the 5 pairs of jumper pins at location H1. (Beneath the row of pins are the letters HHS.)

If you are using software handshaking, the Berg jumper should be on position 5.

If you are using hardware handshaking, you will need to select the line in the serial connector which is used to send the handshake signal. Please check the manual which came with your serial device to determine the correct line.

To select the line, place the Berg jumper _as follows:

Position 1 -Line 4

Position 2 -Line 5

Position 3 -Line 11

Position 4 -Line 19

Position 5 -Line 20 or software handshaking

MODE SELECTION (Switch 1-2)

This switch determines the mode for your seriALL card. When Switch 1-2 is On (Closed) seriALL is in Communication mode.

Communication mode is specifically for use with modems, plotters, and other serial communication devices. seriALL responds to a special set of communication commands when it is in this mode.

When Switch 1-2 is Off (Open) seriALL is in Printer mode. In this mode, seriALL responds to over 35 commands for text and graphics printing.

GRAPHICS PRINTER SELECTION
(Switches 1-3, 1-4, 1-5)

These switches are used to select the appropriate graphics print routines for many popular serial dot matrix printers. Please refer to Table 1 to determine the proper settings for your printer.

If you plan to use seriALL for text printing only (no graphics) you do not need to worry about the settings of Switches 1-3 through 1-5.

Table 1 -Switch Settings for Graphics Printing

Printer	1-3	1-4	1-5
Epson	On	On	On
NEC 8023A/C.Itoh Pro	Off	On	On
Anadex	On	Off	On
IDS	Off	Off	On
Okidata 84	On	On	Off
Other Oki.	Off	On	Off
Apple Dot Matrix and Image Writer	On	Off	Off
Mann Talley	Off	Off	Off

Note: On is also Closed. Off is also Open.

AUTO BAUD RATE (Switch 1-6}

In Printer mode, the normal setting of Switch 1-6 is Off (Open).

If you plan to use seriALL in Communication mode with a modem which has an automatic answer feature, you may instruct the card to automatically set the baud rate at either 300 or 1200 on incoming calls. This seriALL feature will only work with modems which use line 12 as the high speed line.

When Switch 1-6 is On (Closed} the Auto Baud Rate feature is active. When the modem automatically answers a call, seriALL will monitor the high speed line to determine whether to set the baud rate at 300 or 1200.

LINE FEED AFTER CARRIAGE RETURN (Switch 1-7)

When Switch 1-7 is On (Closed) seriALL will send a line feed to the serial device after every carriage return.

When Switch 1-7 is Off (Open) no line feeds are sent after returns.

INTERRUPTS (Switch 1-8)

When Switch 1-8 is On (Closed) interrupts are enabled.

When Switch 1-8 is Off (Open) interrupts are disabled. This is the normal setting.

BAUD RATE (Switches 2-1, 2-2; 2-3, and 2-4)

You will need to set the baud rate for your system according to the switch settings presented in Table 2.

Table 2 -Baud Rate Switch Settings

Baud Rate	2-1	2-2	2-3	2-4
0 Unused	On	On	On	On
1 50	On	On	On	Off
2 75	On	On	Off	On
3 110	On	On	Off	Off
4 135	On	Off	On	On
5 150	On	Off	On	Off
6 300	On	Off	Off	On
7 600	On	Off	Off	Off
8 1200	Off	On	On	On
9 1800	Off	On	On	Off
10 2400	Off	On	Off	On
11 3600	Off	On	Off	Off
12 4800	Off	Off	On	On
13 7200	Off	Off	On	Off
14 9600	Off	Off	Off	On
15 19,2K	Off	Off	Off	Off

Note: On is also Closed. Off is also Open.

STOP BITS (Switch 2-5)

When Switch 2-5 is On (Closed) 1 stop bit is selected.

When Switch 2-5 is Off (Open) 2 stop bits are used.

WORD LENGTH (Switch 2-6)

When Switch 2-6 is On (Closed) 8-bit words are used.

When Switch 2-6 is Off (Open) 7-bit words are used.

PARITY ODD/EVEN (Switch 2-7)

If parity is enabled via the setting of Switch 2-8, Switch 2-7 determines whether parity will be odd or even.

When Switch 2-7 is On (Closed) odd parity is selected.

When Switch 2-7 is Off (Open) even parity is selected.

If parity is disabled, the setting of Switch 2-7 is irrelevant.

PARITY ENABLE/DISABLE (switch 2-8)

When Switch 2-8 is on (Closed) parity is disabled.

When Switch 2-8 is Off (Open) parity is enabled.

Note: When seriALL is in the Communication mode, certain communication settings may be changed through keyboard commands. Please see the section on Communication Commands for further explanation.

3. INSTALLING seriALL INSIDE THE APPLE

Please read the following instructions carefully before you begin to install seriALL inside your Apple.

IMPORTANT: Before starting, TURN OFF POWER to both the printer (or other device) and the Apple computer. Failure to turn off the power to all system components may cause serious damage to the computer and to the seriALL card. Also, please note that failure to follow the installation instructions may void your warranty.

INSTALLING THE seriALL BOARD

1. Remove the cover from the Apple by pulling up on its rear edge until the fasteners release. Next, slide the cover towards the rear of the Apple and lift it out.
2. Make sure the supplied transition cable is properly seated at connection J1 on the seriALL board. The colored wire on the cable should be on top so that the cable points out to the rear of the Apple.
3. Being careful not to touch the gold connector fingers on the bottom of the card, insert the seriALL card into an empty slot inside the Apple.

Depending upon how you intend to use seriALL, it may be installed in unused slots as follows:

Slot 1 = Printer Interface. If you are using CP/M or Pascal, the seriALL card must be installed in slot 1. If you are using Applesoft BASIC you must install the card in any unused slot except zero. However, to insure compatibility with standard off-the-shelf software, it is recommended that the seriALL card be placed in slot 1 when used in the Printer mode.

Slot 2 = Communication Device. If you plan to use a seriALL as a communications device (for example, with a modem) the most common slot is number 2.

Slot 3 = System Console Device. If you plan to use your serial device as a system console for CP/M or Pascal, seriALL must be in slot 3.

If you plan to use your serial device as a system console under Apple DOS, then seriALL may be in any slot except 0.

Note: Unless you are using an Apple //e, slots are numbered from left to right (0 to 7) along the rear edge of the Apple main circuit board. The Apple //e does not have a slot 0.

4. Route the transition cable(s) through any of the openings at the rear of the Apple.

COMPLETING AND TESTING THE INSTALLATION

1. Replace the Apple cover.
2. Connect the seriALL card to the printer or other device.
The connector on the seriALL transition cable can only fit one way.
3. Turn on the Apple power switch, install paper in the printer, and turn on the printer or other device.
4. seriALL has a self-test function. The self-test should be run from Applesoft BASIC. The Applesoft prompt(>) should be present on the screen. Activate seriALL by typing: PR#n and pressing the RETURN key where n is the Apple slot number which contains the seriALL card.

If the seriALL card is set for Printer mode (Switch 1-2 Off/Open) press and hold the CTRL key and the I key. Release the I key, then the CTRL key.

If seriALL is in Communication mode, use the A key instead of the I key as describe in e preceding paragraph.

Next, press the V key. If you are in communication mode, you will also need to press RETURN.

In Printer mode, a screen similar to the following will appear:

SERIAL BY PRACTICAL PERIPHERALS
VERSION 1.00 - COPYRIGHT 1984

PROM CHECKSUM....:GOOD
GRAPHICS PRINTER.:APPLE
BAUD RATE.....:9600
WORD LENGTH.....:8
STOP BITS.....:1
PARITY:NONE
HANDSHAKING.....:XON/XOFF

PRESS ANY KEY TO STOP
TEST DONE

The printer and communication parameters you set when you configured the seriALL card will be shown on your screen. Also, this self-test instructs seriALL to start sending a test pattern to the printer. Press any key to stop the test.

In Communication mode, the self-test screen will be similar to this:

PPI SERIALL:VERIFY

SERIALL BY PRACTICAL PERIPHERALS
VERSION 1.00 - COPYRIGHT 1984

PROM CHECKSUM.....: GOOD
COMMUNICATIONS MODE
BAUD RATE..... :1200
WORD LENGTH.....:8
STOP BITS.....:1
PARITY.....:NONE
HANDSHAKING.....:XON/XOFF

SEND TEST PATTERN (Y/N)?

In Communication mode, the self-test screen will show communication parameters (baud rate, word length, etc.) you set during configuration, or if you have changed these with additional software commands (see the section on Communication mode commands) the last entered command will be displayed.

In Communication mode, the self-test gives you the option of sending a test pattern to the serial device or not. Answer Y to the prompt SEND TEST PATTERN? to start the test. Press any key to stop.

SELF-TEST DIAGNOSTICS

In Printer mode, seriALL automatically sends a test pattern to the printer when you enter the CTRL-I V command.

In Communication mode, you have the option of sending the test pattern or not.

When seriALL is sending the test pattern to the printer or other device, a message will appear at the top of the screen to illustrate the handshaking process.

With X-On/X-Off software hand-shaking or with hardware hand-shaking, the top of the screen will show the following in normal characters:

XON OFF HHS DSR CTS

When seriALL receives an X-On character, the letters XON will be highlighted. When the card receives an X-Off character, the letters OFF will be highlighted.

With hardware handshaking, if seriALL receives a stop signal from the external serial device, the appropriate letters HHS, DSR, or CTS will be highlighted to identify where the signal originated. The letters stand for the following lines in the serial connector:

HHS = Hardware handshake line

DSR = Data Set Ready line

CTS = Clear To Send line

If you are using ETX/ACK software handshaking, the screen will look like this:

ETX ACK HHS DSR CTS

When seriALL sends an ETX signal, the letters ETX will be highlighted. When the card receives an ACK signal, the letters ACK will be highlighted.

If you have trouble with the self-test, or with getting seriALL to interface properly with your system, please refer to the Troubleshooting guide in this manual.

Here is a summary of seriALL configuration.

Table 3 - Configuration Summary

1-1	On	X-on/X-off software handshake, hardware handshake or no handshake. (See text to select hardware handshake line via jumper at H1.)
1-1	Off	ETX/ACK software handshake
1-2	On	Communication mode
1-2	Off	Printer mode
1-3, 1-4, 1-5		Graphics printing. See Table 1.
1-6		Auto baud rate (300/1200) selection
1-7	On	Send linefeed after carriage return
1-7	Off	No linefeed after CR
1-8	On	Interrupts enabled
1-8	Off	Interrupts disabled
2-1	2-2, 2-3, 2-4	Baud rate. See Table 2.
2-5	On	1 stop bit
2-5	Off	2 stop bits
2-6	On	8-bit word length
2-6	Off	7-bit word length
2-7	On	Odd parity
2-7	Off	Even parity
2-8	On	Parity disabled
2-8	Off	Parity enabled

4. OPERATION IN PRINTER MODE

This section gives operating procedures to use when seriALL is in Printer mode. To use seriALL in Communication mode, please refer to Section 6.

TURNING ON seriALL

From Applesoft or Integer BASIC, seriALL is activated by typing: PR#n and pressing RETURN where "n" is the slot number in the Apple which contains the seriALL board.

seriALL DEFAULT VALUES ON POWER-UP

In On power-up, seriALL defaults to the following:

- Page Length = 0 (The automatic skip-over perforation function is not activated.)
- Line Length = 0 (This prevents seriALL from issuing extra carriage returns if the line length is exceeded.)
- Left Margin = 0
- Automatic linefeed with carriage return for BASIC programs
- No automatic linefeed with CP/M or Pascal programs
- Printer Bell disabled
- Screen Echo enabled for BASIC programs
- Screen Echo disabled for CP/M and Pascal programs
- Maintain Mode off.
- High Order Bit disabled

ISSUING COMMANDS FROM APPLESOFT BASIC

Use CTRL-I as the control character when you are operating in Applesoft BASIC. To issue commands from the keyboard in Applesoft DOS:

1. At the Applesoft prompt (]), type: PR#n to activate serialL (n is the Apple slot number which contains the card.) You must activate serialL before it can receive any other commands.
2. To issue a command, type: CTRL-I followed by the serialL Command Character(s). For example, the Command Character for issuing an Automatic linefeed with every carriage return is A. You would:
 - a. Press and_ hold the CTRL key
 - b. Press the I key
 - c. Release the I key
 - d. Release the CTRL key
 - e. Press the A key
3. Turn off serialL by typing: PR#0 when the Applesoft prompt is present on the screen.
4. To activate serialL from within an operating BASIC program, you will need to initialize the card, then send the equivalent control character to the output device followed by the desired serialL command enclosed in quotation marks.

In Applesoft BASIC, CTRL-I is equivalent to CHR\$(9). For example to set the page length to 60, the command would be: CTRL-I60P followed by a carriage return. Inserting this command within a program would look like this:

```
10 PRINT CHR$(4);"PR#n"  
20 PRINT CHR$(9);"60P"
```

To turn off the serialL card, insert a program line like the following:

```
30 PRINT CHR$(4);"PR#0"
```

ISSUING COMMANDS FROM PASCAL

serialL is completely compatible with both CP/M and Pascal 1.0 and 1.1.

Because both CP/M and Pascal use CTRL-I as a tab character, serialL will change this control character to CTRL-Y when these systems are used. Further, because CTRL-Y is used to home the cursor in CP/M and Pascal, CTRL-SHIFT-M (CTRL-] on the Apple //e) is provided as an alternate serialL control character.

When Pascal is in filer mode, text formatting commands for the card can be issued from the keyboard by using the Pascal transfer function. This is done by typing T to get into the transfer mode. Next type the following lines:

CONSOLE: (Press RETURN)

PRINTER: (Press RETURN)

Next, enter the control character you are using (CTRL-Y, CTRL-SHIFT-M, or CTRL-]) followed by the desired serialL commands.
CTRL-C

To list a program, type T followed by the name of the program. Then type PRINTER: and press RETURN.

Note: Use the serialL Maintain mode to retain all entered formatting parameters. This is because Pascal re-initializes serialL each time it accesses the card.

ISSUING COMMANDS FROM CP/M

In CP/M, to issue commands, type: CTRL-P

The control character you are using (CTRL-Y, CTRL-SHIFT-M, or CTRL-]) followed by the desired seriALL commands.

Press RETURN.

LLIST and LPRINT are used to send data to the printer from BASIC under CP/M.

seriALL commands are initiated by sending a special control character followed by the appropriate seriALL command sequence. Commands may be sent from either the Apple keyboard or from within operating programs.

Control characters have ASCII decimal values of zero (0) to thirty-one (31). They are not part of the normally displayed character set.

