I/O Applications Note

Serial Communications Using the HP 95LX

Purpose

This applications note will help you connect the serial port of your HP 95LX to a peripheral device. It supplements information in the *HP 95LX User's Guide*. This note includes instructions for connecting your computer to printers and modems with emphasis on using portable peripherals. The products required to make use of this applications note are:

- The HP 95LX Palmtop Computer (Product Number HP F1000A).
- The HP F10001A Connectivity Pack *or* the HP 82222A Serial Interface Cable. (The cable is designed to meet government regulations and should be the only cable used with the HP 95LX.)
- The HP 82224A Serial Cable Adapter Kit.

This note is organized by peripherals to help speed up the process of getting a connection working.

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For More Information

There is more information on the configuration and use of the HP 95LX data communications software in chapter 31 of the *User's Guide*. Refer to the *User's Guide* when you have questions pertaining to how the software works.

For additional applications notes and technical assistance concerning the connection of other peripherals to your HP 95LX, contact your local support organization. Refer to the inside back cover of the *User's Guide* for the address and telephone number for support.

For more information on the CompuServe Information Service and the services they provide, call toll-free 800-848-8199, or from outside the U.S. call 614-457-0802. Ask for representative 231.

Connecting to a Printer

The following section provides a guide for connecting the HP 95LX to a printer. If you are using a Kodak Diconix 150 Plus printer, skip to that example. If you are unable to print after performing the following steps, refer to the discussion on adapters at the end of this note.

Setup for a Printer

1. On the HP 95LX, select the appropriate printer driver using the Setup Utility as explained in chapter 21 of the *User's Guide*.
2. On your printer, configure the serial port to use:
   - 8 bits/character
   - 1 stop bit
   - No parity
   - Enable XON/XOFF software handshaking
   - Disable hardware handshaking
   - Set the baud rate to match the HP 95LX (default is 9600).
   - Set printer emulation mode to support the printer driver selected in step 1 above.

   Refer to your printer's manual to determine how to configure the printer's serial port. (Hint: Most printers require that you turn them OFF and then ON again AFTER you change any settings.)

3. Connect the 4-pin end of the serial cable to the HP 95LX serial port.
4. Determine which adapter you need for the 9-pin end of the cable. If your printer has a 25-pin female connector, use the adapter for printers from the HP 82224A Serial Cable Adapter Kit. For assistance, refer to "Adapter Information" later in this note.
5. Attach the adapter to the 9-pin connector of the cable and connect the other side to your printer.
6. Your printer should be able to print at this point. If you are not able to print, perform the above steps again.
7. Save the printer set up information in a configuration file for use the next time you want to print.

Example: Printing to a Diconix 150 Plus Printer

A popular portable printer is the Kodak Diconix 150 Plus serial printer. The following procedure provides an example for setting up the Diconix 150 Plus to print with the HP 95LX.

Caution

Use only the provided AC Adapter that came with the Kodak Diconix Printer. The use of any other AC adapter can cause damage to the printer. You will probably blow a fuse inside the printer. Refer to the printer manual for more information.

The adapter end used by the HP 95LX is shaped the same as the adapter end for Diconix printer. It is recommended that you attach a label to the Kodak plug to prevent problems.

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1. On the HP 95LX:
   a. Turn on the computer.
   b. Press (SHIFT)(SETUP) to start the Setup Utility.
   c. Type P for the Printer menu.
   d. Type C for the Printer Configuration menu.
   e. Press (ENTER) to display the names of the printer driver files.
   f. Move the highlight to the Epson FX80 file name.
   g. Press (ENTER) to activate this selection.
   h. Press I (ENTER) to select COM1.
   i. Press B 5 to select 9600 baud rate.
   j. Type Q to quit the Printer Configuration menu.

k. Type S DICONIX (ENTER) to save the configuration information.
l. Type Q to quit the Printer menu.
m. Type Q to quit the Setup Utility.
2. Turn the Diconix printer OFF.
3. On the printer, set the following switches:
   a. Set the main switches (panel A) as follows:

Switch #	1	2	3	4	5	6	7	8	9
Position	Down	Down	Down	Up	Down	Down	Down	Down	Down

Switch 4 is moved up to support skip perforation mode.
   b. Set the switches of serial panel B as follows:

Switch #	1	2	3	4	5	6	7	8
Position	Down	Down	Down	Up	Down	Down	Down	Up

Switches 4 and 8 are moved up to select data length of 8 bits and XON/XOFF software handshaking.
   c. Set the switches of serial panel C as follows:

Switch #	1	2	3
Position	Up	Up	Up

All switches are up to ignore hardware handshake lines.
4. Turn the printer ON to activate these settings.
5. Load paper into the printer.
6. Connect the cable to the HP 95LX.
7. Connect the adapter for printers from the HP 82224A kit to the serial port of the printer. If you purchased the Connectivity Pack, use the adapter included in it and add a male-to-male 25-pin gender converter.
8. Connect the 9-pin end of the cable to the adapter.
9. You should print a text file from the HP 95LX to test the connection.

