

OREGON DIGITAL SYSTEMS, INC.

THE HP-71 SERIALPLUS

OWNER'S MANUAL

March 1987

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REFERENCES

HP-71 Owner's Manual, 00071-90001

HP-71 Reference Manual, 00071-90010

1. INTRODUCING THE SERIALPLUS

Congratulations! You have just purchased the SerialPlus, an environmentally-sealed case designed to protect the HP-71 in harsh environments.

The SerialPlus offers the following features:

A built-in RS-232C Interface that enables you to communicate with computers, modems and printers.

Rechargeable Ni-Cd batteries for extended use.

Compact and lightweight for maximum portability.

Tough construction to withstand rugged use.

What Can My SerialPlus Do?

The HP-71 SerialPlus enables you to collect data with your HP-71 handheld computer in the field or office, then transfer this data to other computers or peripherals via the RS-232 port. It also enables your HP-71 to transmit to and receive from devices which require TTL connections, such as bar code wands. HP-IL connections are available externally.

The SerialPlus encloses your HP-71 in a rugged aluminum case, so that you can collect data in wet or dry weather, in factories, in restaurants, or anywhere.

The SerialPlus comes with a carrying strap, an RS-232 cable, and a power cord. Driver software is provided on disc. Other options include: an EPROM, a tape or magnetic card, an HP-IL cable, or a combined HP-IL and RS-232 cable. Software-controlled 5-volt power is available to power external peripherals.

Before You Begin

As the SerialPlus works with the HP-71, so this manual is intended to complement the HP-71 manual. If

you have never used the HP-71 before, consult its manual to learn its commands and BASIC programming.

The SerialPlus adds three new BASIC keywords to the HP-71's menu: SETUP, SERIAL\$, and ERROR. SETUP prepares the SerialPlus to transmit data by specifying the pieces of information needed for the HP-71 and your peripheral to understand one another. SERIAL\$ does the actual transmission and reception of data, while ERROR informs you of errors occurring while receiving. These keywords are contained in the LEX file SERIALSI. You will be using them to operate the SerialPlus.

With the same software options, the SerialPlus also provides true TTL transmit and receive.

2. GETTING STARTED

2.1 Setting Up

When you receive your SerialPlus, you should have the case with its RS-232 interface, along with the software media, a recharging cable, a serial cable, and any other cables you ordered. A Torx screwdriver is provided for you to open the back of the SerialPlus.

To prepare the SerialPlus for use, unscrew and remove the back. You will be connecting the four colored wires to the correct pins on the HP-71 card reader port.*

WARNING

Incorrect connection of the wires could severely damage your HP-71 and its modules.

Refer to Figure 1 on the following page as you take these steps:

1. Make sure the HP-71 is off and the Ni-Cd batteries disconnected.
2. Remove the batteries from your HP-71, as it will now be powered from the SerialPlus' Ni-Cds. *Note: If the batteries are not removed from the HP-71, problems will occur in the SerialPlus's charge retention.*
3. If you have an HP-IL module, connect the HP-IL cables (located inside the case) from the RS-232 port to your HP-71.
4. Place the HP-71 in the case.

**Other modules may reside in the card reader port of your HP-71 along with the SerialPlus connectors. Some modules could interfere with the correct operations of the SerialPlus. In case of doubt, run initial tests without the additional modules present.*

5. Connect the four colored wires from the RS-232 port to the HP-71 Card Reader Port as shown. For safety, hook up the wires in the following order:

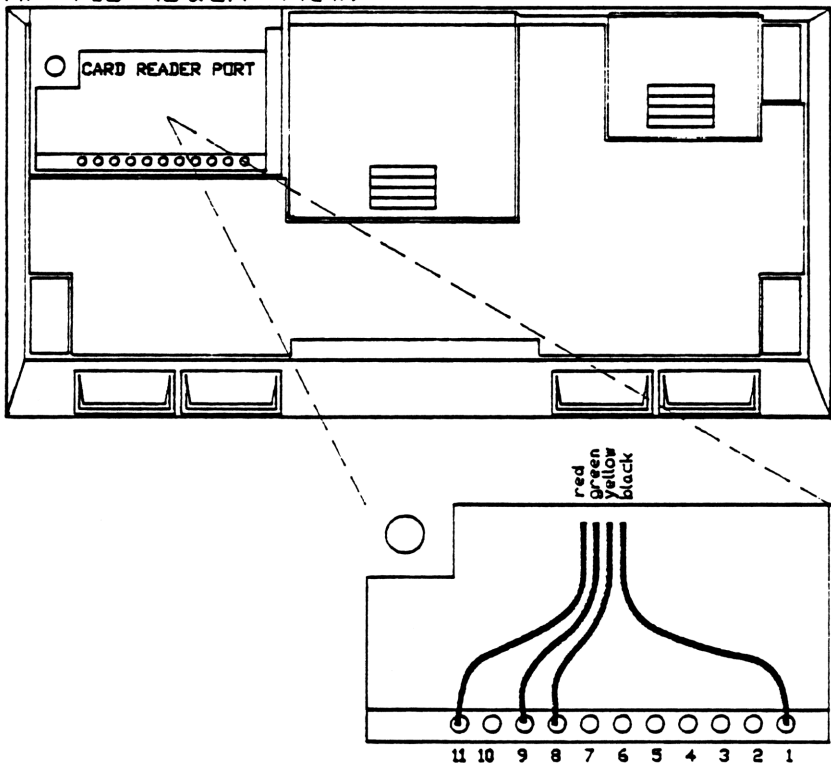
Black Red Green Yellow

6. Connect the Ni-Cd batteries (white molex connector).

The color-coded wires must be connected before you install the battery pack. Review the placement of the wires before connecting the Ni-Cd batteries in order to avoid damage from incorrect connections.

Figure 1

HP-71B (Back View)



Now put your HP-71 into the case so that the display screen shows through the front window with the keys behind the keypad. When you place the back on the case, the gasket strip should fill the gap left by the slope in the back of the HP-71. The screws should be snug but not overly tight.

Before you actually use the SerialPlus, you should plug in the power cord to begin an initial battery charge.

Next, copy the software programs into the HP-71 from the media provided. See the *HP-71 Owner's Manual*, pp. 112-114, for instructions. The filenames are SERIALSI and DEMO.

Only SERIALSI is needed to operate the SerialPlus. The DEMO program is an aid to correctly setting up communication parameters.

Also included on the disk is SITEST and SEVENBIT. SITEST is used by Oregon Digital to check proper operation of the SerialPlus. SEVENBIT is a lex file containing two keywords for transmitting and receiving in seven data bits. You need not load SITEST, into your HP-71, and you should only copy SEVENBIT if you intend to use this feature. See Appendix C, "Seven-Bit Format," for more information.

2.2 Initial Use

You are now ready to begin transmitting and receiving data. Connect the SerialPlus to your peripheral device using the correct cable. If you want to check the wiring for your particular peripheral, see Appendix D.

Note: Section 5, "Troubleshooting," should help you with any difficulties you might have.

The program DEMO will help you become familiar with the SerialPlus and let you check to make sure the devices are working properly.

Key in RUN DEMO and press [ENDLINE]. DEMO will show you one at a time the values or parameters the SerialPlus needs in order to transmit data. If the value which is automatically shown (called the "default value") is not what your peripheral needs in order to receive or transmit, then backstep over the value and change it. [ENDLINE] will then move you to the next parameter.

For definitions of the terms DEMO will ask you for, see section 3.1, "SETUP."

DEMO is not necessary to operate the SerialPlus.

3. USING THE SOFTWARE COMMANDS

3.1 SETUP

SETUP prepares the SerialPlus to transmit or receive, so that SERIAL\$ can do the actual transmission or reception. When you key in SETUP, you must specify the following parameters:

Baud
#Seconds1
#Seconds2
S/P/O
H/L/E
"RepChar"

Each of these words represents a numeric or string variable which you must key in. Refer to your peripheral's manual to know which variables your peripheral requires.

SETUP must be entered as follows:

SETUP<Baud>,<#Seconds1>,<#Seconds2>,
<S/P/O>,<H/L/E>,<"RepChar">*

All parameters are required in this keyword.

The speed of the HP-71 varies slightly over time, which can change its transmission/reception rate. Therefore SETUP should be executed again if a Setup has not been executed in the past 2-3 hours.

Baud

"Baud" means baud rate, or the rate of transfer of data in bits per second. Key in the numeric value representing the baud rate for your peripheral. Once you

**Do not key in the special symbols < and >. These are intended only to separate the different parameters in the text. Separate your variable entries only with a comma.*

set the baud rate, it will remain in effect until changed through another use of SETUP.