CTRL-I is the control character for Applesoft BASIC programs. Use CTRL-Y for CP/M or Pascal programs.

Note: If you are using an Apple II, or Apple II+ you may also use CTRL-SHIFT-M for CP/M or Pascal programs. If you are using an Apple //e, you may use CTRL-] in place of CTRL-Y for CP/M and Pascal.

You may change the control character if you wish for either Applesoft BASIC, CP/M, or Pascal. This is explained in the section on seriALL Board Commands.

Control characters are sent by doing the following:

1. Press and hold the CONTROL (CTRL) key.
2. Press I if you are in Applesoft BASIC, or press Y if you are running a Pascal or CP/M program.
3. Release the letter key.
4. Release the CTRL key.

This sequence is represented by CTRL-I or CTRL-Y in the command listings.

Once the control character is sent, you will need to enter the appropriate seriALL command (see the Command Listings).

Note: You do not need to enter any spaces between the control character and the seriALL command. Spaces shown in the command listings are included only for clarity. However, if you accidentally enter extra spaces, they will be ignored.

TERMINATING COMMANDS

All commands (except graphics commands) will take effect as soon as the last character in the command sequence is entered. Commands may also be completed by pressing RETURN or CTRL-X (CTRL-X tells the Apple to ignore the commands and eliminates your receiving a SYNTAX ERROR message on the screen or in your printout.)

Graphics commands do not take effect until you enter RETURN, CTRL-X, or press the Space Bar. Please refer to the Graphics Command Listing for complete information on using serialL Graphics Commands.

5. PRINTER MODE COMMANDS

In the Printer mode (Switch 1-1 Off), seriALL responds to the following types of commands:

Text Formatting Commands Printer Control Commands seriALL Board
Commands Screen Commands Graphics Commands

TEXT FORMATTING COMMANDS

seriALL has many useful text formatting features including setting margins, line length, and page length, and formatting BASIC program listings. These functions can be initiated from either the keyboard or under program control.

Note: Remember to substitute CTRL-Y for CTRL-I if you are using CP/M or Pascal and do not include any spaces when entering commands.

ISSUE AUTOMATIC LINEFEED: CTRL-I A

This command instructs seriALL to issue an Automatic linefeed with every carriage return. seriALL defaults to this on power-up when BASIC programs are being run.

When running CP/M or Pascal programs, seriALL will not issue an automatic linefeed unless you enter this command. This is because CP/M and Pascal automatically issue a linefeed after every carriage return.

KILL AUTOMATIC LINEFEED: CTRL-I K

This command kills the automatic linefeed sent with each carriage return.

FORMAT A BASIC PROGRAM LISTING: CTRL-I F

This command instructs seriALL to format BASIC program lines by breaking multiple statement lines at the colons and placing each statement on a new indented line. This makes the listing easier to read, and allows you to see the program logic more clearly. After entering the command, type LIST to produce a formatted listing.

Do not activate this command unless you are listing a BASIC program. Otherwise, all lines of output will be broken wherever a colon appears. This mode is turned off by typing the control character (CTRL-I) followed by RETURN or by issuing any other command.

Note: Set your line lengths, margins, and enter any other seriALL commands before you enter CTRL-I F. The CTRL-I F command should be the last command entered before printing begins since entering any other seriALL commands will cancel it.

For example, if you wanted to get a listing that had a left margin of 5, a line length of 75, a page length of 60 (with 3 lines at the top and bottom margins for auto skip-over perforation) you would first adjust paper in the printer to 3 lines below top of form.

Next you would enter: CTRL-I5L CTRL-175N CTRL-I60P CTRL-IF CI1RL-X with no spaces between commands. (If you accidentally enter spaces, they will be ignored.)

Completing the command with CTRL-X (instead of RETURN) prevents the system from printing a SYNTAX ERROR message. Type LIST and press RETURN. The listing will be printed according to the parameters you entered.

RESET LEFT MARGIN TO ZERO: CTRL-I L

This command resets the left margin to zero.

SET LEFT MARGIN TO n: CTRL-I nL

This command sets the left margin n columns from the left edge of the paper. The left margin can be from 0 to 255.

SET LINE LENGTH TO ZERO and DISABLE SCREEN ECHO: CTRL-I N
This command sets the line length to 0 and disables the line length function. This keeps Seri ALL from issuing extra carriage returns if the line length is exceeded. This command also disables screen echo (See CTRL-I I).

SET LINE LENGTH TO n and ENABLE SCREEN ECHO: CTRL-I nI
This command sets the line length ton characters from the left margin (n can be from 1 to 255) and enables screen echo.

Note: When screen echo is enabled an Applesoft BASIC program listing will still not exceed 40 characters per line on the screen unless you are using an 80-column card and it is active.

SET LINE LENGTH TO n and DISABLE SCREEN ECHO: CTRL-I nN
This commands sets the printer line length ton characters from the left margin. The line length can_ be set from 1 to 255. It also disables screen echo (see CTRL-I I).

RESET PAGE LENGI'H TO ZERO: CTRL-I P
This command resets the page length to zero. This also cancels the skip-over perforation function (CTRL-I nP).

Note: In the above commands, if you enter a number higher than 255 for n, seriALL will default to a line length of 255.

SET PAGE LENGTH TO n LINES and ENABLE AUTOMATIC SKIP-OVER PERFORATION: CTRL-I nP
Set the page length to n lines. (n may be from 1 to 127.) seriALL will issue six linefeeds and reset its line counter after n lines have been printed. This allows automatic skip-over-perforation.

Standard continuous form paper has 66 lines per page so CTRL-I 60P followed by RETURN will allow automatic skip-over-perforation with a three-line margin at the top and bottom of the paper. Setting n to zero disables automatic skip over-perforation and produces continuous printing.

Note: Issue this command after setting the paper to the top of form. This is because the CTRL-I nP command sets the seriALL internal line counter to 0.

PRINTER CONTROL COMMANDS

The following are printer control commands:

ENABLE PRINTER BELL: CTRL-I B

This command instructs seriall to pass CTRL-G characters received from the Apple on to the printer. (CTRL-G rings the printer bell, if it has one.)

From software, a PRINT CHR\$(7) (PRINT CTRL-G) program line will also ring the bell if this command is in effect.

CANCEL PRINTER BELL: CTRL-I C

This command instructs seriall to filter out any CTRL-G characters. seriall defaults to this on power-up so that CTRL-G will not ring the printer bell (if it has one).

SEND ESCAPE CHARACTER TO THE PRINTER: CTRL-I E

This command sends an escape character to the printer. If you are using an Integer Apple, the escape character cannot be sent because of the lack of the CHR\$ function.

serialL BOARD COMMANDS

These commands are used to issue instructions directly to the serialL board.

SET THE CONTROL CHARACTER TO n: CTRL-I nC

This command allows you to set the control character to the value of n, where n is the ASCII value of any character on the Apple keyboard. You may change the control character to one of your own choosing.

Using this command also allows the control character to become a printable character which can be embedded in a text file.

Further, it may be used to allow unusual data to be passed through the serialL card without being incorrectly interpreted as a command character.

Note: If you are running Applesoft BASIC programs, and you want to change the control character from CTRL-I to something else, the ASCII value you enter as n must be greater than 128. If you select a character with an ASCII value of less than 128, simply add 128 to it and enter this total as n.

For example, let's say you decide to change the control character from CTRL-I to the @ sign. The @ character has an ASCII value of 64. Adding 128 to 64 equal 192. You would enter 192 as the value of n in this command. While this command is in effect, you would use the @ key as the control character instead of CTRL-I.

NULL CDMMAND: CTRL-I RETURN, CTRL-X, or Backspace Key(<-)

If you start to enter a serialL command and then decide to exit the command mode just press RETURN, CTRL-X, or the Backspace Key (<-).

CHANGE CONTROL CHARACTER FROM CTRL-I TO CTRL-n: CTRL-I CTRL-n
This changes the control character from CTRL-I to CTRL-n where n is almost any character on the Apple keyboard. Be careful not to change to a character which is used by the printer or by your software.

Note: seriALL protects you from changing to control characters which are used extensively by the Apple. These are: CTRL-M (carriage return); CTRL-H (backspace); and CTRL-X (cancel).

Should you attempt to change the control character to one of these, seriALL will ignore the command.

CHANGE CONTROL CHARACTER FROM CTRL-I TO: CTRL-I (SHIFT N)
This lets you change the control character from CTRL-I to the symbol. The symbol is accessed by pressing SHIFT-N (or SHIFT-6 on the Apple //e).

CHANGE CONTROL CHARACTER FROM CTRL-n TO CTRL-m: CTRL-n CTRL-m
This changes the control character from CTRL-n to CTRL-m where n and m are almost any character on the Apple keyboard. Again, be careful not to change to a character which is used by the printer or by your software. (See the note under the CTRL-I CTRL-n command.)

Note: If you enter the control character by mistake, you can cancel it by just pressing RETURN, CTRL-X or the Backspace Key.

SET TEXT FORMATTING PARAMETERS TO THEIR DEFAULT VALUES: CTRL-I D

This command sets all text formatting parameters back to their default values. The default text parameters are:

Page Length = 0 (The automatic skip-over perforation function is not activated.)

Line Length = 0 (This prevents seriALL from issuing extra carriage returns if the line length is exceeded.)

Left Margin = 0

Automatic linefeed with carriage return for BASIC programs

No automatic linefeed with CP/M or Pascal programs

Printer Bell disabled

Screen Echo enabled for BASIC programs

Screen Echo disabled for CP/M and Pascal programs

Maintain Mode off.

SET MAINTAIN MODE: CTRL-I M

This command enables the Maintain Mode. When in this mode, all print formatting parameters are maintained when leaving and re-entering the card. This allows parameters to be entered only once for as long as the Apple is powered on, and also maintains parameters when switching to or from BASIC, CP/M, or Pascal.

The Maintain mode is especially useful when running programs in which interface commands cannot be imbedded. (Many off-the-shelf software programs have no provisions for imbedding additional commands.)

The Maintain mode can only be turned off by the Default Command (CTRL-I D) or by powering off the computer.

Note: The PFS Graph program uses a run-time Pascal compiler which clears the Maintain mode and all seriALL parameters. Also, some copy protection schemes clear all memory in order to prevent copying. This will also clear the Maintain mode.

SET TRANSPARENT MODE: CTRL-I T

This command sets seriALL in Transparent mode. In this mode, seriALL does not recognize any commands. This is useful when using a program (such as a word processing or graphics screen dump software) which might send characters through seriALL which could be interpreted as commands.

The Transparent mode is also appropriate when you are running a program which handles text formatting internally inserting carriage returns, etc is undesirable.

Because the Transparent mode disables the seriALL automatic linefeed function, when you are in BASIC you will need to either turn on your printer's automatic linefeed switch or make sure your program contains line feeds.

In Transparent Mode, character data is sent with the High Order bit cleared unless the CTRL-I H command is entered prior to setting the Transparent Mode.

Reinitializing seriALL by typing PR#n will clear the Transparent mode.

Note: If you issue the Transparent mode command when the Maintain mode (CTRL-I M) is in effect, the only way to clear the Transparent mode without powering off the Apple is to clear the high-order bit at location \$4F8 + n where n is the slot number containing the seriALL. This can be done when the Applesoft prompt is on the screen by typing:

```
POKE 1272 + n, PEEK(1272+n)-128
```

VERIFY OPERATION: CTRL-I V

This command is used to verify operation of seriALL by performing a self-test. The seriALL revision number will be listed and the card will check the on-board firmware and give a status report on the screen. The communication parameters will be listed and the printer will then print a test pattern which verifies most of the seriALL internal components. Press any key to stop the test.

SCREEN COMMANDS

seriALL supports the following video screen commands.

ENABLE SCREEN ECHO: CTRL-I I or CTRL-I 0

This command enables screen echo to allow simultaneous output to the video screen and to the printer (or other device). To be compatible with other interface cards, CTRL-I 0 has the same effect. If you are using an Apple //e, seriALL will echo either 40-or 80-column screens.

ENABLE SCREEN ECHO and SET LINE LENGTH TO n: CTRL-I nI

This enables screen echo and allows you to set the line length. Line length can be from 1 to 255.

Note: When screen echo is enabled, an Applesoft BASIC program listing will still not exceed 40 characters per line on the screen unless you are using an 80-column card and it is active.

DISABLE SCREEN ECHO and SET LINE LENGTH TO ZERO: CTRL-I N

This command disables screen echo. It also sets the line length to zero, which disables the line length function.

DISABLE SCREEN ECHO and SET LINE LENGTH TO n: CTRL.-I nN

This command disables screen echo. It also sets the line length to n characters from the left margin. The line length-can be from 1 to 255.

DUMP PRESENT SCREEN TO THE PRINTER:

CTRL-I S

This instructs Seri ALL to dump the contents of the present screen to the printer. seriALL automatically knows if you are using an Apple //e, and will dump either a 40-column or 80-column screen from the Apple //e. If you are not using an Apple //e, only 40-columns screens may be dumped.

DUMP THE PRESENT SCREEN STARTING AT LINE n: CTRL-I nS

This instructs serialL to dump the present screen to the printer starting at line n and stopping at line 24. The variable n may be from 1 to 23. This command is particularly useful for dumping a portion of the screen, such as a spreadsheet window.

DUMP THE PRESENT SCREEN FROM A VIDEX 80-COLUMN CARD: CTRL-I W

If you have installed a Videx 80-column card in your Apple, this command will dump the contents of the screen to the printer. The Videx card must be installed in slot 3 for this command to work.

The Videx display will jitter while the command is active. The jitter is an unavoidable consequence of the Videx design. It will stop when the screen dump is complete.

DUMP THE PRESENT SCREEN FROM A VIDEX CARD FROM LINE n: CTRL-I nW

This instructs serialL to dump the present screen from the Videx board starting at line n and stopping at line 24. The variable n may be from 1 to 23.

Note: serialL does not support other peripheral 80-column cards. If you do not have a Videx card installed in your Apple, you may not dump 80-column screens.

SWITCHING BETWEEN 40 AND 80 COLUMNS ON THE APPLE //e

For those of you who are using an Apple //e, the following may be helpful. You can change from 40 to 80 columns by typing PR#3. Doing this however, turns off serialL. Turn the card back on again by typing PR#n where n is the Apple slot number containing serialL.

You can also go from 40 to 80 columns by typing ESC 8. This can only be done if the 80-column firmware has been initialized by typing PR#3, and the 80-column mode has not been disabled with ESC CTRL-Q. Switching from 40 to 80 columns in this way doesn't affect serialL.

