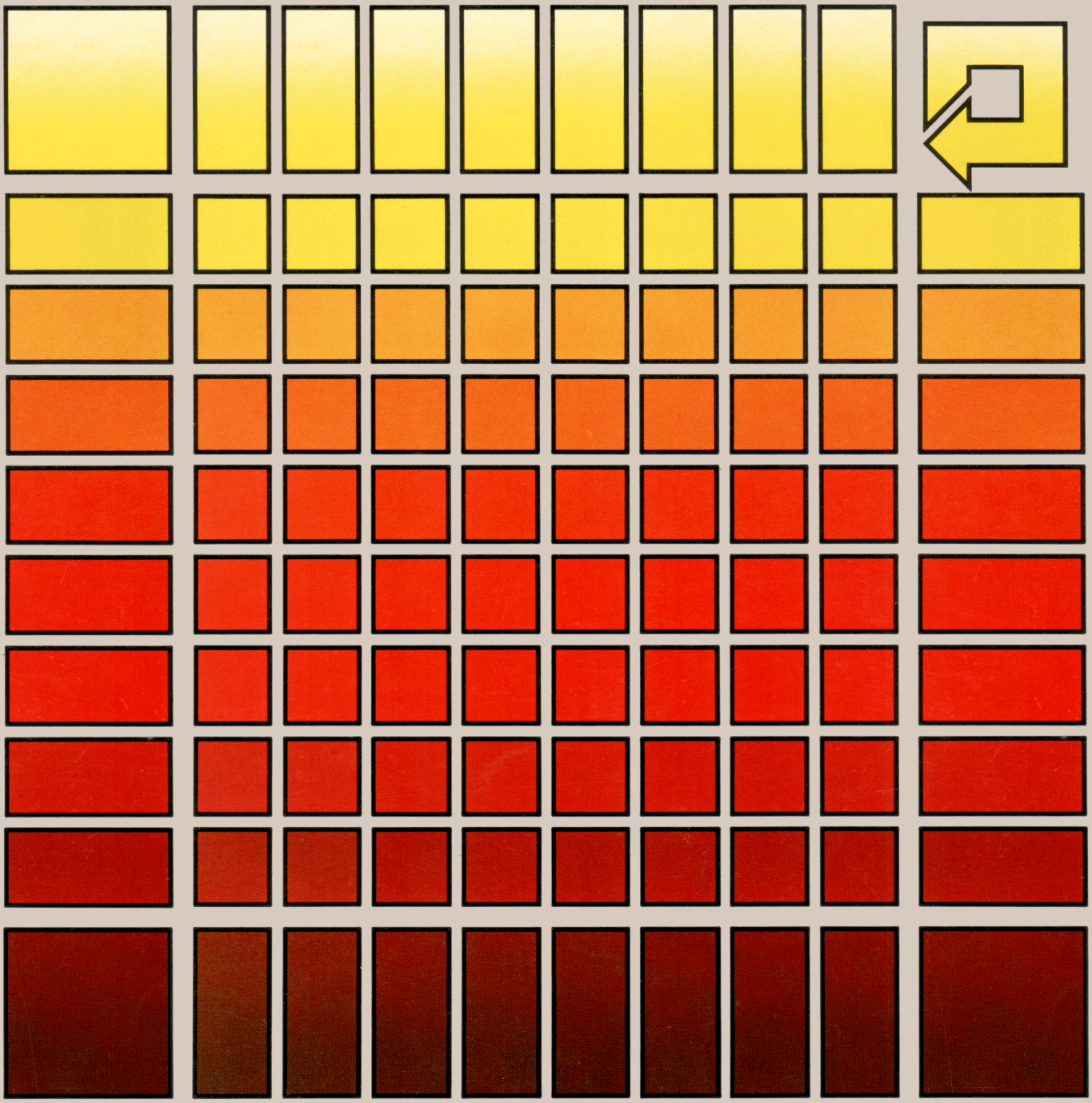
HEWLETT-PACKARD

HP 82168A

Acoustic Coupler

OWNER'S MANUAL



HEWLETT PACKARD

HP 82168A
Acoustic Coupler

Owner's Manual

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Read This First!