Connecting to a Modem

The following section discusses how to connect the HP 95LX to a modem. There are examples of using a WorldPort modem and logging on to the CompuServe Information Service.

Note	The HP 95LX uses a three-wire serial connection for communication and controls data flow by using software handshaking (XON/XOFF). This should not present any problems for most AC-powered modems.
	However, most *battery-operated* modems require additional control lines. These modems usually will not work with the HP 95LX. (Although they may perform successfully when used with an AC adapter.)
	However, Touchbase Systems manufactures a line of battery-operated modems that work with the HP 95LX when powered either by the battery or by the AC adapter. Refer to the following example, "Using WorldPort Modems," for more information.

Setup for a Modem

1. With the HP 95LX turned on, select the COMM application.
2. Select the data communication configuration required by the remote system. Refer to chapter 31 of the *User's Guide* for more information on how to set these parameters. You may want to save these settings in a configuration file for use next time.
3. Connect the 4-pin end of the serial cable to the HP 95LX serial port.
4. Determine which adapter you need for the 9-pin end of the cable. Use the adapter for modems from the HP 82224A Serial Cable Adapter Kit. For assistance, refer to "Adapter Information" later in this note.
5. Attach the adapter to the 9-pin connector of the cable and connect the other side to your modem.
6. Make sure the modem is set to ignore handshake lines (DTR, RTS), because the HP 95LX doesn't implement them.
7. From the Datacomm menu of the HP 95LX, use the CONNECT command to initiate communications.

Example: Using WorldPort Modems

The Touchbase Systems modems that work in battery mode with the HP 95LX include:

- WorldPort 1200
- WorldPort 2400 (serial number 50000 and up)
- WorldPort 2400/MNP (serial number 4000 and up)

Connecting to a WorldPort 2400 Modem

1. Select the RX-Sensed battery On/Off mode for turning the modem on and off. Refer to the WorldPort 2400 manual to determine how this is selected.
2. Connect the cable to the HP 95LX.
3. Connect the adapter for modems to the serial port of the modem. You can use the serial cable adapter that came with the Connectivity Pack if you also attach a null modem adapter and a male-to-male gender changer.
4. Connect the 9-pin end of the cable to the adapter.
5. Connect the telephone line to the modem.
6. On the HP 95LX:
   a. Turn the computer ON.
   b. Press the COMM key to start the data communications application. The modem should turn on; if it does not, refer to step 1 above or the modem's manual for troubleshooting assistance.
   c. Press (MENU) S to select the Settings menu.
   d. Type U to retrieve a configuration file previously saved or Type C to set up a new configuration.

Note

If you are setting up a new configuration, you must match the settings used by the remote system. Refer to chapter 31 of the *User's Guide* for more instructions.

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   e. Enter the telephone number to dial: Type D N from the Config menu, type in the number, and press (ENTER).
   f. Type Q twice to exit the menus.
   g. Instruct the modem software to ignore the DTR line: Type AT&D&W and press (ENTER) to set Ignore DTR and to save

this configuration in the modem's memory. The modem should respond "OK." This step needs to be done only one time.

h. Press (MENU) C to connect to the remote system. If you entered a number to dial, the modem should attempt to dial it.

7. You should be connected to the remote computer. If not, repeat the sequence of steps listed above or check the modem's manual for troubleshooting assistance.

Example: Logging on to CompuServe

If you have an account on the CompuServe Information Service, the following procedure lists the steps to take to make a successful connection. If you would like information about CompuServe, refer to "For More Information" on page 2 of this applications note.

1. Follow steps 1 through 6c of the previous procedure.
2. Type U to display the files with .DCF file extensions. If the file names are not displayed, press (ESC) to display them.
3. Move the highlight to the COMPUSRV.DCF file name.
4. Press (ENTER) to select these settings.
5. Type C D N and type in the local number for access to CompuServe.
6. Press (ENTER) Q Q to enter the number and quit the menus.
7. Press (MENU) C to dial the number just entered.
8. Respond to the CompuServe prompts as normal.

If you already have an account on CompuServe and this is the first time logging on with your HP 95LX, you will need to reset your terminal display settings on CompuServe. Log on to CompuServe, and type GO PROFILE 1 2 3. This takes you to the screen to change the number of characters in a line to 40 and the number of lines to 16.

Adapter Information

The HP 95LX uses three wires for serial communications. The three-wire connection consists of a ground line, a line for transmitted data and a line for received data. The fourth pin on the HP 95LX is used as a shield ground. Transmitting data on one line and receiving on another can create a conflict when you're trying to connect two devices together. For data to be sent and received, the transmit line on one device must be connected to the receive line of the other device.