You may switch from 80 to 40 columns by typing CTRL-Q or ESC 4. This does not affect serialL. You may also switch from 80 to 40 columns by typing ESC CTRL-Q. Doing this turns off the serialL card. Turn it back on by typing PR#n.

PRINTER COMMUNICATION COMMANDS

These commands may be used to modify the communication between serialL and your printer.

LEAVE THE HIGH ORDER BIT INTACT: CTRL-I H

serialL defaults to receiving 7-bit data from the Apple on power.up. This means it will, automatically strip off the 8th (high order) bit. The CTRL-I H command tells serialL to leave the 8th data bit intact.

STRIP OFF THE HIGH ORDER BIT: CTRL-I X

This command cancels the CTRL-I H command, and instructs serialL to strip off the 8th (high order) bit on data sent from Apple. (serialL default to this on power-up.)

GRAPHICS COMMANDS

The following commands are for use with dot-matrix printers which have graphics capabilities.

Graphics commands are initiated by typing CTRL-I G. You may then enter any of the graphic sub-commands listed below. Graphics commands must be completed by:

1. Pressing RETURN
2. Entering CTRL-X
3. Pressing the Space Bar.

Pressing RETURN tells seriALL to execute the entered graphics sub-commands.

Entering CTRL-X tells seriALL to execute the graphics sub-command(s) but instructs the Apple to ignore them. This prevents SYNTAX ERROR message from appearing on the screen or on your printout.

Pressing the Space Bar tells the seriALL card to execute the entered graphics sub-commands, but leaves seriALL in the graphics mode after the command is executed. You may then enter another graphics sub-command without having to enter CTRL-I G first. When you enter additional sub-commands the graphic pictures will be "concatenated" i.e. they will be printed one right after the other, with the upper and lower borders actually touching each other.

You may enter multiple sub-commands, before pressing RETURN, CTRL-X, or the Space Bar. (The exception is that M and R may not be entered simultaneously.)

PRINT PRIMARY HI-RESOLUTION SCREEN:

No Sub-Command

Entering CTRL-I G alone (with no sub-command) will print the primary Hi-Resolution screen. The image will be centered on the page, with each white dot on the screen printed as a black dot on the paper.

PRINT GRAPHICS SCREEN DOUBLE SIZE:

D Sub-Command

This will print the graphics screen double-size.

PRINT GRAPHICS SCREEN IN EMPHASIZED PRINT: E Sub-Command

This will print the graphics screen using emphasized (double-strike) print.

INVERT GRAPHICS SCREEN:

I Sub-Command

This will invert the graphics image. Each dot on the screen will appear on the paper as a white space against a black background.

PRINT GRAPHICS SCREEN AT LEFT MARGIN:

L Sub-Command

This will print the graphics image at the left margin which was set with the CTRL-I nL command.

DUMP THE MIXED HI-RES AND TEXT SCREEN:

M Sub-Command

Some programs use the Apple mixed text and graphics mode for annotating and displaying various kinds of data. This command allows that mixed image to be recreated on paper. The four lines of text at the bottom of the screen will always be from the primary text page regardless of which Hi-Res screen is printed.

ROTATE THE GRAPHICS SCREEN 90 DEGREES:

R-Sub Command

This command rotates the graphics image 90 degrees on the paper. Note: The M sub-command will be ignored if the Rotate Graphic sub-command (R) is entered. (This is because most printers cannot print text characters sideways.) Also on some printers the text portion may appear to be slightly different than it looks on the screen. This is due to the difference in width of the screen characters versus the printer's characters.

DUMP THE SECONDARY GRAPHICS PAGE: 2 Sub-Command

This will print the secondary graphics page.

PRINT BOTH HGR1 AND HGR2 SIDE BY SIDE:

S Sub-Command

This will print page one next to page two or page two next to page one if used with the sub-command. Also, this can be used with the "R" (rotated) sub-command to print images rotated top to bottom.

Using Graphics Commands

You might want to try out a few Graphics Sub-Commands.

First, initialize seriALL by typing PR#n at the Applesoft prompt. Next, insert the disk containing the graphics you wish to print in the drive.

Load the graphics image into the primary hi-res page by typing:

```
BLOAD filename,A$2000.
```

You may also load another image in the secondary hi-res page by typing:

```
BLOAD filename, A$4000.
```

Once loaded, try printing the primary page. Make sure your printer is turned on and type CTRL-I G followed by CTRL-X. This will print the image centered on the page.

Now, try printing the image rotated and then inversed. Type CTRL-I GR and press the Space Bar. When the cursor returns, type I followed by CTRL-X. You should get two images, concatenated (touching each other at the borders). The first will be rotated and the second will be inversed.

6. COMMUNICATION MODE COMMANDS

When the serialL card is in Communication mode (Switch 1-1 On) it can respond to a variety of communication commands. Further, when in this mode, pressing CTRL-A T puts the Apple in Terminal mode, where it functions like a dumb terminal.

In Communication mode, the control character is CTRL-A, regardless of the operating system or language being used. There are three types of communication command sequences:

1. CTRL-A x (RETURN) where x is a letter on the Apple; keyboard. You may also enter the full command name, for example VERIFY before you press RETURN.
2. CTRL-A x (Space) E or D (RETURN) where x is a letter on the Apple keyboard. You may also enter the full command name, for example, ECHO, followed by the complete word ENABLE or DISABLE. Alternatively, you may just enter the first letter of the command, for example, E for Echo followed by either E for Enable or D for Disable. '
3. CTRL-A nx (RETURN) where n is a number and x is a letter. Again, you may enter the full command name or just the first letter of the command before you press RETURN.

The first letter and the full command names are indicated like this in the command listing:
B)REAK

Except where indicated by (Space), DO NOT insert spaces in the command sequence. Spaces in this list are included only for clarity.

Note: Not all communication commands are supported by CP/M and Pascal. In the following command listing, those commands which may be used with CP/M and Pascal are marked with an asterisk(*) .

*SEND BREAK CHARACTER: CTRL-A B)REAK

This command instructs the serialL card to send a 233 millisecond break to the serial device. This can be useful if you are logged to a modern or time share system. This break is equivalent to a CTRL-C or Reset command, and may be used to get the other system's attention.

RESET serialL CARD: CTRL-A R)ESET

This command resets the serialL card. It is identical to a PR#0 and IN#0 command in BASIC. This command also resets the Apple //e 80-column screen.

TERMINAL MODE:: CTRL-A T)ERMINAL

This command sets the serialL card in Terminal mode so that the Apple can function as a dumb terminal. Terminal mode is further described in Section 7.

ZAP: CTRL-A Z)AP

This command instructs serialL to ignore all further commands.

ENABLE SCREEN ECHO: CTRL-A E)CHO (Space) E)NABLE

This command enables screen echo, so that characters sent or received by the system appear on the screen.

DISABLE SCREEN ECHO: CTRL-A E)CHO (Space) D)ISABLE

This command disables screen echo.

ENABLE FIND KEYBOARD: CTRL-A F)IND (Space) E)NABLE

This command enables the Apple keyboard, and can be embedded in a program.

DISABLE FIND KEYBOARD: CTRL-A F)IND (Space) D)ISABLE

This command disables the Apple keyboard. It can also be embedded in a program.

ENABLE LINEFEED: CTRL-A L)INEFEED (Space) E)NABLE

This command instructs the serialL card to generate a linefeed after each carriage return.

DISABLE LINEFEED: CTRL-A L)INEFEED (Space)) D)ISABLE

This tells serialL not generate a linefeed after each carriage after each carriage return.

ENABLE LINEFEED MASK: CTRL-A M)ASK (Space) E)NABLE

This tells the serialL card to filter out any linefeeds received on incoming data.

DISABLE LINEFEED MASK: CTRL-A M)ASK (Space) D)ISABLE

This command allows any incoming linefeeds to pass through the serialL card.

ENABLE X-OFF RECOGNITION: CTRL-A X)OFF (Space) E)NABLE

If you are using X-On/X-Off software handshaking, this command tells serialL to recognize X-Off characters. serialL defaults to this on power-up.

DISABLE X-OFF RECOGNITION: CTRL-A X)OFF (Space) D)ISABLE

If you are using X-On/X-Off software handshaking, this command instructs serialL to ignore X-Off characters.

*SET BAUD RATE CTRL-A n)AUDRATE

This command may be used to set or change the baud rate. It will override the baud rate which was selected via the settings of switches 2-1, 2-2, 2-3, and 2-4 on the serialL card.

The variable n may be a number from 0 to 15. Please refer to Table 2 on page 10 to see which baud rate corresponds to the numbers 0 to 15.

When n is 0, serialL is instructed to restore the baud rate which was selected with the DIP switch settings.

***CARRIAGE RETURN DELAY: CTRL-A nC)ARRIAGE RETURN**

This command instructs serialL to issue a delay after each carriage return. The variable n may be a value from 0 to 3, with the following delay times:

- 0 = no delay
- 1 = 32 millisecond delay
- 2 = 0.25 second delay
- 3 = 2.0 second delay

***FORM FEED DELAY: CTRL-A nF)ORM FEED**

This instructs the serialL card to issue a delay after each form feed character. The variable n may be a value from 0 to 3, with the following delay times:

- 0 = no delay
- 1 = 32 millisecond delay
- 2 = 0.25 second delay
- 3 = 2.0 second delay

***LINEFEED DELAY: CTRL-A nL)INE FEED**

This instructs the serialL card to issue a delay after each linefeed. The variable n may be a value from 0 to 3 with the following delay times:

- 0 = no delay
- 1 = 32 millisecond delay
- 2 = 0.25 second delay
- 3 = 2.0 second delay

DATA FORMAT: CTRL-A nD)ATA FORMAT

This command may be used to override the data format (word length and stop bits) set via the switch settings on the serialL board. The variable n may be from 0 to 7, with the following format options:

- 0 = 8 bits 1 stop bit
- 1 = 7 bits 1 stop bit
- 2 = 6 bits 1 stop bit
- 3 = 5 bits 1 stop bit
- 4 = 8 bits 2 stop bits
- 5 = 7 bits 2 stop bits
- 6 = 6 bits 2 stop bits
- 7 = 5 bits 2 stop bits

SET PARITY: CTRL-A nP)ARITY

This command may be used to override the parity which was set via DIP switches on the seriALL board. The variable n corresponds to the following:

- 0 = no parity (none)
- 1 = odd parity
- 3 = even parity
- 5 = mark
- 7 = space

SELECT SCREEN SLOT: CTRL-A nS)CREEN SLOT

If you are using an auxiliary video board (such as a Videx 80-column card) this command tells the seriALL card what slot it is installed in inside the Apple. The variable n may be from 0 to 7.

In Terminal mode, if you have an Apple //e with the Apple 80-column card and you use the CTRL-A 3S)CREEN SLOT command to activate it, you must follow this command with: CTRL-A OS in order for the card to function properly with seriALL.

TRANSLATE LOWER CASE: CTRL-A nT)RANSLATE

If you do not have an Apple //e and you do not have an auxiliary video board the Apple is limited to displaying all data in uppercase characters. seriALL can convert incoming data from lowercase to uppercase via this command. All uppercase data will be displayed in inverse video (dark letters on a light background) on the screen.

The variable n may have a value from 0 to 3, which corresponds to the following:

- 0 = lowercase to uppercase
- 1 = no change
- 2 = lowercase to uppercase inversed
- 3 = uppercase to uppercase inversed and lowercase to uppercase.

7. TERMINAL MODE

In communication mode, the CTRL-A T command puts serialL in Terminal mode. In this mode, the Apple functions like a dumb terminal. This is useful if you wish to connect the Apple to another computer or to a timesharing system.

TERMINAL MODE COMMANDS

In Terminal mode, serialL responds to the following commands:

EXIT TERMINAL MODE: CTRL-A Q)UIT

This command is used to exit Terminal mode, and return serialL to normal Communication mode operation.

EXIT TERMINAL MODE AND TURN OFF serialL: CTRL-A R)ESET

This will take serialL out of Terminal mode and turn off the serialL card.

ENABLE SPECIAL CHARACTERS: CTRL-A S)PECIAL (Space) E)NABLE

This lets serialL generate lowercase characters and the other ASCII characters which are presented in Table 4. serialL defaults to this when Terminal mode is first entered.

DISABLE SPECIAL CHARACTERS: CTRL-A S)PECIAL (Space) D)ISABLE

This disables the serialL's special character function.

GENERATING SPECIAL CHARACTERS

In Terminal mode you can generate lowercase characters and ten ASCII characters which are not provided on the Apple II or II+ keyboard.

Generate lowercase characters by pressing the ESC key one time followed by all the characters you wish to appear in lowercase. To capitalize a single letter, press ESC again, then type the letter to be capitalized.

You may lock the keyboard in uppercase by pressing ESC two times successively. Get back to lowercase by pressing ESC one time as described in the preceding paragraph.

Table 4 shows the other ASCII characters which may be generated when seriALL is in Terminal mode and when the enable special characters function is in effect.

Table 4 - Other ASCII Characters

First, press ESC followed by:

1	to get	FS	(or 9C in hexadecimal)
2	to get	US	(or 9F in hexadecimal)
3	to get	[(or DB in hexadecimal)
4	to get	\	(or DC in hexadecimal)
5	to get	_	(or DF in hexadecimal)
6	to get	{	(or FB in hexadecimal)
7	to get		(or FC in hexadecimal)
8	to get	}	(or FD in hexadecimal)
9	to get	~	(or FE in hexadecimal)
0	to get	ESC	(or 9B in hexadecimal)
:	to get	RUB	(or FF in hexadecimal)

8. USING serialL WITH POPULAR SOFTWARE

USING serialL WITH VISICALC

serialL is also completely compatible with VisiCalc spreadsheet software. To access the serialL card from within VisiCalc, get into the printer mode by typing /PP. (Alternatively you can type /Pn where n is the slot number containing the serialL card.)

Next, send CTRL-I to serialL by typing: "^CI and follow it with any serialL command. The ^ is typed by pressing SHIFT-N OR SHIFT-6 on the Apple //e. (If you have changed the control character from I to another letter enter that other letter after typing "^C.)

Finally, type the desired bottom right-hand coordinate of the printout, and press RETURN.

COMPATIBILITY WITH WORDSTAR

To use serialL with WordStar on the Apple to its fullest capacity, you should perform the following steps.

1. Run the WordStar INSTALL program entering the correct information for your system. When you receive this message:

```
*****Communication Menu*****
```

```
Please enter selection (E, X, N, B, U):
```

```
Select N for none required (or handled outside WordStar).
```

2. This message should appear:

```
No Communication Protocol OK (Y/N) :  
Press Y.
```

3. The Driver Menu will then appear. Select L for CP/M List Device.

COMPATIBILITY WITH VISIPILOT VERSION 1.1

The following are instructions for creating a driver which will allow you to use seriALL with VisiPlot version 1.1 to its fullest capacity.