System Documentation

This manual for the HP 82168A Acoustic Coupler should be used in conjunction with the manuals for other components in your HP-IL system. In particular, the manuals for your HP-IL controller and its HP-IL enhancements describe how to control HP-IL peripherals. If you intend to use preprogrammed software to operate the coupler, the manuals for that software will describe how to control the coupler. This manual describes only the operation of the coupler—you may need to refer to other manuals for additional information.

To best learn how to use the coupler with your controller, read these parts of this manual in the order shown:

1. **Section 1, "Basic Operation."** It gives basic information about connecting and using the coupler.
2. **The section applicable to your controller.** It lists the coupler's capabilities that your controller can use, describes how your controller operates the coupler, and gives several examples that you can use with the coupler. (This part may not be necessary if you'll be using a preprogrammed software solution.)

If you need additional reference information about the coupler, refer to appendix C, "Technical Description," which describes the technical aspects of the coupler's operation.

If you have a controller that isn't discussed in the manual, refer to appendix C for information about how the coupler can be operated using HP-IL messages. If your controller is manufactured by Hewlett-Packard and you need information about using it with the coupler, you can write to:

Hewlett-Packard Company
Portable Computer Division Customer Support
1000 N.E. Circle Blvd.
Corvallis, OR 97330

Contents

Section 1

Basic Operation

Introduction

The HP 82168A Acoustic Coupler is a telephone interface device that provides remote communications capabilities for your computer through the Hewlett-Packard Interface Loop (HP-IL).

Your HP 82168A Acoustic Coupler is packaged with the following accessories:

- One HP-IL cable.
- One ac adapter/recharger.
- One rechargeable nickel-cadmium battery pack.

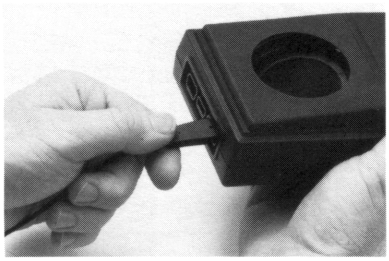
Specifications and optional accessories are listed in appendix B.

Installation

Power

Power for the HP 82168A Acoustic Coupler is provided by the rechargeable battery pack. The battery pack is located in the compartment on the top of the coupler.

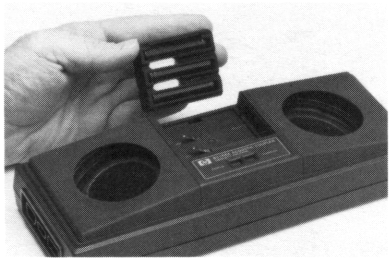
> **Note:** Be sure the battery pack is installed whenever the recharger is connected. If this is not done, improper operation may result.



To recharge the battery pack using ac power, insert the ac plug of the ac adapter/recharger into an ac outlet and plug the recharger connector into the RCH receptacle at the end of the coupler. (The coupler does not have to be powered down.) If the coupler is turned off, the battery pack will fully recharge in about 4 hours. If the coupler is operating, the battery pack will recharge in about 13 hours. A fully charged battery pack will operate the coupler for approximately 3 hours without the ac adapter/recharger plugged in.

To maintain long battery life, it is recommended that you always fully charge the battery pack and let it fully discharge before you recharge it. Otherwise, the charging capacity of the pack will be reduced.

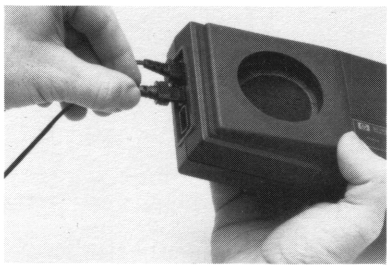
To remove or replace the battery pack, *unplug the recharger* and disconnect the coupler from the interface loop. Press on the back of the battery compartment door and lift it off the coupler. Then lift the battery pack out of the compartment. To install the battery pack, align its contacts with the two spring connectors, then replace the door and secure its latch.