You may tell the SerialPlus to transmit at any rate between 10 and 2400 bits per second. Entries above 2450 or below 10 will cause a "Baud too slow" or "Baud too fast" error message to be displayed.

#Seconds1

Here you set the number of tenths of seconds the HP-71 will wait to receive the first byte of data. If it has not received anything within that number of seconds, it will display the error message "Time out." This parameter keeps the HP-71 from getting stuck indefinitely waiting for data that never comes. The maximum wait for the first byte depends on the speed of the CPU (central processing unit) within the HP-71. With a CPU speed of 640 kilohertz, the maximum wait is 314 minutes. #Seconds1 should be set at zero when the SerialPlus is not receiving data.

#Seconds2

This sets the delay in tenths of seconds allowed between bytes received before the error message "Time out" is displayed. This can also be set at zero when the SerialPlus is not receiving.

#Seconds1 and #Seconds2 are used by the SerialPlus only when receiving, but a value must always be entered.

S/P/O

This parameter controls the stop bits and parity option. Parity is a system of error detection which checks whether the number of set bits transmitted is even or odd, thus making sure that the correct number of bits has been sent or received. This verifies the data integrity. Stop bits synchronize the rate of transfer of bits by making sure one device is ready to receive at the same time that

the other device is ready to send. If a parity error occurs, the ERROR function will inform you. (See Section 3.3, ERROR.)

You can set the parity for on or off and for even or odd, and the stop bits at one or two, by keying in the appropriate number from the table below (in the first column). For example, keying in a <3> turns parity on and sets it at even, with 1 stop bit.

The manual for your peripheral device will tell you whether that peripheral requires even, odd, or no parity, and the number of stop bits required.

TABLE 3.1
S/P/O Settings

NUMBER	(BINARY)	STOP BITS	PARITY	ODD/EVEN
0	000	1	Off	---
1	001	1	Off	---
2	010	1	On	Odd
3	011	1	On	Even
4	100	2	Off	---
5	101	2	Off	---
6	110	2	On	Odd
7	111	2	On	Even

Note: Only 0-7 are valid numbers for this parameter. Other numbers return error messages.

H/L/E

Here you specify the handshake and end-of-line sequences which control the communication between the HP-71 and your peripheral. The function of handshaking is similar to that of stop bits in that it synchronizes the timing of the transfer so that one device is ready to receive at the same time that the other is ready to send. An end-of-line sequence tells the machine receiving the data that the transmission of a particular set of bits is

finished. The receiver will then be ready for the next sequence.

"H" turns the handshake on or off, and "L" sets the level of the handshake at high or low, depending on whether your particular peripheral receives data when the handshake line is on high or low. (Your peripheral's manual should tell you this.) Handshaking is not available for receiving. It also does not work when you are trying to send and receive at the same time. This is because the RS-232 interface has only 2 lines available: one for sending and one for receiving. When handshaking is used in sending, the receive line is used to check the handshake.

"E" tells the HP-71 whether or not to search for an end-of-line sequence (EOLS) when it is receiving on the RS-232 interface. The sequence set should be the same as the one your peripheral sends. The end-of-line sequence to be detected when receiving is chosen through the `ENDLINE` keyword that already exists in the HP-71's operating system. (See the *HP-71 Reference Manual*, p. 96, for more information.) When transmitting, this same EOLS is sent along with the data transmitted.*

All three of these are set at the same time by keying in one of the code numbers from Table 3.2. For example, keying in <4> will set the handshake at "on," the level at "low," and the end-of-line sequence at "off."

When handshaking is used for sending, the SerialPlus has a 20-second "Time-out." Suppose the SerialPlus tries to send data to a peripheral that is busy. If, in 20 seconds, the device the SerialPlus is sending to is still not available, then the SerialPlus will exit the routine with a "Device Busy" error message. This will keep the SerialPlus from using up its power charge waiting to send

*Note: Do not set `ENDLINE` to be a null string (the 71 detects nothing as an end-of-line sequence), as the SerialPlus will not wait to receive at all, but will exit. This is a safety feature to prevent overwriting of data.

data to a peripheral that will not receive, such as a printer which is out of paper.