Note: This driver will also work with printer cards which have graphics dump capabilities.

1. Boot up the VisiPlot diskette.
2. Choose the "QUIT" option from the menu.
3. Press Y to indicate you do want to quit.
4. At the Applesoft prompt (]), type: CALL-151 and enter the following driver routine. Do not enter the] character or the asterisks. (R) at the end of each line means press RETURN.

```
]CALL-151
*3000:FF 8D 02 BB 97 00 00 00 (R)
*3008:80 00 00 01 00 00 00 00 (R)
*3010:00 00 4C BD 97 89 CE A5 (R)
*3018:36 48 A5 37 48 A9 00 85 (R)
*3020:36 AD B1 97 29 07 09 C0 (R)
*3028:85 37 A9 8D 20 F5 97 68 (R)
*3030:85 37 68 85 36 A9 89 20 (R)
*3038:F5 97 A9 C7 20 F5 97 AD (R)
*3040:00 C0 10 FB 2C 10 C0 20 (R)
*3048:F5 97 C9 8D DO F1 60 6C (R)
*3050:36 00 00 00 00 00 00 00 (R)
*3000.3057 (R)
```

```
*3000- FF 8D 02 BB 97 00 00 00
*3008- 80 00 00 01 00 00 00 00
*3010- 00 00 4C BD 97 89 CE A5
*3018- 36 48 A5 37 48 A9 00 85
*3020- 36 AD B1 97 29 07 09 C0
*3028- 85 37 A9 8D 20 F5 97 68
*3030- 85 37 68 85 36 A9 89 20
*3038- F5 97 A9 C7 20 F5 97 AD
*3040- 00 C0 10 FB 2C 10 C0 20
*3048- F5 97 C9 8D DO F1 60 6C
*3050- 36 00 00 00 00 00 00 00
```

*Type CTRL-C followed by RETURN to get back to the Applesoft prompt. At the prompt(]) type:

```
]BSAVE VISIPILOT.DRIVER,A$3000,L$40 and press RETURN.
```

5. Run VisiPlot as usual.
6. Choose "PRINT" for printing a graph when one is ready.
7. Press RETURN for a normal size picture, or enter any desired seriALL graphics commands and then press RETURN. For example, if you wanted to have the image rotated and printed double size enter: DR then press RETURN.

Note: seriALL graphics command set has the following options:

- a. Press RETURN for a normal small picture
- b. R for a rotated image
- c. D for double size
- d. I for inverse (white on black)
- e. E for emphasized (darkens the graph image)
- f. L to print the graph at the left margin
- g. M Menu at the bottom is printed with the graph

COMPATIBILITY WITH VISIPILOT VERSION 1.0

serialL also works with VisiPlot Version 1.0

Follow the steps given above, but use this driver routine:

```
]CALL -151
*3000:00 8D 02 D8 98 00 00 00 (R)
*3008:80 80 00 01 00 00 00 00 (R)
*3010:00 00 4C DA 98 89 CE A5 (R)
*3018:36 48 A5 37 48 A9 00 85 (R)
*3020:36 AD CE 98 29 07 09 C0 (R)
*3028:85 37 A9 80 20 12 99 68 (R)
*3030:85 37 68 85 36 A9 89 20 (R)
*3038:12 99 A9 C7 20 12 99 AD (R)
*3040:00 C0 10 FB 2C 10 C0 20 (R)
*3048:12 99 C9 8D D0 F1 60 6C (R)
*3050:36 00 00 00 00 00 00 00 (R)
*3000.3057 (R)
```

```
3000- 00 8D 02 D8 98 00 00 00
3008- 80 80 00 01 00 00 00 00
3010- 00 00 4C DA 98 89 CE A5
3018- 36 48 A5 37 48 A9 00 85
3020- 36 AD CE 98 29 07 09 C0
3028- 85 37 A9 80 20 12 99 68
3030- 85 37 68 85 36 A9 89 20
3038- 12 99 A9 C7 20 12 99 AD
3040- 00 C0 10 FB 2C 10 C0 20
3048- 12 99 C9 8D D0 F1 60 6C
3050- 36 00 00 00 00 00 00 00
```

At this point, continue as for VisiPlot Version 1.1.

USING seriALL WITH APPLEPLOT

As shipped, seriALL is compatible with the Appleplot program. However, performance can be enhanced by making a modification to one line in the ApplePlot program.

Line 58 in the ApplePlot software now reads:

```
58 GG$ = "PRINT GRAPH": GOSUB 32: GOSUB 940: GOTO 20
```

change it to:

```
58 VTAB 22
  :INPUT "GRAPH COMMANDS (DRIELM)?";D9$
  :PRINT CHR$(4);"PR#1"
  :PRINT CHR$(9);"G";D9$
  :PRINT CHR$(4);"PR#0"
  :GOTO 20
```

This new line produces a new option in the text window. The new option is the DRIELM set of commands which corresponds to seriALL graphics dump commands. These are:

- D = Double size
- R = Rotated 90 degrees
- I = Inverse
- E = emphasized
- L = Left margin
- M = Mixed text and graphics.

9. serialL COMMAND SUMMARY

PRINTER MODE COMMANDS

TEXT FORMATTING COMMANDS

CTRL-I	A	Issue Automatic Linefeed
CTRL-I	K	Kill Automatic Linefeed
CTRL-I	F	Format a BASIC Program Listing (Press RETURN, or any other serialL command to exit.)
CTRL-I	L	Reset Left Margin to Zero
CTRL-I	nL	Reset Left Margin to n
CTRL-I	N	Set Line Length to Zero and Disable Screen Echo
CTRL-I	nI	Set Line Length to n and Enable Screen Echo
CTRL-I	nN	Set Line Length to n and Disable Screen Echo
CTRL-I	nP	Set Page Length to n Lines and Enable Automatic Skip-Over Perforation
CTRL-I	P	Reset Page Length to Zero

PRINTER CONTROL COMMANDS

CTRL-I	B	Enable Printer Bell
CTRL-I	C	Cancel Printer Bell
CTRL-I	E	Send Escape Character to the Printer

BOARD COMMANDS

CTRL-I	nC	Character Control to n
CTRL-I	RETURN,	
	CTRL-X, or <-	are the Null Commands
CTRL-I	CTRL-n	Change Control Character From CTRL-I to CTRL-n
CTRL-n	CTRL-I	Change Control Character From CTRL-n to CTRL-I
CTRL-I	D	Set Text Formatting Parameters to their default values
CTRL-I	M	Set Maintain Mode
CTRL-I	T	Set Transparent Mode
CTRL-I	V	Verify Operation

SCREEN COMMANDS

CTRL-I	I	or Enable Screen
CTRL-I	O	Echo
CTRL-I	nI	Enable Screen Echo and Set Line Length to n
CTRL-I	N	Disable Screen Echo and Set Line Length to Zero
CTRL-I	nN	Disable Screen Echo and Set Line Length to n
CTRL-I	s	Dump Present Screen to the Printer
CTRL-I	nS	Dump the Present Screen Starting at Line n
CTRL-I	W	Videx 80 Column Screen Dump
CTRL-I	nw	Dump the Present Videx 80-Column Screen Starting at Line n

PRINTER COMMUNICATION COMMANDS

CTRL-I	H	Leave the High Order bit Intact
CTRL-I	X	Strip Off the High Order Bit

GRAPHICS COMMANDS

CTRL-I	G	Print Primary Hi-Resolution Screen
CTRL-I	GD	Print Graphics Screen Double Size
CTRL-I	GE	Print Graphics Screen in Emphasized Print
CTRL-I	GI	Invert Graphics Screen
CTRL-I	GL	Print Graphics Screen at Left Margin
CTRL-I	GM	Dump the Mixed Hi-Res and Text Screen
CTRL-I	GR	Rotate the Graphics
CTRL-I	G2	Dump the Secondary Graphics Pages
CTRL-I	GS	Side by Side for Normal Picture or Top to Bottom for Rotated Pictures

COMMUNICATION MODE COMMANDS

Remember to complete each command by pressing the RETURN key.

In this summary, pressing the Space Bar is indicated by the symbol #, and n indicates a numerical value to be entered.

CTRL-A	B	Send Break Character
CTRL-A	Q	Exit Terminal Mode
CTRL-A	R	Reset SerialL
CTRL-A	T	Enter Terminal Mode
CTRL-A	V	Verify Operation
CTRL-A	E#E	Enable Screen Echo
CTRL-A	E#D	Disable Screen Echo
CTRL-A	F#E	Enable Find Keyboard
CTRL-A	F#D	Disable Find Keyboard
CTRL-A	L#E	Enable Linefeed
CTRL-A	L#D	Disable Linefeed
CTRL-A	M#E	Enable Linefeed Mask
CTRL-A	M#D	Disable Linefeed Mask
CTRL-A	S#E	Enable Special Characters
CTRL-A	S#D	Disable Special Characters
CTRL-A	nB	Set Baud Rate (See Table 2)
CTRL-A	nC	Carriage Return Delay
CTRL-A	nF	Form Feed Delay
CTRL-A	nL	Linefeed Delay
CTRL-A	nD	Data Format
CTRL-A	nP	Set Parity
CTRL-A	nS	Select Screen Shot
CTRL-A	nT	Translate Lowercase

10. TROUBLESHOOTING

By nature an RS232 port can be challenging to connect correctly. With this in mind; this section is an attempt to answer as many questions as possible.

The installation section of this manual can be a very good aid in achieving a proper setup. The following is a brief summary of things to remember when hooking up: serial RS232 devices.

1. seriALL should be installed in one of the following slots inside the Apple:

 SLOT 1 -if connected to printer
 SLOT 2 -if connected to a modem.
 SLOT 3 -if connected to terminal for Pascal or CP/M
2. Plug the seriALL transition cable in the connected marked PRINTER for printers or terminals; use the connector marked MODEM for modems.
3. The RS232 cable should be wired as pins 1 through 8 and pin 20, directly across with no twist arounds. (The auto baud rate answer feature used with modems, requires pin 12 wired to pin 12, and some printers require pin 11 to 11 for busy handshake.)
4. The data format has to be correctly set for baud rate, word length, stop bits and/or parity.
5. The printer, modem, plotter, terminal or whatever device is being connected must be ready to be used. Power to the device should be turned on, it must be online, and it may need paper installed or a telephone line hooked up to it.

The following troubleshooting chart describes specific problems, possible causes, and solutions. However, remember that sometimes a particular problem may have multiple causes.

PROBLEM	POSSIBLE CAUSE	SOLUTION															
Typed PR#n RETURN The cursor disappeared and the APPLE just hung up.	1a) The "CTS", "DSR", "DCD" or "HHS" inputs are busy.	1a) To begin with, forget about using Pascal or CP/M for a moment.															
	<table border="1"> <thead> <tr> <th></th> <th>MODEM</th> <th>PRINTER</th> </tr> </thead> <tbody> <tr> <td>CTS</td> <td>pin 5</td> <td>ok</td> </tr> <tr> <td>DSR</td> <td>pin 6</td> <td>ok</td> </tr> <tr> <td>DCD</td> <td>pin 8</td> <td>--</td> </tr> <tr> <td>HHS</td> <td>-----</td> <td>busy</td> </tr> </tbody> </table>		MODEM	PRINTER	CTS	pin 5	ok	DSR	pin 6	ok	DCD	pin 8	--	HHS	-----	busy	ONLY USE APPLE BASIC TO TROUBLESHOOT SETUP.
		MODEM	PRINTER														
	CTS	pin 5	ok														
DSR	pin 6	ok															
DCD	pin 8	--															
HHS	-----	busy															
1b) ETX/ACK chosen and the receiving device, i e. printer is not setup for it or not ready.	Unplug the printer or modem cable from the seriALL cable. Do a RESET on the Apple and try PR#n RETURN again.																
1c) Printer not ready, turned off, paper out or something.	If there is still no cursor, make sure a jumper is installed on HHS-1,2,3,4 or 5.																
1d) Modem off, not ready or not hooked up.	If still no cursor, make sure that S2-1,2,3,4 are NOT all ON. There must be some kind of correct baud rate set for the seriALL to work at all.																

PROBLEM	SOLUTION																		
For Reference- In RS232, the signal lines are identified in complementary groups as follows,	1b) ETX/ACK will not work without a printer or other device talking back to it.																		
seriALL PRINTER connector	For the moment, in order to determine if the board is working at all, please turn SW1-1 to the ON position for X-On/X-Off mode.																		
<table border="1"> <thead> <tr> <th>Pin</th> <th>Name</th> <th>Purpose</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FGND</td> <td>Frame Ground has a 100 ohm resistor going to Logic Ground. Not normally needed in order to make a setup mode.</td> </tr> <tr> <td>7</td> <td>LGND</td> <td>LGND Logic Ground, is attached to the digital logic ground of the APPLE computer. ABSOLUTELY, POSITIVELY MUST BE USED FOR ANY SETUP TO WORK AT ALL AND CORRECTLY.</td> </tr> <tr> <td>3</td> <td>TXD</td> <td>Transmit Data line. The seriALL outputs data to a printer, plotter or terminal on pin 3 TXD line.</td> </tr> <tr> <td>2</td> <td>RXD</td> <td>Receive Data line. The seriALL receives software handshake data from printers and plotters on pin 2 RXD line. Terminals send their data to the seriALL on this line.</td> </tr> <tr> <td>4</td> <td>RTS</td> <td>Request To Send is used by a printer to tell the seriALL card that it wants to know if its all right to send a software handshake sequence. The seriALL makes no use of his signal and automatically assumes the print is asking for this information. The seriALL also has a +12VDC 15K ohm pull-up resistor to this line. HHS-1 RTS can be used to handshake the output of the seriALL card.</td> </tr> </tbody> </table>	Pin	Name	Purpose	1	FGND	Frame Ground has a 100 ohm resistor going to Logic Ground. Not normally needed in order to make a setup mode.	7	LGND	LGND Logic Ground, is attached to the digital logic ground of the APPLE computer. ABSOLUTELY, POSITIVELY MUST BE USED FOR ANY SETUP TO WORK AT ALL AND CORRECTLY.	3	TXD	Transmit Data line. The seriALL outputs data to a printer, plotter or terminal on pin 3 TXD line.	2	RXD	Receive Data line. The seriALL receives software handshake data from printers and plotters on pin 2 RXD line. Terminals send their data to the seriALL on this line.	4	RTS	Request To Send is used by a printer to tell the seriALL card that it wants to know if its all right to send a software handshake sequence. The seriALL makes no use of his signal and automatically assumes the print is asking for this information. The seriALL also has a +12VDC 15K ohm pull-up resistor to this line. HHS-1 RTS can be used to handshake the output of the seriALL card.	Do a RESET one more time on the APPLE and try a PR#n RETURN command again.
Pin	Name	Purpose																	
1	FGND	Frame Ground has a 100 ohm resistor going to Logic Ground. Not normally needed in order to make a setup mode.																	
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	At this point, make ABSOLUTELY sure the PR#n RETURN command is being done CORRECTLY.																		
	To help make sure,																		
	A) Install seriALL in SLOT 1																		
	B) Unplug any output cable																		
	C) Put jumper on HHS-5																		
	D) Set SW1-1 to "ON"																		
	E) Set SW2-1,2,3,4 to "OFF"																		
	F) "RESET" or "CTRL and RESET" should show APPLE prompt].																		