HP-IL Connections

The Hewlett-Packard Interface Loop consists of a controller (computer) and one or more peripheral devices. The devices may be connected in any order—but the interface must form a continuous loop. All connections are designed to ensure proper orientation.

To connect the HP 82168A Acoustic Coupler to the loop, unplug one end of a cable from a device in the loop and plug it into the coupler. Then, with another cable (one is included with the coupler), connect the coupler to that device. (In some cases, the coupler may be the only device in the loop.)



Note: The system's operation may be disrupted when the loop is disconnected.

After connecting the coupler to the loop, you may need to initialize the system to accomodate the new device. (Refer to "HP-IL Messages" in appendix C.) *All devices must be turned on for the interface loop to operate properly.*

Operation

As soon as the HP 82168A Acoustic Coupler has power and is connected on the loop, you can begin using its capablities.

Refer to appendix A for information about verifying proper operation of the coupler.

Front Panel Indicators

The front panel of the coupler contains two indicators that let you know when the coupler is operating properly.

POWER Indicator. The POWER indicator shows whether or not the coupler is powered up. When the coupler is powered up, the POWER indicator will become dark red. When it is powered down, the POWER indicator will become pale red.

The coupler will power up whenever it receives any HP-IL message. Therefore, you can power up the coupler by simply operating the loop with your controller. (However, the first message will be lost, and a "transmit" error may result.)

Using your controller, you can power down the coupler by sending a Loop Power Down message. (Refer to "HP-IL Messages" in appendix C.) Additionally, the coupler will automatically power down if no HP-IL activity occurs and no carrier tone is detected for 10 minutes. This "activity time-out" can be disabled with Remote mode instructions sent using your controller. (Refer to "Remote Mode Instructions" in appendix C.) After an activity time-out, if the coupler is sent an HP-IL message, that message will be lost and a "transmit" error will result. Therefore, you should ensure that your controller can accommodate this type of error.

The coupler will also power down when battery power becomes insufficient. When battery power first becomes low, the POWER indicator will start flashing, indicating that there is about 3 minutes of sufficient power remaining. You should connect the ac adapter/recharger to continue operations.

> **Note:** The coupler will not power up if battery power is insufficient. If your coupler will not power up, remove and reinstall the battery pack then connect the ac adapter/recharger. After the battery pack has recharged for about a minute, you can power up the coupler.

CARRIER Indicator. The CARRIER indicator shows when the coupler detects a carrier tone of the proper frequency from the telephone line. The carrier indicator is dark green when a carrier tone is detected and pale green when one is not detected.

Establishing a Communications Link

Before establishing a communications link with a computer over the telephone line, the following settings must be determined:

- Control protocol.
- Parity.

These settings are based in part on the settings of the computer system your coupler will be communicating with. You should make sure the dial-up computer system transmits and receives data at 300 baud.

Control Protocol. The coupler can interact with a computer over the telephone line using a choice of protocols (procedures) that govern how devices send and receive information. The coupler can use XON/XOFF, ENQ/ACK , or no protocol. Before establishing a link, the coupler should be set to the same protocol as the dial-up system. The coupler's protocol can be selected by the controller using Remote mode instructions. (Refer to "Remote Mode Instructions" in appendix C.)

The default setting for the coupler is XON/XOFF protocol.

Parity. Many computer systems encode transmitted data with a "parity bit" for use in error-checking procedures. (Refer to "Data Error Detection" in appendix C.) The coupler should be set to use the same parity as the dial-up computer. This can be done with your controller using Remote mode instructions. The following parities are available:

- Even parity (default).
- Odd parity.
- Zero parity.
- One parity.
- No parity.

Establishing a Telephone Link. To establish a communications link with another computer, dial the number for the computer and listen for the carrier tone. When you hear the tone, insert the telephone handset into the acoustic cups of the coupler. *Be sure the cord to the handset is at the end of the coupler marked CORD.* Push firmly on the handset to ensure that the rubber collars form a tight seal. When the coupler detects the carrier tone, the CARRIER indicator will become dark green.