TABLE 3.2
H/L/E Settings

NUMBER	(BINARY)	HNDSHK	LEVEL	EOLS
0	000	NO	---	Off
1	001	NO	---	On
2	010	NO	---	Off
3	011	NO	---	On
4	100	YES	Low	Off
5	101	YES	Low	On
6	110	YES	High	Off
7	111	YES	High	On

Note: Only 0-7 are valid numbers for this parameter. Other numbers return error messages.

"RepChar"

"RepChar" stands for the "replacement character" used when parity errors occur in reception of data. When a parity error occurs, the incorrectly received byte will be replaced with this character. For instance, if you keyed in "A," as your replacement character, then the letter *A* would appear in your printout of the received data every time the actual character was missed. If you key in more than one character here, additional characters will be ignored.

Example

SETUP 1200,5,1,2,7,"A" sets the SerialPlus to transmit and receive at 1200 bits per second with time-outs of 1/2 (5/10) and 1/10 seconds. Parity setting 2 turns on parity and sets it for odd, with 1 stop bit. H/L/E setting 7 turns the handshake on, and it will transmit when the peripheral is at a high level. The replacement character for parity error bytes is the letter A.

3.2 SERIAL\$

SERIAL\$ controls the actual sending and receiving of data. The SerialPlus requires two parameters for SERIAL\$: #Chars, and "String." #Chars is used for receiving and String is used for sending. When this command is executed, the SerialPlus will send first, then wait to receive.

SERIAL\$ must be keyed in as follows:

SERIAL\$(<#Chars>,<"String">)

All parameters are required in this keyword.

#Chars

This parameter is used to check if enough memory is available in the SerialPlus to receive incoming data. If you set #Chars to zero, then the SerialPlus will not try to receive any incoming characters. (It is a good idea to set #Chars to zero when you are sending data to a printer from the SerialPlus.)

When the End-of-Line Sequence detection is turned off, the SerialPlus will also try to receive the number of bytes of data specified by this parameter. With EOLS on, however, the SerialPlus will receive bytes until it detects the end of a line. Nevertheless, even if EOLS is on, the SerialPlus will not try to receive if #Chars has been set to zero.

The *HP-71 Reference Manual*, p. 81, gives the maximum string length to be 65,535. This is the maximum number of characters that can be received in a block.

CAUTION

When EOLS is on, the #Chars parameter must be set for the maximum number of characters expected in a line. If more characters are received than the #Chars is set to receive, then files in the RAM may be overwritten. This may result in memory loss.

"String"

"String" refers to any quoted expression, string variable, or combination of the two. Here you specify the actual data you want to send. If you specify a null string: "", then the SerialPlus will not send at all but will go on to receive. To transmit large blocks of received data, use large, previously dimensioned string variables. The string given will be transmitted using the parameters previously set by the SETUP keyword.

Example:

if the EOLS option is turned off, then execution of `A$=SERIAL$(10,"HELLO")` will cause the SerialPlus to first transmit HELLO (plus the current ENDLINE sequence), then wait to receive 10 characters. `SERIAL$` is a function which returns the received characters as a string. In this example the string variable `A$` will now contain the received characters. `A$` can now be stored in a file, tested, converted to a number, or otherwise manipulated by the HP-71's string functions. (See the *HP-71 Owner's Manual*, pp. 74-75.)

3.3 ERROR

ERROR informs you of errors occurring while receiving. It does not show transmission errors and may return unpredictable results when you send without receiving. This keyword contains no parameters.

Key in ERROR after using SERIAL\$. ERROR will return one of the following numbers to let you know if any errors occurred while receiving. For example, a "10" will show you that a parity error and a bad data (stop bit) error occurred, but that time-out limits were not exceeded.

TABLE 3.3
Error Indicators

NUMBER	(BINARY)	PARITY	TIME-OUT	BAD DATA
0	0000	None	None	None
2	0010	None	None	ERROR
4	0100	None	ERROR	None
6	0110	None	ERROR	ERROR
8	1000	ERROR	None	None
10	1010	ERROR	None	ERROR
12	1100	ERROR	ERROR	None
14	1110	ERROR	ERROR	ERROR

Note: ERROR currently returns only even numbers, because the fourth binary bit is being reserved for future options; therefore, the SerialPlus currently returns only a 0 in the fourth place.