5	CTS	Clear To Send is made to be always read, +12VDC 15K ohm pull-up HHS-2 CTS can be used to handshake the output of the serialL card.	G) Type after the prompt, PR#1 RETURN, where RETURN mean the RETURN key.
6&8	DSR DCD	Data Set Ready & Data Carrier Detect are tied together and are controllable by the serialL card as DTR. When the serialL is activated, this line is set ready, +12VDC RS232 Driver output.	If the Apple is still hung up, the serialL board is not functioning correctly. Please call Practical Peripherals, Inc. customer service at (818) 991-8200, for further assistance.
11	SSD	Secondary Signal Detect This is sometimes used as the hardware handshake line from a few printers. A possible type of printer is an OKIDATA. Watch out because even though they say a line goes busy when the printer buffer is full, quite often in fact, they do nothing. HHS-3 SSD has +12VDC 15K pull-up resistor for ready condition.	1c) Correct printer condition. 1d) Correct modem condition.
19	RCH	Reverse Channel Most of the time used by NEC type printers to do hardware handshaking back to the serialL card. HHS-4 RCH has +12VDC 15K pull-up resistor for ready condition.	
20	DTR	Data Terminal Ready This is the best candidate for any output handshaking situation. HHS-5 DTR has +12VDC 15K pull-up resistor for ready condition.	

PROBLEM	POSSIBLE CAUSE	SOLUTION															
2) Doing PR#n RETURN command only works if serialL cable is not plugged in, otherwise, the APPLE just hangs and the cursor just disappear.	2a) The "CTS", "DSR", "DCD" or "HHS" inputs are busy. <table border="1"> <thead> <tr> <th></th> <th>MODEM</th> <th>PRINTER</th> </tr> </thead> <tbody> <tr> <td>CTS</td> <td>pin 5</td> <td>ok</td> </tr> <tr> <td>DSR</td> <td>pin 6</td> <td>ok</td> </tr> <tr> <td>DCD</td> <td>pin 8</td> <td>ok</td> </tr> <tr> <td>HHS</td> <td>-----</td> <td>busy</td> </tr> </tbody> </table>		MODEM	PRINTER	CTS	pin 5	ok	DSR	pin 6	ok	DCD	pin 8	ok	HHS	-----	busy	2a) If the problem is because "CTS", "DSR", "DCD" or "HHS" inputs are busy, then the following technique will determine what's wrong. A) Plug the serialL cable to either serialL MODEM or serialL PRINTER connector. Make sure that the cable has its colored wire at the top of the serialL board. The cable will face out the back of the APPLE when plugged on correctly. B) Do the serialL card's self-test command. For PRINTER MODE, SW1-2 OFF type CTRL-I V. For COMMUNICATION MODE, SW1-2 ON type CTRL-A V. This should be done with a 40-column screen on the Apple.
	MODEM	PRINTER															
CTS	pin 5	ok															
DSR	pin 6	ok															
DCD	pin 8	ok															
HHS	-----	busy															
	2b) ETX/ACK chosen and the receiving device, ie. printer is not setup for it or not ready.																
	2c) Printer not ready, turned off, paper out or something.																
	2d) Modem off, not ready or not hooked up.																

PROBLEM

For Reference-
In RS232, the signal lines are identified
in complementary groups as follows,

serialL MODEM connector

Pin	Name	Purpose
1	FGND	Frame Ground has a 100 ohm resistor going to Logic Ground. Not normally needed in order to make a setup mode.
7	LGND	LGND Logic Ground, is attached to the digital logic ground of the APPLE computer. ABSOLUTELY, POSITIVELY MUST BE USED FOR ANY SETUP TO WORK AT ALL AND CORRECTLY.
2	TXD	Transmit Data line. For modems this is the line that the serialL outputs data over to it.
3	RXD	Receive Data line. For modems this is the line that the serialL sends data to the serialL card.
4	RTS	Request To Send is used in combination with Clear To Send for modems. The serialL is asking the modem if it is alright for the serialL to send data to it.
5	CTS	Clear To Send is a signal coming from the modem to the serialL card, telling the serialL card that its alright to send data to the modem. Ready or OK is a +12VDC signal from the modem. The actual minimum is +3VDC.
6	DSR	Data Set Ready is a signal from the modem to the serialL card, tell the serialL card that the modem is ready. It commonly indicates that there is power turned on at the modem.
20	DTR	Data Terminal Ready is a signal from the serialL card going to the modem telling the modem that the serialL is ready to receive data from the modem. Normally, with modems, this line is always read. The serialL would do software handshaking such as X-On/X-Off or ETX/ACK over a telephone line.
8	DCD	Data Carrier Detect is a signal coming from the modem to the serialL card telling the serialL card that the modem has established a telephone connection. The carrier of the modem at the other end of the telephone line has been detected.
12	HSP	Hi-Speed indicator from the modem is +12VDC when the modem has answered a telephone call and has established a 1200 baud connection. This will only be found on 1200 baud type of smart modems.

SOLUTION

C) At top of the screen, and, there will be a display showing the conditions of the X-On/X-Off, CTS, DSR, HHS RS232 status lines.

Plug the printer, modem, or whatever cable onto the end of the SerialL cable sticking out of the Apple. This must be done with the serialL card in its self-test mode.

Observe the state of the X-On/X-Off, CTS, DSR, HHS RS232 status lines. With the device ready, all of the above should be a normal display not inverse. The ones that are showing in inverse are the reason the card is getting hung up.

D) If HHS is the problem then move HHS jumper to a different position and see from the display at the top of the Apple screen if the condition is corrected. Try all the possible selections.

If CTS, DSR, or DCD are wrong, then determine from the manual of the printer, modem, plotter or whatever, what might be causing the problem. For the serialL part, it will have RTS and DTR signal lines in a ready state (+12VDC) condition when it's active. From the way the serialL was designed, it is highly unlikely that it's sending a wrong RS232 signal to the serial device attached to it.

There have been a couple of very rare cases where an older printer outputted an inverted busy status. At this time, the

correct solution to this problem is to slow down the baud rate. An additional solution is to seek relief from the manufacturer of the peripheral.

A final, last ditch, nothing else to try solution, would be to disconnect the offending wire from the cable and see if the setup now works.

PROBLEM	POSSIBLE CAUSE	SOLUTION
3) Printer prints "xxxxffffbbbbb ... " type pattern, instead of "ABCDE... " pattern. that its supposed to.	3) Most likely problem is the serialL is set of for the wrong BAUD RATE.	3) Check for the correct BAUD RATE required by the printer, modem, plotter or whatever type device is attached to the serialL.
May also do lots of linefeeds and form.00 feeds.		Check the SW2-1,2,3,4 switch settings of the serialL card for correct BAUD RATE setting. The serialL self test, in PRINTER MODE type CTRL-I V. In COMMUNICATION MODE CTRL-A V will display all the data parameters including the BAUD RATE

PROBLEM	POSSIBLE CAUSE	SOLUTION
4) Some of the print out is OK, but from . time to time, parts of it are missing or all chopped up.	4) The handshake back to the serialL is not correct.	4a) This problem is most likely with the serialL hooked up to a printer.

NOTE: Use the serialL Verify mode.
 From Apple prompt],
 From PRINTER mode SW1-2, OFF, type, CTRL-I V.
 From COMMUNICATIONS mode SW1-2, ON, type CTRL-A V.

The Apple screen will show all the data format parameters and at the top show all of the handshake statuses. When the printer, plotter, terminal, or modem link are correctly handshaking, these line swill toggle the inverse of the proper handshake status display.

From the printer manual, look up where they talk about their RS232 signal lines. Usually, they have a list of the RS232 signal lines along with a one or two line description of how the printer uses them.

Normally, they will have pin 20 described as DTR, goes busy, mark condition, when the printer buffer is almost full, paper empty occurs, or printer is set offline. From this, a jumper should be placed on the serialL HHS-5 position.

PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>With the display active, working on getting whatever is hooked up to the serialL card handshaking properly. Don't get tricked into using ETX/ACK when the printer expecting X-On/X-Off (DC1/DC3).</p> <p>NOTE: The serialL was designed with normal RS232 convention of READY is SPACE condition or +12VDC BUSY is MARK condition or -12VDC.</p> <p>The serialL START bit is a SPACE condition of +12VDC and STOP bits are MARK condition of -12VDC.</p>		<p>4b) In the case of Diablo printers, even though they lead one to believe that DTR toggles when the printer is busy, this is not usually true. To have the Diablo do this, one has to get into the logic boards of the Diablo and move a jumper from one pin to another.</p> <p>With Diablo printers, just allow DC1/DC3, the exact same as X-On/X-Off software handshaking to control the data flow.</p> <p>4c) NEC type printers use pin 19, RCH, Reverse CHannel for hardware handshaking. Choose HHS-4 for correct handshaking.</p>

PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>5) Printer skips every other line.</p> <p>Printer does double line spacing.</p> <p>There is a blank line between line of printout that not supported to be there.</p> <p>Extra linefeed is happening.</p>	<p>5a) SW1-7, add linefeed after carriage return switch may be in the ON position.</p>	<p>5a) Set SW1-7 to the OFF position.</p> <p>5b) Do CTRL-A L)inefeed (Space) D)isable command to turn off this mode.</p> <p>5c) In PRINTER mode, type CTRL-I K)ill linefeed command.</p>

PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>6) Apple works one minute and not the next.</p> <p>Apple is no performing intermittently.</p>	<p>6) SW1-8 is "ON", IRQ enable switch is active.</p> <p>The UART is causing the IRQ interrupt to occur in the APPLE and there is no proper program to support it.</p> <p>The UART generate an IRQ type interrupt whenever DSR or DCD change states.</p>	<p>6a) Turn SW1-8 OFF so that the UART interrupt does not get through to the Apple.</p> <p>6b) Write a machine language routine to handle the IRQ interrupt that is happening.</p> <p>The IRQ interrupt would be useful for application that are doing multiple task at the same time.</p> <p>At a machine language level, Transmit register empty, Receive register full, DSR and or DCD changed state statues can</p>

all be enabled to cause an IRQ interrupt.

Remember to read the UART status register during the IRQ routine so the interrupt doesn't get stuck in a endless loop. Reading the UART status register clears the UART IQ output.

PROBLEM	POSSIBLE CAUSE	SOLUTION
7) Pascal or CP/M kill the Apple when booted. Apple died when booted up. No Apple screen display and the keyboard doesn't work.	7) The serialAll card is plugged into SLOT 3 and Pascal or CP/M are trying to use an external terminal instead of APPLE.	7a) Only use SLOT 3 for Pascal or CP /M when a external terminal is properly attached to the serialAll and using an Apple II or Apple II+ computer. 7b) Apple //e already uses SLOT 3 for its own 80 column card. so don't use it for the serialAll.
8) serialAll doesn't work in SLOT 3 of an Apple //e	8) Apple //e is using an 80-column card in it's SLOT 0.	8) Don't use SLOT 3 of an Apple //e for any type of card when using an 80-column card in SLOT 0. The electronics of the Apple //e turn of the control signals to SLOT 3 when an 80 column card is plugged into it.
9) Turn on serialAll card and nothing shows up on the APPLE screen even though the serialAll output is working OK. Can't see the things being typed on the Apple Screen.	9) The serialAll screen echo features are not enabled.	9a) in PRINTER mode, use a CTRL-I I command to enable screen echo. 9b) in COMMUNICATION or DUMB TERMINAL mode, use the CTRL-A E)cho (Space) E)Enable command.
10) DOUBLE characters are appearing on the APPLE screen. "DDoouubbllee" instead of "Double"..	10) Can only be happening in COMMUNICATIONS or TERMINAL mode, and is probably because FULL DUPLEX is enabled for both the serialAll and modem link.	10) Use E)cho D)isable command, CTRL-A E)cho (Space) D)isable to get rid of the second character.

PROBLEM	POSSIBLE CAUSE	SOLUTION
11) APPLE screen is skipping lines. There is an extra blank line added after every input line.	11) The modem link is sending a Carriage Return plus Linefeed sequence to the APPLE.	11) Use M(ask E(nable command, CTRL-A M)ask (Space) E(nable to mask out the linefeed character.

PROBLEM	POSSIBLE CAUSE	SOLUTION
12) Keyboard on the Apple seems like its not working.	12a) Echo is off and the keyboard output is just not being seen. 12b) Wrong IN# command.	12a) Use E)cho E(nable command, CTRL-A E)cho (Space) E(nable command, to get the screen output again. 12b) Try IN#0 RETURN to get the Apple keyboard working again.

PROBLEM	POSSIBLE CAUSE	SOLUTION
13) Apple losing input characters.	13) The input BAUD RATE is probably greater than 1200 baud.	13a) The seriALL will operate in the DUMB TERMINAL mode at baud rates up through 1200 baud. This is possible, because a input buffer has been programmed to buffer the input characters during APPLE 40 and APPLE //e 80 column screen scrolls. The seriALL prom contains the programs necessary to do the APPLE 40 and APPLE //e screen scrolls. It does not use those provided by APPLE in their <i>note: content after "their" is cut-off on paper.</i>

PROBLEM	POSSIBLE CAUSE	SOLUTION
14) CRASHES a machine language program.	14) seriALL TERMINAL mode uses the Key input buffer for input character buffering. The input buffer starts at \$2FF hex and goes down towards \$200.	14) Adjust program, or don't use seriALL TERMINAL mode at 1200 baud.

PROBLEM	POSSIBLE CAUSE	SOLUTION
15) Graphics don't work.	15)Wrong switch settings on S-1 (1-3, 1-4, 1-5).	15) See installation section for correct switch settings. Use CTRL-I V or CTRL-A V command to see current printer selection

11. TECHNICAL DESCRIPTION

FIRMWARE ENTRY POINTS

There are three distinct sets of entry points to the serial card firmware. These entry points can be used by the machine language programmer who wants to take advantage of the many powerful, built-in text, graphics dump and communications features.