The cable that is furnished with the Connectivity Pack (also available separately as part number HP 82222A) has a 4-pin connector on the HP 95LX end and a 9-pin, DB-style connector on the other. The pins used on the 9-pin connector are:

Pin No.	Used for
1	Not used
2	Transmit data (from the HP 95LX)
3	Receive data (to the HP 95LX)
4	Not used
5	Signal ground
6-9	Not used

There are many different styles of connectors with different numbers of wires and pins used for communication. In addition, the male/female pin possibilities for each connector makes the situation even more complex. Fortunately, there are adapters made for most of these configurations. You can purchase these adapters at most computer dealers and electronic stores.

There are three types of adapters readily available; gender changers, null modem adapters and serial cable adapters.

Gender Changers. Used when your cable and device have the same gender connectors (female/female or male/male). Their purpose is to link the two connectors together without changing the pin configurations.

Null Modem Adapters. Used to swap the pin configurations for connecting the receive and transmit lines together. The HP 95LX transmits data on pin 2, and suppose, for example, the device you're

attaching also transmits data on pin 2. A null modem adapter connects pins 2 and 3 of the HP 95LX to pins 3 and 2 of the other device. Null modem adapters usually have one male and one female end.

Serial Cable Adapters. Used to provide a connection between different styles of connectors. (Also known as serial modem or serial printer adapters.) The most common configuration available is used to connect a 9-pin connector to a 25-pin connector. A serial cable adapter can be used as a substitute for a null modem adapter or a gender changer when you also need to connect to different style connectors.

There are three serial cable adapters available from HP. There is an adapter included in the Connectivity Pack (HP F1001A) and two adapters available in the Serial Cable Adapter Kit (HP 82224A). The adapters have small pictures (icons) of the peripheral device they are designed to work with.
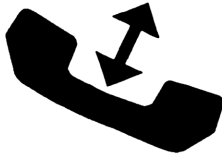
1. Computer Adapter
2. Modem Adapter
3. Printer Adapter

The serial cable adapter for IBM PC and IBM PC XT serial ports included in the Connectivity Pack converts the 9-pin female connector on the cable to a 25-pin female connector and swaps pins 2 and 3. The connections of the pins on this adapter are as follows:

9-pin #	Direction	25-pin #	Definition
2	From the HP 95LX	3	Transmit data
3	To the HP 95LX	2	Receive data
5		7	Signal ground
Shield		Shield,1	Shield ground
		4-6	Not connected
		8-25	Not connected

The serial cable adapter for modems included in the Serial Cable
Adapter Kit converts the 9-pin female connector on the cable to a
25-pin male connector and pins 2 and 3 are wired straight through.
The connections of the pins on this adapter are:

9-pin #	Direction	25-pin #	Definition
2	From the HP 95LX	2	Transmit data
3	To the HP 95LX	3	Receive data
5		7	Signal ground
Shield		Shield,1	Shield ground
		4-6	Not connected
		8-25	Not connected

The serial cable adapter for printers included in the Serial Cable
Adapter Kit converts the 9-pin female connector on the cable to a
25-pin male connector and swapped pins 2 and 3. The connections of
the pins on this adapter are:

9-pin #	Direction	25-pin #	Definition
2	From the HP 95LX	3	Transmit data
3	To the HP 95LX	2	Receive data
5		7	Signal ground
Shield		Shield,1	Shield ground
		4-6	Not connected
		8-25	Not connected

The most difficult task when setting up the serial connection on the
HP 95LX is to determine what connector is required. The easiest way
to determine what is required is to draw a picture of both connectors,
label the three lines as they are defined in the peripheral's owner

manuals and then draw the lines required to make the connection. The following tables and steps will help determine which adapter to purchase if one is needed.

Signal Name	9-Pin Connector	Peripheral Connector	Signal Name
HP 95LX transmit	2	2	_____
HP 95LX receive	3	3	_____
Ground	5	7	Signal ground

	9-Pin Connector	Peripheral Connector
Gender	Female	_____
Total pins	9	_____

1. Read the manual for the peripheral device and determine what pins are used for transmitting and receiving. Write receive and transmit into the correct position on the diagram.
2. Draw a line between transmit pin on the 9-pin side of the diagram to receive pin on the peripheral side of the diagram.
3. Draw a line between receive pin on the 9-pin side of the diagram to transmit pin on the peripheral side of the diagram.
4. Determine the gender of the connector on the peripheral. Write the gender in the diagram.
5. Determine the size of the connector on the peripheral device. (e.g., 9 pins, 25 pins, ...) Write this number in the space for the total # of pins on the peripheral.
6. Take this information to your local computer dealer or electronics store when you go to purchase the adapter you need.

Special I/O Considerations

There are two special factors that may affect serial data communications on the HP 95LX:

The HP 95LX supports software handshaking only. Some devices require the hardware handshake lines and do not allow them to be disabled. If this is the case with your device, contact the manufacturer to determine if there is some method of working around the limitation.

Cable Length. The HP 82222A Serial Cable (provided in the Connectivity Pack) is specially designed to meet government regulations and to give the highest reliability. Do not try to use the serial port with a longer cable. This may result in poor transmission quality or allow more electrical noise to enter the circuits and may corrupt the data being transferred.

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