3.4 Error messages returned by SETUP and SERIAL\$

SETUP Errors

Insufficient Memory: The 71 has been unable to allocate a buffer for storage of the parameters needed in the SETUP function in order to execute SERIAL\$.

Invalid Argument: Either the S/P/O or the H/L/E parameters are set at less than zero or greater than eight.

Missing Parameter: One of the required parameters for the SETUP keyword has been left out.

Baud Too Slow or Baud Too Fast: The baud rate was set above or below the rates that the SerialPlus can use.

SERIAL\$ Errors

Device Busy: When handshaking is active for sending, the peripheral has been busy for more than 20 seconds.

File not Found: SERIAL\$ was begun without using SETUP, so that the SerialPlus has no setup buffer from which to prepare SERIAL\$. Using the SETUP keyword, specify the parameters to create the buffer.

Insufficient Memory: Not enough room exists in the HP-71 to receive the string specified by the #Chars parameter.

3.5 Examples

1) To send to a printer:

SETUP 1200,0,0,0,4,"X" sets the transmit speed at 1200 baud, with time-outs at zero, since no data is to be received. Parity is turned off for this particular printer. H/L/E is set at 4: handshake on, at a low level, with the SerialPlus not detecting an end-of-line sequence (EOLS), since it is not receiving. What is put in the Replacement String does not matter, since this function is only used when parity is on and when receiving.

Many printers expect a carriage return and linefeed at the end of a string. To set a carriage return/linefeed as an end-of-line sequence on the SerialPlus, execute the ENDLINE command with no parameters any time before using SERIAL\$. Whatever endline sequence is specified by the use of ENDLINE will be transmitted along with the string. See the *HP-71 Reference Manual*, p. 96, for further explanation.

Keying in SERIAL\$(0,"hello") now will send "hello" to the printer. The 0 makes sure the SerialPlus does not try to receive. The endline sequence was set by the use of the ENDLINE keyword.

2) For Bi-Directional Operation:

SETUP 2400,50,10,3,1,chr\$(160) sets transmit/receive speed at 2400 bits per second. Time-outs are set for 5 (50/10) seconds before the first byte received and 1 (10/10) second between each byte received. Parity is turned on and set at even, with 1 stop bit. Handshake is off, since handshake is not available for half duplex, but the end-of-line sequence ability is turned on. Any reception of data will continue until an end-of-line sequence is detected or a time-out occurs. The replacement character is Chr\$(160), which will replace any parity errors with a space, allowing easy reconstruction of the original message. (See the *HP-71*

Reference Manual, p. 323, for details on character display codes.)

Keying in A\$=SERIAL\$ (80,"hello") now will cause the SerialPlus to send the letters "hello" and then receive. The received characters will go into A\$. Be sure to dimension A\$ (DIM A\$[80]). With the above setup command, transmission and reception will take place at 2400 bits per second. The SerialPlus will check to be sure that there is room for the reception of a maximum of 80 characters, but will look for an end-of-line sequence to end reception.

4. OPERATING PRECAUTIONS

The SerialPlus is made for use in the field. It is rugged and water resistant, with high-quality, long-life batteries and circuitry that is tolerant of short circuits and other abuse. However, some actions may damage or deteriorate the SerialPlus package. Observe the precautions listed below to keep your SerialPlus and HP-71 running as they should.

WARNING

Incorrect connection of wires to the card reader port may damage the HP-71 and/or the SerialPlus.

CAUTIONS

- Remove the alkaline batteries from the HP-71 before using the SerialPlus.
- Disconnect the Ni-Cd batteries when the SerialPlus is not connected to the HP-71.
- Do not place fingers, tools or other foreign objects into the I/O port.
- Recharge the SerialPlus when the HP-71 BAT annunciator comes on.
- Do not charge the SerialPlus continuously.
- Disconnect the RS-232C cable when not in use. (Plugging in the cable turns on the interface, causing battery drain.)
- Periodically cycle the batteries through a full charge-discharge cycle for maximum battery life.

5. TROUBLESHOOTING

Table 5.1 contains some possible error conditions and recommended corrective action. In most instances, performing the corrective action described will eliminate the problem. If the problem persists, however, you should return the unit for repair.