BASIC Entry Points

The first set of entry points is normally used by Applesoft or Integer BASIC, and Apple 00S, and are defined as follows:

\$Cn00	Initialization	CSW (\$36,\$37) and/or KSW (\$38,\$39) must point to \$Cn00. If CSW points to \$Cn00 the character in the A-register will be output.
\$Cn05	Input	The character is returned in the A-register. This entry point is not valid in printer mode.
\$Cn07	Output	Enter with the character to be output in the A-register. The X and Y registers will be unchanged in all of the above entry points. By using these entry points, serialALL assumes it is in BASIC, and will use the BASIC power-on defaults. These are: automatic line feed after carriage return, video echo enabled, and if printer mode is selected, CTRL-I for the command character. If Communications mode is selected, the command character will be CTRL-A.

Pascal 1.0 Entry Points

The second set of entry points is used by Pascal version 1.0. Since they reside in the common ROM space, the common ROM must first be turned off by accessing \$CFFF, then SerIALL's common ROM turned on by accessing any location in the \$Cnxx range. The X-register must contain \$Cn, and the Y-register must contain \$n0 on entry, where n is the slot# (1-7) which contains serIALL.

\$C800	Initialization	On exit, the A-, X-, and Y-registers are unchanged.
\$C84D	Input	The character is returned in the A-register with high bit cleared.
\$C9AA	Output	Enter with the character to be output in the A-register.

Pascal 1.1 and CP/M Entry Points

The third set of firmware entry points is used by both Pascal version 1.1 and Apple CP /M. Unlike the Pascal 1.0 entry points, these are accessed indirectly.

The actual entry point address is calculated by adding the contents of the address specified below to \$Cn00.

\$Cn0D	Initialization	On exit the X-register contains 0.
\$Cn0E	Input	The character is returned in the A-register. The X-register is non-zero if an error occurred.
\$Cn0F	Output	Enter with the character to be output in the A-register. The X-register is non-zero if an error occurred.
\$Cn10	Status	<p>On entry, the A-register should contain 0 to request input status, or 1 to request output status. For input, the carry is set if data is available. For output, carry set indicates ready for output.</p> <p>The above entry points require that the X-register contain \$Cn and the Y-register contain \$n0 on entry, where n is the slot which contains seriALL.</p> <p>The actual output entry point, for example, would be calculated by adding the contents of \$Cn0F, which is \$1A, to \$Cn00. Therefore, if seriALL was in slot 2, then the output entry point would be \$C21A.</p> <p>By using either the Pascal 1.0 or Pascal 1.1-CP/M entry points, seriALL uses the Pascal-CP/M power-on defaults. These are: no automatic line feed after carriage return, video echo disabled, and if printer mode is selected, both CTRL-Y and CTRL-] for the command character. If Communication mode is selected, the command character will be CTRL-A.</p>

PERIPHERAL I/O SPACE

The peripheral card I/O defined by Apple to be the 16 locations from \$C000+\$n0 thru \$C00F+\$n0 where n is the slot which contains the peripheral card.

These are locations the peripheral I/O used by serialL:

\$C081+\$n0	INPUT 1	Bit 0 -- XON-XOFF/ETX-ACK (0= XON) Bit 1 -- Com/Printer mode (0=Com) Bit 2,3 -- Unused, Always 1 Bit 4 thru Bit7 -- Baud rate
\$C082+\$n0	INPUT 2	Bit 0 Unused, Always 1 Bit 1 <LF> after <CR> Bit 2 Parity enable Bit 3 Parity odd/even (0=odd) Bit 4 Unused, Always 1 Bit 5 Word length (0=8bit, 1=7bit) Bit 6 Unused, Always 1 Bit 7 Stop bits (0=1bit, 1=2bits)
\$C084+\$n0	INPUT 4	Bit 0,1 Unused, Always 1 Bit 2 thru Bit 4 Graphics printer Bit 5 300/1200 Auto baud rate Bit 6 High speed (modem only) Bit 7 Raw RS-232 data

Please read "Controlling the ACIA" for bit definitions of the following ACIA registers.

\$C088+\$n0 READ/WRITE
\$C089+\$n0 STATUS/RESET
\$C08A+\$n0 COMMAND
\$C08B+\$n0 CONTROL

CONTROLLING THE ACIA

The Asynchronous Communications Interface Adapter (ACIA) used in seriALL is the 6551.

Interface to the ACIA is accomplished through the peripheral card I/O locations.

Use of the READ/WRITE registers is implicit. That is, performing a read operation at $\$C088+\$n0$ will read the Receive Data Register (RDR), and a write operation at the same address will write to the Transmit Data Register (TDR).

A read operation at location $\$C089+\$n0$ will read the STATUS register. The STATUS register bits are defined as follows:

Bit 0	Parity error
Bit 1	Framing error
Bit 2	Data overrun
Bit 3	RDR full
Bit 4	TDR empty
Bit 5	Data Carrier Detect (DCD)
Bit 6	Data Set Ready (DSR)
Bit 7	Interrupt (IRQ)

A write operation to $\$C089+\$n0$ will RESET the ACIA.

The COMMAND register can be written to or read from at address \$C08A+\$n0. COMMAND register bits are defined as follows:

Bit 0 Enable receiver
 Bit 1 IRQ interrupt disable

Bit 3	Bit 2	XMIT IRQ	RTS Level	XMTR
0	0	Disabled	High	Off
0	1	Enabled	Low	On
1	0	Disabled	Low	On
1	1	Disabled	Low	BRK

Bit 4 Echo enable Bit5 Parity enable

Bit 7	Bit 6	Parity
0	0	Odd
0	1	Even
1	0	Mark
1	1	Space

The CONTROL register can be written to or read from at address \$C08A+\$n0. CONTROL register bits are defined as follows:

Bit 3	Bit 2	Bit 1	Bit 0	Baud Rate
0	0	0	1	50
0	0	1	0	75
0	0	1	1	110
0	1	0	0	135
0	1	0	1	150
0	1	1	0	300
0	1	1	1	600
1	0	0	0	1200
1	0	0	1	1800
1	0	1	0	2400
1	0	1	1	3600
1	1	0	0	4800
1	1	0	1	7200
1	1	1	0	9600
1	1	1	1	19,200

Bit 4 Clock source (should be 1)

Bit 6	Bit 5	Parity
0	0	8
0	1	7
1	0	6
1	1	5

Bit 7 Stop bit: 1/2 (0 = 1bit)

For a more detailed description of the 6551, refer to the Synertek data manual.

MACHINE LANGUAGE DRIVER

The following routines are using serialL (6551) directly. assume that machine language given as examples of by accessing the ACIA All examples serialL is in slot 1.

The first example demonstrates how to initialize the ACIA. This routine first reset's the ACIA, then programs it with the following parameters:

No parity
8-bit word
1 stop bit
9600 baud

```

1000 RESET      .EQ $C099
1010 COMMAND    .EQ $C09A
1020 CONTROL    .EQ $C09B
1030
1040 CHARACTER.OUT
1050 INIT.ACIA
1060
800-8D 99 C0   1070      STA RESET
1080
803-A9 0B      1090      LDA #$0B
805-8D 9A C0   1100      STA COMMAND
1110
808-A9 1E      1120      LDA #$1E
80A-8D 9B C0   1130      STA CONTROL
1140
80D-60         1150      RTS
```

The next example is typical of routines to output data through seriALL. Enter this routine with the data to be output in the A-register.

```

1000 STATUS      .EQ $C099
1010 WRITE       .EQ $C098
1020
1030
1040 CHARACTER.OUT
800-48          1060 PHA (DATA)
1070
801-AD 99 C0   1080 .0 LDA STATUS
804-29 70      1090 AND #$70
806-C9 10      1100 CMP #$10
808-D0 F7      1110 BNE .0
1120
80A-68         1130 PLA (DATA)
80B-8D 98 C0   1140 STA WRITE
1150
80E-60         1160 RTS

```

This last example waits for a character to be input by the seriALL, and returns it in the A-register.

```

1000 STATUS      .EQ $C099
1010 READ        .EQ $C098
1020
1030
1040 CHARACTER IN
1050
800-AD 99 C0   1060 .0 LDA STATUS
803-29 08      1070 AND #$08
805-F0 F9      1080 BEQ .0
1090
807-AD 98 C0   1100 LDA READ
1110
1120          RTS

```

Figure 2 show the seriALL schematic.

APPENDIX

Anadex 9000, 9000A, 9500, and 9500A

Serial setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON Anadex Graphics
-4 OFF Anadex Graphics
-5 ON Anadex Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 ON 9600 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug cable on PRINTER

Anadex 9000, 9000A, 9500, and 9500A setup is as follows:

S 1-1 ON Serial Interface
-2 OFF 13.2 inch line width
-3 ON 9600 Baud
-4 ON 9600 Baud
-5 ON 9600 Baud
-6 ON 9600 Baud
-7 ON 8 DATA bits
-8 OFF 1 STOP bit
-9 OFF NO PARITY
-10 OFF NO PARITY

Anadex 9000, 9500 series continued

Anadex 9000, 9500 series setup continued:

S 2-1 OFF No skip over perforation
-2 OFF No skip over perforation
-3 OFF Not Used
-4 OFF 6 lines/inch
-5 ON XON/XOFF (DC1/DC3)
-6 OFF XON/XOFF (DC1/DC3)
-7 OFF Wrap around overlength
-8 OFF No LF after CR

Anadex Wordscribe printer

Serial setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON Anadex Graphics
-4 OFF Anadex Graphics
-5 ON Anadex Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud
-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY
HHS-5 pin 20 DTR, Data Terminal Ready
Plug cable on PRINTER

Anadex Wordscribe setup is as follows:

SW1-1 ON 19,200 Baud
-2 ON 19,200 Baud
-3 ON 19,200 Baud
-4 ON 19,200 Baud
-5 OFF NO PARITY
-6 OFF NO PARITY
-7 OFF NO PARITY
-8 OFF 1 STOP bit
SW2-1 ON Serial Interface
-2 OFF XON/XOFF (DC1/DC3)
-3 OFF XON/XOFF (DC1/DC3)
-4 ON XON/XOFF (DC1/DC3)
-5 OFF No output protocol
-6 OFF No Output protocol
-7 ON 8 DATA bits

Apple Imagewriter "FACTORY SETTING"

Seriall FACTORY SETTING defaults:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON Apple Graphics
-4 OFF Apple Graphics
-5 OFF Apple Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 ON 9600 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug cable on PRINTER

Apple Imagewriter FACTORY SETTING:

S 1-1 OPEN USA character set
-2 OPEN USA character set
-3 OPEN USA character set
-4 OPEN 66 lines/page
-5 OPEN 8 DATA bits
-6 OPEN Elite character pitch
-7 OPEN Elite character pitch
-8 OPEN No LF after CR

S 2-1 CLOSED 9600 Baud
-2 CLOSED 9600 Baud
-3 OPEN Data Terminal Ready HHS
-4 OPEN Not Used

COMREX Letter Quality Printer

Seriall setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF Printer type, Don't care
-4 OFF Printer Type, Don't care
-5 OFF Printer Type, Don't care
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 OFF 2 STOP bits
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

COMREX HHS-5 pin 20, DTR
Plug cable on "PRINTER"

COMREX setup is as follows:

SW#-1 OFF 1200 Baud
-2 OFF 1200 Baud
-3 OFF 1200 Baud
-4 ON 1200 Baud
-5 OFF 1200 Baud
-6 OFF 1200 Baud
-7 OFF 8 DATA bits
-8 OFF NO PARITY

Diablo Letter Quality Printers

Serial setup for all types of Diablos:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF Printer type, Don't care
-4 OFF Printer Type, Don't care
-5 OFF Printer Type, Don't care
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

Diablos HHS-5 pin 20, DTR
Plug cable on "PRINTER"

Diablo 620 SPI

SW -1 LEFT(ON) 1200 Baud
-2 RIGHT(OFF) NO PARITY
-3 RIGHT(OFF) NO PARITY
-4 RIGHT(OFF) DC1/DC3 (XON?XOFF)
-5 RIGHT(OFF) No Self Test
-6 RIGHT(OFF) No LF after CR
-7 RIGHT(OFF) 11 inch forms length
-8 LEFT(ON) 1200 Baud

Diablo Letter Quality Printers cont.

Diablo 630 API/SPI ECS setup:

LCPN control panel

RS232 Serial Interface

SW -4 OFF(DOWN) DC1/DC3 (XON/XOFF)
-5 ON (UP) 1200 Baud
-6 OFF(DOWN) NO PARITY
-7 OFF(DOWN) NO PARITY

FPCPN control panel (HPR05 PCB)

RS232 Serial Interface

LEFT SWITCH

SW -1 OFF(DOWN) ECS disable
-2 OFF(DOWN) Not Used
-3 ON (UP) 8 DATA bits
-4 OFF(DOWN) Not Used
-5 OFF(DOWN) English
-6 OFF(DOWN) English
-7 OFF(DOWN) English

RIGHT SWITCH

SW -1 OFF(DOWN) No LF after CR
-2 OFF(DOWN) 1200 Baud
-3 ON (UP) 1200 Baud
-4 OFF(DOWN) Not Used
-5 OFF(DOWN) NO PARITY
-6 OFF(DOWN) NO PARITY
-7 OFF(DOWN) DC1/DC3 (XON/XOFF)

Diablo Letter Quality Printers cont.

Diablo 630 setup:

SWITCH MODULE A66

(without control panel)

SW -1 LEFT(OFF) No Self Test
-2 RIGHT(ON) DC1/DC3 (XON/XOFF)
-3 RIGHT(ON) TEN PITCH
-4 LEFT(OFF) NO PARITY
-5 LEFT(OFF) NO PARITY
-6 RIGHT(ON) 1200 Baud
-7 LEFT(OFF) 1200 Baud

(with control panel)

SW -1 LEFT(OFF) ETX/ACK disabled
-2 RIGHT(ON) DC1/DC3 (XON/XOFF)
-3 LEFT(OFF) 2400 Baud
-4 LEFT(OFF) 2400 Baud
-5 RIGHT(ON) 2400 Baud

NOTE: Because of 2400 Baud,
Serial SW2-1 OFF, SW2-2 ON,
SW2-3 OFF, SW2-3 ON 2400 Baud

NOTE: Switch module A66 is inside the
Diablo printer on the top of the logic
board closest to the front of the
printer. It is normally not user
servicable.

Switches under the access cover, Right-Hand Dip Switch:

SW -1 OFF Half-duplex ASCII mode
-2 OFF NO PARITY
-3 OFF 1200 Baud (30)
-4 OFF Unused
-5 ON 1200 Baud (120)
-6 OFF NO PARITY
-7 OFF Paper out sensing enabled

Diablo Letter Quality Printers cont.

Diablo 1640/1650 (OEM) setup:

HPR04 Switch Definition
A25-1 OFF No Self Test
-2 ON 10 cpi (pitch)
-3 ON DC1/DC3 (XON/XOFF)
-4 OFF NO PARITY
-5 OFF NO PARITY
-6 ON Half Duplex
-7 ON 1200 Baud
-8 OFF 1200 Baud

IF there is an Operator Control Panel installed on the front outside of the printer, the setup is as follows:

HPR04 Switch Definition
A25-1 XXX Enhanced 2741 option
-2 OFF ETX/ACK protocol disabled
-3 ON DC1/DC3 (XON/XOFF)
-4 XXX Corr/PTTC 2741 option
-5 OFF Not Used, see front panel
-6 OFF Not Used, see front panel
-7 OFF Not Used, see front panel
-8 OFF Not Used, see front panel

OPERATOR CONTROL PANEL, front panel
PARITY OFF NO PARITY
PARITY OFF NO PARITY
H DUPLEX ON HALF DUPLEX
SPEED 120 ON 1200 Baud
SPEED 30 OFF 1200 Baud
AUTO LF OFF No LF after CR

IDS 460/560, Paper Tiger, Printers

SerialL setup:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF IDS Graphics
-4 OFF IDS Graphics
-5 ON IDS Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 ON 9600 Baud
-5 OFF 2 STOP bits
-6 OFF 7 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

IDS HHS-5, pin 20, DTR
Plug cable on "PRINTER"

IDS 460/560 is setup as follows:

S3 -1 ON 11 inch form size
-2 OFF 11 inch form size
-3 ON 11 inch form size
-4 ON 9600 Baud
-5 OFF 9600 Baud
-6 ON NO PARITY
-7 OFF NO PARITY

S4 -1 OFF 10 cpi (pitch)
-2 ON 10 cpi (pitch)
-3 OFF 6 lines/inch
-4 OFF No skip over perforation
-5 OFF No LF after CR
-6 OFF Fixed character spacing
-7 ON Enable Graphics printing

Mannesman Talley MT160, MT180

SerialL setup for Mannesman Talley:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF Man Tal Graphics
-4 OFF Man Tal Graphics
-5 OFF Man Tal Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud
-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug cable on PRINTER

Mannesman Talley serial setup:

To setup MT160, or MT180 serial
parameters,
Press and Hold "YES", press "NO"
momentarily.

The printer will print the following
query:

RESTORE DEFAULTS? NO
CHANGE FORM LENGTH? NO
CHANGE PRINT FORMAT? NO
CHANGE CHAR SET? NO
SLASH ZERO? NO
CHANGE AUX CODE SET? NO

Mannesman Talley MT160, MT180

**Mannesman Talley serial setup
continued:**

CHANGE COMM CONFIG? YES
CHANGE BUFFER SIZE? NO
PARALLEL? NO
SERIAL? NO
CHANGE BAUD? NO
9600? YES
CHANGE NO. DATA BITS? YES
7? NO
8? YES
CHANGE PARTIY? YES
NONE? YES
CHANGE BUSY? NO
CHANGE COMM PROTOCOL? YES
NONE? NO
XON/XOFF? YES
END MENU

MBIS + MODEM

SerialL setup for MBIS with MODEM:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 ON Communications Mode
-3 OFF No Printer type
-4 OFF No Printer type
-5 OFF No Printer type
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud
-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug SerialL cable on "MODEM"

MBIS setup:

INPUT CONFIGURATION HEADER

H1-1 OPEN TXD pin 3
-2 OPEN RCD pin 2
-3 JUMPERED TXD pin 2
-4 JUMPERED RCD pin 3
-5 OPEN CTS pin 5
-6 OPEN SSD pin 11
-7 OPEN RCH pin 19
-8 JUMPERED DTR pin 20, HHS

MBIS + MODEM continued

MBIS setup continued:

OUTPUT CONFIGURATION HEADER

H2-1 OPEN TXD pin 3
-2 OPEN RCD pin 2
-3 JUMPERED TXD pin 2
-4 JUMPERED RCD pin 3
-5 OPEN CTS pin 5
-6 OPEN SSD pin 11
-7 OPEN RCH pin 19
-8 JUMPERED DTR pin 20 HHS

INPUT BAUD RATE SELECT

H3-1 through 8 all OPEN
-9 JUMPERED 19,2000 Baud

OUTPUT BAUD RATE SELECT

Depends on MODEM and transmission speed
Suggest 300 baud for normal modems,
Suggest 1200 baud for smart modems.

H4-3 JUMPERED 300 Baud
-5 JUMPERED 1200 Baud

CONFIGURATION SWITCHES

SW1-1 ON NO PARITY
-2 ON 1 STOP bit
-3 OFF 8 DATA bits
-4 ON Pause default off
-5 OFF Input Software Handshake
-6 OFF Output Software Handshake

SW2-1 ON Normal buffer hyst.

-2 ON NO PARITY
-3 ON Not Used
-4 ON Not Used
-5 OFF Reverse Channel Active
-6 ON Single Sheet Feed OFF

MBIS + PRINTER

SerialL setup for MBIS with PRINTER:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 XXX Depends on type of
-4 XXX printer hooked up to
-5 XXX the output of MBIS.
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud

-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug SerialL cable on "PRINTER"

MBIS setup:

INPUT CONFIGURATION HEADER

H1-1 JUMPERED TXD pin 3
-2 JUMPERED RCD pin 2
-3 OPEN TXD pin 2
-4 OPEN RCD pin 3
-5 OPEN CTS pin 5
-6 OPEN SSD pin 11
-7 OPEN RCH pin 19
-8 JUMPERED DTR pin 20, HHS

MBIS + PRINTER continued

MBIS setup continued:

OUTPUT CONFIGURATION HEADER

H2-1 JUMPED TXD pin 3
-2 JUMPED RCD pin 2
-3 OPEN TXD pin 2
-4 OPEN RCD pin 3
-5 OPEN CTS pin 5
-6 OPEN SSD pin 11
-7 OPEN RCH pin 19
-8 JUMPED DTR pin 20 HHS

INPUT BAUD RATE SELECT

H3-1 through 8 all OPEN
-9 JUMPED 19,2000 Baud

OUTPUT BAUD RATE SELECT

Depends entirely on the printer.
Suggest 1200 baud for Daisywheel,
Suggest 9600 baud for Dot Matrix.

H4-5 JUMPED 1200 Baud
-8 JUMPED 9600 Baud

CONFIGURATION SWITCHES

SW1-1 ON NO PARITY
-2 ON 1 STOP bit
-3 OFF 8 DATA bits
-4 ON Pause default off
-5 OFF Input Software Handshake
-6 OFF Output Software Handshake

SW2-1 ON Normal buffer hyst.
-2 ON NO PARITY
-3 ON Not Used
-4 ON Not Used
-5 ON Reverse Channel OFF
-6 ON Single Sheet Feed OFF

MBS-8K or MBS-32/64K

Serial setup for both:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON EPSON Graphics
-4 ON EPSON Graphics
-5 ON EPSON Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud
-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready

MBS-8K setup:

S1-Handshaking Signals
B JUMPED XON/XOFF (DC1/DC3)
-B OPEN
X JUMPED
W JUMPED

S2- Data Word Format
WL OPEN 8 DATA bits
EP OPEN NO PARITY
SB JUMPED 1 STOP bit
PI OPEN NO PARITY

S3-Baud Rate Selection

-1 through -6 all OPEN
-7 JUMPED 19,200 Baud

MBS-8K or MBS-32/64K continued

MBS-32/64K setup:

DATA IN/OUT
H2-1 OPEN
-2 OPEN
-3 JUMPERED Send Software HS
to Serial pin 2
-4 JUMPERED Receive Data from
Serial pin 3

HARDWARE HANDSHAKING

H3-1 JUMPERED DTR pin 20
-2 through -6 all OPEN

BAUD RATE

H4-1 through -6 all OPEN
-7 JUMPERED 19,200 Baud

CONFIGURATION SWITCH

SW1-1 OFF XON/XOFF (DC1/DC3)
-2 OFF Normal buffer hyst.
-3 ON Printer error report
-4 OFF Normal Busy
-5 OFF NO PARITY
-6 OFF NO PARITY
-7 OFF 8 DATA bits
-8 ON 1 STOP bit

MODEM, normal 300 baud modem

Serial setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 ON Communications Mode
-3 OFF No Printer type
-4 OFF No Printer type
-5 OFF No Printer type
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 ON 300 Baud
-2 OFF 300 Baud
-3 OFF 300 Baud
-4 ON 300 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug Serial cable on "MODEM"

NOTE: See "CTRL-A" Communications
Mode command set. These commands
allow the user to make changes when
modem is being used.

MODEM, smart 1200 baud type modem

Serial setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 ON Communications Mode
-3 OFF No Printer type
-4 OFF No Printer type
-5 OFF No Printer type
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug Serial cable on "MODEM"

NOTE: See "CTRL-A" Communications
Mode command set. These commands
allow the user to make changes when
modem is being used.

**MODEM, smart 1200 baud type modem
used for ANSWER mode only**

Serial setup is as follows:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 ON Communications Mode
-3 OFF No Printer type
-4 OFF No Printer type
-5 OFF No Printer type
-6 ON Auto 300/1200 Baud ***
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-5 pin 20 DTR, Data Terminal Ready
Plug Serial cable on "MODEM"

NOTE: The cable to the modem will
require pin 12, HSP, installed. It
has been our experience, that mode
RS232-C cable purchased from stores
lack this wire. The standard cable
contains pins 1 through 8 and pin 20
wired 1 to 1 across.

The Serial will, sense the HSP line
and change its baud rate between
300 or 1200 baud automatically. A
terminal package program which does
not use the Serial's on board
program will not change baud rates
automatically unless its written to
to do so.

NEC Letter Quality Printers

SeriALL setup for all types of NECs:

NOTE: NEC printers are often times setup for ETX/ACK software handshake protocol. The SeriALL can easily support this configuration by turning SeriALL SW1-1 to the OFF position.

SW1-1 ON XON/XOFF (DC1/DC3)
see note above.
-2 OFF Printer mode
-3 OFF NEC/C.Itoh printer types
-4 ON NEC/C.Itoh printer types
-5 ON NEC/C.Itoh printer types
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-4 pin 19, RCH, Reverse Channel
Plug cable on "PRINTER"

NEC 3500R setup:

CONTROL PANEL (if installed)
SW2-1 OFF Normal Operation
-2 XXX Don't Care for SeriALL
-3 XXX Don't Care for SeriALL
-4 ON Remote Mode

INTERNAL SWITCHES
SW1-1 ON 1200 Baud
-2 ON 1200 Baud
-3 OFF Disable Local LF
-4 XXX Don't Care for SeriALL
-5 OFF NO PARITY
-6 OFF NO PARITY
-7 ON XON/XOFF (DC1/DC3)

If NEC 3500R has a front CONTROL PANEL
then:
SW2 are to be set ALL OFF.

If NEC 3500R does not have a front
CONTROL PANEL, then:
SW2-7 OFF Normal Operation mode
SW2-8 ON Remote mode

SW3-7 ON Reverse channel active low

NEC models 3510, 3515, 3520, or 3525

Control Panel

SW1-1 OFF Remote mode
-5 ON XON/XOFF (DC1/DC3)
SW2-4 OFF Normal Operation mode
SW4-1 OFF Local LF after CR is OFF
-2 OFF NO PARITY
-3 OFF NO PARITY
-4 ON Half duplex mode

NEC models 5510, 5515, 5520, or 5525

Internal switch on G9BNF or G9DGD
printed circuit board, is to be set
as follows:

SW1-5 ON Reverse channel active low
-7 ON 1200 baud
-8 ON 1200 baud

Front Panel switches are to be set as
follows:

SPEED = H 1200 baud, Hi-speed
PARITY= D NO PARITY, Disabel parity
LOC LF= OFF Local LF after CR is OFF
TEST = OFF Test mode for printer OFF
LOCREM= REM Select REMOTE operations
mode.

NEC models 7710, 7715, 7720, or 7725

Internal switch is set as follows:

SW1-2 ON CD is disabled
-3 ON CTS is disabled
-4 ON DSR is disabled

Front Panel switches are to be set as
follows:

sw1-3 ON Reverse channel active low
-6 ON XON/XOFF (DC1/DC3)

SW2-3 OFF Local LF after CR is OFF
-4 OFF Normal mode

SW3-1 ON 1200 baud
-2 OFF 1200 baud
-3 ON 1200 baud
-4 OFF Half duplex mode

OKI 82/83, Low-speed Interface

Serial setup for Low-speed:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF OKI Graphics
-4 ON OKI Graphics
-5 OFF OKI Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

HHS-3 pin 11 SSD, Supervisory
Send Data
Plug cable on "PRINTER"

OKI 82/83 Low-speed setup:

SW-1 ON DTR is SPACE when READY
-2 ON 1200 Baud
-3 OFF 1200 Baud
-4 ON 1200 Baud
-5 OFF NO PARITY
-6 OFF NO PARITY

HARDWARE HANSHAKE SELECT JUMPER

SP1 SELECT Side A, SSD pin 11 HHS
SP2 SELECT Side A, Floats pin 18

OKI 82/83, 92/93, Hi-speed Interface

Serial setup for Hi-speed:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF OKI Graphics
-4 ON OKI Graphics
-5 OFF OKI Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 ON 9600 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

OKI 82/83 HHS-5 DTR, pin 20
OKI 92/93 HHS-3 SSD, pin 11
Plug cable on "PRINTER"

OKI 82/83 Hi-speed setup:

SERIAL CONFIGURATION SWITCH

SW- 1 ON NO PARITY
- 2 ON NO PARITY
- 3 OFF 8 DATA bits
- 4 ON 9600 Baud
- 5 ON 9600 Baud
- 6 ON 9600 Baud

- 9 ON XON/XOFF (DC1/DC3)
-10 OFF XON/XOFF (DC1/DC3)
-11 OFF XON/XOFF (DC1/DC3)

OKI 92/93, Hi-speed setup:

NOTE: USE OKI FACTORY SETTINGS.