TABLE 5.1
Error Conditions

<u>ERROR CONDITION</u>	<u>CORRECTIVE ACTION</u>
1. HP-71 does not respond	<ul style="list-style-type: none">• Ensure that the Ni-Cd batteries are connected.• Ensure that the four wires are connected correctly to the pins in the card reader port (See Figure 1).• Ensure that the batteries are fully charged.
2. Peripheral does not respond to the HP-71	<ul style="list-style-type: none">• Ensure that the SETUP parameters are correct.• Ensure that the cable is correctly configured for your peripheral.• Verify that the four wires are connected correctly to the pins in the card reader port (See Figure 1).
3. Poor battery life	<ul style="list-style-type: none">• Disconnect RS-232 cable when not using serial port.• Verify that alkaline batteries have not been left in the HP-71.• Cycle the Ni-Cd batteries: charge 12 hours, then discharge until BAT indicator comes on.

APPENDICES

APPENDIX A: OWNER'S INFORMATION

Accessories Included with the SerialPlus

Your SerialPlus should have come with:

The SerialPlus Owner's Manual
SERIALSI Software
An AC Recharger
An RS-232 Cable
A Shoulder Strap
A Service Card

Availability of all accessories, standard or optional, is subject to change without notice.

Your Serial Number and Operating System Version

Each SerialPlus has a serial number located on the inside of the case. You should keep a record of this number. If your SerialPlus is lost or stolen, the serial number can be useful for tracing and recovery as well as for insurance claims. Oregon Digital Systems does not maintain a record of individual owners' names and case serial numbers.

Write your serial number here:

With the software installed, the VER\$ function returns a string that indicates which version of the serial interface software your computer is using. Type VER\$ [ENDLINE] to determine the version of your software. This information is helpful when corresponding with Oregon Digital Systems concerning technical assistance.

Limited 90-Day Warranty

Oregon Digital Systems, Inc. warrants the SerialPlus against defects in materials and workmanship

for 90 days from the date of original purchase. If you transfer ownership, the warranty is transferred to the new owner and remains in effect for the original 90-day period. During the warranty period, we will repair or, at our option, replace at no charge any product that proves defective, provided you return the product, shipping prepaid, to Oregon Digital Systems, Inc.

This warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification by other than Oregon Digital Systems, Inc.

No other express warranty is given. The repair or replacement of the product is your exclusive remedy. ANY OTHER IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS OF SERVICE IS LIMITED TO THE 90-DAY DURATION OF THIS WRITTEN WARRANTY. Some states, provinces or countries do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. IN NO EVENT SHALL OREGON DIGITAL SYSTEMS, INC. BE LIABLE FOR CONSEQUENTIAL DAMAGES. Some states, provinces or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights; you may also have other rights which vary from state to state, province to province, or country to country.

If you have any questions concerning this warranty, please contact:

Oregon Digital Systems, Inc.
Customer Support
P.O. Box 367
Corvallis, OR 97339, U.S.A.
(503) 752-0448

Service Information

Products are sold on the basis of specifications available at the time of manufacture. Oregon Digital Systems, Inc. shall have no obligation to modify or update products once sold.

You may have your unit repaired at Oregon Digital Systems, Inc. any time it needs service, whether or not the unit is under warranty. Repairs done after the expiration of the warranty are subject to standard repair charges.

Repair charges include all labor and materials. In the United States, the full charge is subject to the customer's local sales tax. All such taxes will appear as separate items on invoiced amounts.

Computer products damaged by accident or misuse are not covered by fixed standard repair charges. In these situations repair charges will be individually determined based on time and materials.

Any out-of-warranty repairs are warranted against defects in materials and workmanship for a period of 90 days from the date of service.

Should your unit require service, return it with the following items:

- A completed Service Card, including a description of the problem.

- A sales receipt or other proof of purchase date if the product is still under warranty.

The product, Service Card, and proof of purchase date (if required) should be packaged in a protective carton to prevent in-transit damage. We suggest that you insure the shipment.

Whether or not the unit is under warranty, it is your responsibility to prepay shipping charges for delivery to Oregon Digital Systems, Inc.

After warranty repairs are completed, Oregon Digital Systems, Inc. will return the unit postage prepaid. On out-of-warranty repairs in the United States and some other countries, the unit will be returned C.O.D., covering shipping costs and service charges.

Service contracts are available. Circuitry and designs are proprietary to Oregon Digital Systems, Inc., and service manuals are not available to customers.

When you need help, Oregon Digital Systems is committed to providing after-sale support to its customers. For either product information or technical assistance, call or write to:

Oregon Digital Systems, Inc.
Customer Support
P.O. Box 367
Corvallis, OR 97339, U.S.A.
(503) 752-0448

APPENDIX B: QUICK REFERENCE

Keyword Reference

SETUP<Baud>,<#Seconds1>,<#Seconds2>,<S/P/O>,<H/L/E>,<"RepChar">

All parameters required.

Calibrates transmission speed to allow for machine variability.

Baud: Continuously variable from 10 to 2400 bits per second.

#Seconds1: The wait for the first byte of received data in tenths of seconds.

#Seconds2: The wait between bytes of received data in tenths of seconds.

S/P/O: Stop Bits/Parity

H/L/E: Handshake

RepChar: A character used as a replacement in case of parity errors.

S/P/O Settings

NUMBER	(BINARY)	STOP BITS	PARITY	ODD/EVEN
0	000	1	Off	---
1	001	1	Off	---
2	010	1	On	Odd
3	011	1	On	Even
4	100	2	Off	---
5	101	2	Off	---
6	110	2	On	Odd
7	111	2	On	Even

H/L/E Settings

<u>NUMBER</u>	<u>(BINARY)</u>	<u>HNDSHK</u>	<u>LEVEL</u>	<u>EOLS</u>
0	000	NO	---	Off
1	001	NO	---	On
2	010	NO	---	Off
3	011	NO	---	On
4	100	YES	Low	Off
5	101	YES	Low	On
6	110	YES	High	Off
7	111	YES	High	On

SERIAL\$(<#Chars>,<"String">)

All parameters required.

#Chars: Sets number of bytes to be received.

String: A quoted expression, string variable or combination, for transmission.

ERROR

No parameters.

Error Indicators

<u>NUMBER</u>	<u>(BINARY)</u>	<u>PARITY</u>	<u>TIME-OUT</u>	<u>BAD DATA</u>
0	0000	None	None	None
2	0010	None	None	ERROR
4	0100	None	ERROR	None
6	0110	None	ERROR	ERROR
8	1000	ERROR	None	None
10	1010	ERROR	None	ERROR
12	1100	ERROR	ERROR	None
14	1110	ERROR	ERROR	ERROR

See Section 3.4 for a list of the error messages the SerialPlus can display.

APPENDIX C: SEVEN-BIT FORMAT

The SerialPlus comes with a lex file, SEVENBIT, which allows the transmission and reception of seven-bit format on the HP-71. The file contains two keywords, "ENSEV\$" and "DESEV\$." ENSEV\$ will encode the data before it is transmitted from the HP-71 so that transmitted data will be in seven-bit format. DESEV\$ decodes the data that has been received, converting the seven-bit format into an eight-bit format.

Note that the HP-71 will be sending and receiving with two stop bits. In order to use this seven-bit software, the device which is communicating with the HP-71 must be able to transmit with two stop bits.

You should also change the "ENDLINE" sequence on the HP-71 in order to use this format. For sending and receiving with a <carriage return> <linefeed>, use the following command on the HP-71: `ENDLINE CHR$(141)&CHR$(138)`. To convert the endline to a seven-bit format, the most significant bit of the eight bits must be set. Thus, to convert any endline sequence to seven-bit format, you need to add 128 to the decimal ascii value of the endline characters.

For example, the decimal ascii value of a carriage return is 13. Then to convert a carriage return to seven-bit format, use $13+128=141$. An easy way to accomplish the conversion is as follows:

1. Look up the decimal ascii value of all the endline characters.
2. Add 128 to the decimal value of the endline statement. `ENDLINE CHR$(#1+128)&CHR$(#2+128)&CHR$(#3+128)`

The following is an example of a BASIC program for the HP-71 which will send and receive at 2400 baud in a seven-bit format:

```
10 SETUP 2400,50,50,0,1,"A"  
20 DIM A$[80],B$[80]  
30 ENDLINE CHR$(141)&CHR$(138)  
40 INPUT "SEND?";A$  
50 A$=ENSEV$(A$)  
60 B$=SERIAL$(80,A$)  
70 B$=DESEV$(A$)  
80 DISP B$
```