CONFIGURATION SWITCHES

SW1-1 OFF NO PARITY
-2 ON NO PARITY
-3 OFF 8 DATA bits
-4 ON 9600 Baud
-5 OFF 9600 Baud
-6 OFF 9600 Baud
-7 OFF 9600 Baud
-8 OFF Block end on LF

SW2-9 OFF Centronic's unblocked
-10 OFF Centronic's unblocked
-11 ON Centronic's unblocked
-12 OFF DTR 'SPACE' when on-line
-13 OFF SSD 'MARK' when BUSY
-14 OFF SSD 'MARK' when BUSY
-15 OFF Ignore CD
-16 ON Buffer threshold 2047 bytes

HARDWARE HANSHAKE SELECT JUMPER

SP1 SELECT Side A, SSD pin 11 HHS
SP2 SELECT Side A, DTR pin 20 HHS
SP3 SELECT Side B, +5V to pin 18

OKI 84 Hi-speed Interface

Serial setup for OKI 84 HI-speed:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON OKI 84 Graphics
-4 ON OKI 84 Graphics
-5 OFF OKI 84 Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 ON 9600 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

OKI 84 HHS-5 DTR, pin 20
Plug cable on "PRINTER"

OKI 84 Hi-speed setup:

SERIAL CONFIGURATION SWITCH

SW1-1 ON NO PARITY
-2 ON NO PARITY
-3 ON 8 DATA bits
-4 ON Ready/Busy handshaking
-5 ON Print mode (not diagnostic)
-5 ON Print mode (not diagnostic)
-6 ON DTR pin 20, Ready/Busy
-7 ON DTR pin 20, Ready/Busy

OKI 84 Hi-speed Interface continued

SW2-9 ON 9600 Baud
-10 ON 9600 Baud
-11 ON 9600 Baud
-12 ON Undefined
-13 ON 32 byte buffer hysteresis
-14 ON Undefined
-15 OFF RS232-C
-16 ON RS232-C

QUANTEX 7030

Serial setup for QUANTEX 7030:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 OFF Printer type, Don't care
-4 OFF Printer type, Don't care
-5 OFF Printer type, Don't care
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 1200 Baud
-2 ON 1200 Baud
-3 ON 1200 Baud
-4 ON 1200 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

QUANTEX 7030 HHS-5 DTR, pin 20
Plug cable on "PRINTER"

QUANTEX 7030 setup:

CONFIGURATION SWITCHES

SW1-5 ON Serial interface mode
SW2-1 OFF 1200 Baud
2 OFF 1200 Baud
3 ON 1200 Baud
4 OFF 8 DATA bits
5 ON 1 STOP bit
6 ON NO PARITY

SW3-3 ON XON/XOFF (DC1/DC3)
-4 ON XON/XOFF (DC1/DC3)

Star Micronics DELTA 10/15

Serial setup for DELTA 10/15:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON EPSON type Graphics
-4 ON EPSON type Graphics
-5 ON EPSON type Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 9600 Baud
-2 OFF 9600 Baud
-3 OFF 9600 Baud
-4 OFF 9600 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

DELTA 10/15 HHS-3 SSD, pin 11
Plug cable on "PRINTER"

Star Micronics setup for DELTA 10/15:

SW3-1 OFF 8 DATA bits
-2 OFF NO PARITY
-3 OFF Busy by Byte
-4 OFF Busy by Byte
-5 OFF NO PARITY
-6 ON 9600 Baud
-7 ON 9600 Baud
-8 ON 9600 Baud

Star Micronics RADIX

Serial setup for RADIX:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON EPSON type Graphics
-4 ON EPSON type Graphics
-5 ON EPSON type Graphics
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 19,200 Baud
-2 OFF 19,200 Baud
-3 OFF 19,200 Baud
-4 OFF 19,200 Baud
-5 OFF 2 STOP bits
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

RADIX HHS-3 SSD, pin 11
Plug cable on "PRINTER"

Star Micronics setup for RADIX:

SW3-1 ON 2 STOP bits
-2 OFF 8 DATA bits
-3 OFF NO PARITY
-4 OFF Busy by Byte
-5 OFF Busy by Byte
-6 ON NO PARITY
-7 ON 19,200 Baud
-8 ON 19,200 Baud
-9 ON 19,200 Baud

TRANSTAR 140

Serial setup for TRANSTAR140:

SW1-1 ON XON/XOFF (DC1/DC3)
-2 OFF Printer mode
-3 ON Printer type, Don't care
-4 ON Printer type, Don't care
-5 ON Printer type, Don't care
-6 OFF NO Auto 300/1200 Baud
-7 OFF Send LF after CR
-8 OFF No Apple IRQ Interrupt

SW2-1 OFF 2400 Baud
-2 ON 2400 Baud
-3 OFF 2400 Baud
-4 ON 2400 Baud
-5 ON 1 STOP bit
-6 ON 8 DATA bits
-7 ON NO PARITY
-8 ON NO PARITY

TRANSTAR 140 HHS-5 DTR, pin 20
Plug cable on "PRINTER"

TRANSTAR 140 setup:

DIP SWITCH SUMMARY

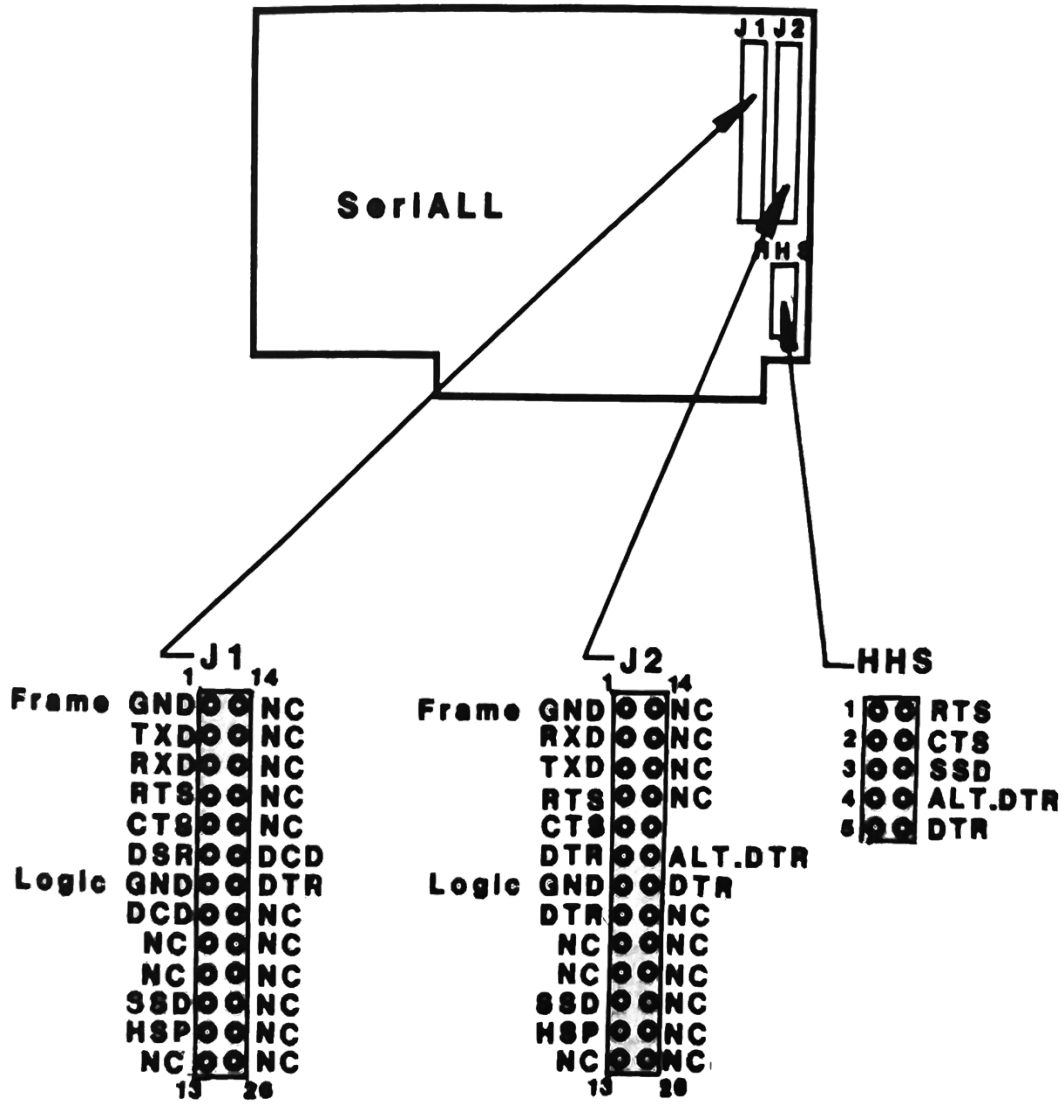
SW 40-1 OPEN* 2400 Baud
-2 OPEN* 2400 Baud
-3 OPEN* 8 DATA bits
-4 CLOSED* NO PARITY
-5 OPEN* NO PARITY
-6 CLOSED* 1 STOP bit
-7 OPEN* XON/XOFF (DC1/DC3)
-8 CLOSED* Must be CLOSED*

TRANSTAR 140 setup continued

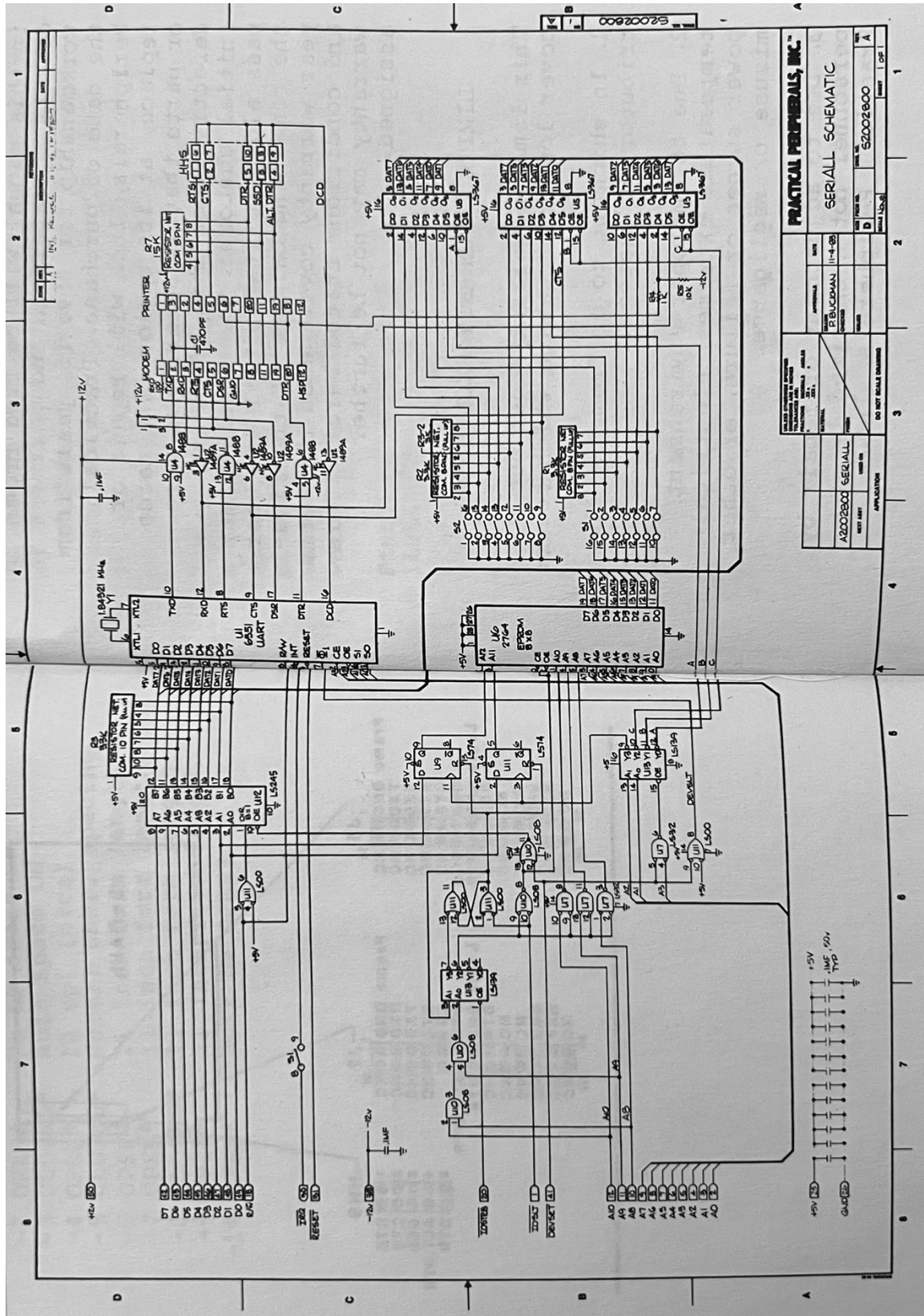
SW 41-1 OPEN* Must be OPEN*
-2 OPEN* No LF after CR
-3 CLOSED* Auto Space ON
-4 OPEN* 10 cpi (pica)
-5 CLOSED* Normal char. spacing
-6 OPEN* 11 inch form length
-7 OPEN* 11 inch form length
-8 CLOSED* 11 inch form length
-9 OPEN* 11 inch form length
-10 OPEN* Must be OPEN*

OUTPUT PIN CONFIGURATION

OUTPUT PIN CONFIGURATION



SERIAL SCHEMATIC



PRactical PERIPHERALS, INC. SERIAL SCHEMATIC	
MODEL: AZD02800 PART: 155,8	DATE: SZD02800 REV: A
DESIGNED BY: P. BUCKMAN CHECKED BY:	DATE: 11-4-83 DRAWN BY:
ALL DIMENSIONS IN INCHES DIMENSIONS IN PARENTHESES ARE OPTIONAL UNLESS NOTED OTHERWISE	DO NOT SCALE DIMENSIONS
AZD02800 SERIAL I/O PART NO.	APPLICATIONS

WARRANTY

Practical Peripherals, Inc. warrants that the product described in this manual will be free from defects in materials and workmanship for five (5) years from the date of purchase. Practical Peripherals, Inc. will repair or replace, at its option, any cards or parts that it determines were defective when shipped to its initial customer. The reseller may pass along to its initial End User the remaining balance of the five-year warranty coverage on the terms and conditions stated herein. This warranty may not be further assigned.

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2. Due to improper environment temperature extremes, electrical power surges or failure, or other misuse or negligence.
3. Due to adjustment or repair by personnel not authorized by Practical Peripherals, Inc.
4. Due to improper installation, or failure to follow the installation instructions.
5. Due to forces beyond the control of Practical Peripherals, Inc. including but not limited to war, insurrection, civil disturbances, natural disasters, labor disputes, or government regulations.

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