APPENDIX D: TECHNICAL SPECIFICATIONS

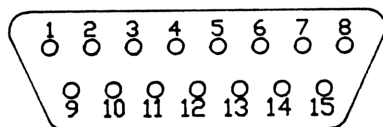
CASE:	Aluminum; closed-cell neoprene gasket; 8 X 6-32 Torx screws. 8.9 X 1.2 X 5.3 inches. [226 X 32.0 X 134.6 (+5.1)mm] Weight: 18 oz. (510.3 g.) External removable D-rings for strap attachment.
POWER:	4 X 600mAh Nickel Cadmium Batteries: Recharge time: 10 hours Current drain: <ul style="list-style-type: none">• Off - 0.03mA• Idle - 0.75mA• Operating - 26.4mA maximum, driving a 3K Ohm load.
OUTPUTS:	15-pin D-sub connector with slide lock
Pin 1:	RS-232C (Positive Logic), Transmit (Tx). Output Voltage Swing: ± 9 volts (typical driving 3K ohms) Output Resistance: less than 350 Ohms. Short Circuit Current: ± 10 mA (typical) protected.
Pin 2:	TTL compatible (Negative Logic), Transmit (Tx). Output Voltage Swing: 0-5 volts.
Pin 3:	+5 volts 150mA D.C. software controlled (for bar code wands, etc.)
Pins 7, 14:	HP-IL Line (if HP-IL option is installed on HP-71).
Pins 4, 5:	GND

INPUTS:	25-Pin D-sub connector
Pins 6, 13:	HP-IL line (if HP-IL option is installed on HP HP-71).
Pins 8, 15:	8VAC 100mA power for battery recharge.
Pin 9:	RS232C (Positive Logic), Receive (Rx), doubles as DSR to check device busy. Low: 0.8 volts max. High: 2.0 volts min. Withstand: \pm 30 volts (power on or off). Input Impedance: 3K ohms to 7K ohms. Hysteresis: 0.5 volts.
Pin 10:	N/C
Pin 11:	TTL Compatible (Negative Logic), Receive (Rx). Low: 0.8 volts max. High 3.5 volts min. at 0.015mA (typical)
Pin 12:	Connect to GND to supply power to RS232C interface.

Plug Pinout Summary

15-Pin Plug on SerialPlus

Figure 2

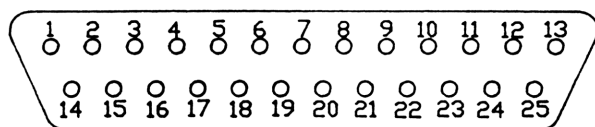


Pin 1:	RS-232 Transmit <u>from</u> SerialPlus
Pin 2:	TTL Transmit <u>from</u> SerialPlus
Pin 3:	+5 volts <u>from</u> SerialPlus
Pin 4:	GND
Pin 5:	GND
Pin 6:	HP-IL
Pin 7:	HP-IL
Pin 8:	8 VAC <u>into</u> SerialPlus
Pin 9:	RS-232 receive <u>into</u> SerialPlus
Pin 10:	No connection
Pin 11:	TTL receive <u>into</u> SerialPlus
Pin 12:	Enable, GND (or connect to pin 4/5) to enable SerialPlus transmit
Pin 13:	HP-IL
Pin 14:	HP-IL
Pin 15:	8 VAC <u>into</u> SerialPlus.

See below for signal details .

25-Pin Plug on Optional Serial Cables

Figure 3



Pin 1:	GND (15-Pin 4)
Pin 2:	RS-232 receive <u>into</u> SerialPlus
Pin 3:	RS-232 transmit <u>from</u> SerialPlus
Pin 4:	10K ohm to Pin 3 (Pull down in "off" state)
Pin 6:	Jumpered to Pin 20
Pin 7:	GND (jumpered to Pin 1)
Pin 8:	Handshake for duplex operation; not available on SerialPlus (15Pin-10)
Pin 20:	Jumpered to Pin 6.

All other pins: No connection.

Note: For communication to another computer in D.C.E. mode, Pins 2 and 3 may be reversed by simply disassembling the plug.

READER COMMENT FORM

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or applying the material presented in this manual.

Were there specific sections, pages, or illustrations that
you found particularly helpful or particularly confusing?
Please explain.

This image shows a blank sheet of white paper with horizontal black ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the paper.

Oregon Digital Systems, Inc.
885 N.W. Grant Ave.
Corvallis, OR 97330
(503) 752-0448