If you dial up a system which requires that a person on the other end establish the link, be sure you have a good telephone connection, then insert the handset into the coupler. When the person on the other end has established a link to the computer and your coupler detects a carrier tone, the CARRIER indicator will become dark green. You can then use the coupler to communicate with the computer.

Terminating a Telephone Link. After ending communications with the other computer, you can terminate the telephone link by removing the handset from the coupler. The telephone handset can be removed by rolling it to one side and pulling it out of the coupler.

> **Note:** To insure proper operation, the handset must be fully seated in the coupler. If the handset is not pushed into the coupler as far as it will go, data transmission errors may occur.

Telephone Link Interruptions. There are times when, to recover from errors, it is desirable to suspend communications between the coupler and the computer on the telephone line. The coupler can be instructed to break communications with the computer by sending it a B1 (break on) instruction followed immediately by a B0 (break off) instructions. (Refer to "Remote Mode Instructions" in appendix C.) This operation sends the computer a short "break" signal, interrupting its operation. A computer that recognizes a break will suspend operations until you send it instructions.

There may occasionally be unintentional interruptions because of a poor telephone connection or acoustical interference. If your carrier tone is lost or the connection is faulty (in which case data transmission errors might be detected), you should hang up, redial the computer, and reestablish the link. If you cannot reestablish contact, refer to "Verifying Proper Operation" in appendix A. Should you encounter further problems with the connection, you should contact the computer operator or the telephone company and request service.

> **Note:** The coupler should be set on a surface that is free from vibrations and other disturbances. If the coupler is subject to vibrations, loud noises, or other physical disturbance, data transmission might be disrupted.

Section 2

Using the HP-75 As a Controller

This section contains procedures for operating the HP 82168A Acoustic Coupler with an HP-75 Portable Computer. Also, it contains a program that enables your HP-75 to act as a remote terminal for a host computer (or even another HP-75).

The following minimum configuration is necessary for using the HP-75 with the HP 82168A Acoustic Coupler:

- HP-75 Portable Computer.
- HP 82168A Acoustic Coupler.
- *HP-75 I/O Utilities Users' Library Solutions* (part number 00075-13013).

Without the HP-IL Commands file included with the users' library solutions book, you cannot operate the coupler with the HP-75. The solutions book can be obtained from your Hewlett-Packard dealer. Also, the following may be helpful:

- Users' Library program number 75-00168-1. This is a terminal emulator program that works like the one described in this section. The program can be obtained from HP-75 Users' Library, Hewlett-Packard Company, 1000 N.E. Circle Blvd., Corvallis, OR 97330, U.S.A.
- HP-75 Data Communications Pac (part number 00075-15035), available from your Hewlett-Packard dealer. This is a ROM-based terminal emulator program that does not require the use of the HP-75 I/O utility solution.
- *The HP-IL SYSTEM: An Introductory Guide to the Hewlett-Packard Interface Loop*, by Gerry Kane, Steve Harper, and David Ushijima. Published by OSBORNE/McGraw Hill, this book is available at many bookstores.

Power Up and Power Down

The HP 82168A Acoustic Coupler is powered up and down by the HP-IL controller. To power up the coupler using the HP-75, type in the following instruction with the HP-75 in Standby OFF mode and press [RTN].

```
ASSIGNIO
```

If device codes have already been assigned, you may use the `RESTORE10` instruction to power up the coupler.

The coupler, along with all other devices that respond to the LPD message, can be powered down by typing in the following instruction and pressing [RTN].

```
SENDIO ',''TL+,LPD',''
```

(If a printer is assigned on the loop, a `PRINTER IS *` instruction must be executed prior to the `SENDIO` instruction. If a display device is assigned on the loop, `DISPLAY IS *` must be executed first.)

Establishing Settings

Instructions can be sent to the coupler to establish certain settings necessary for data communications. Instructions are sent in the following format:

```
SENDIO ' device code ','unl,ren,lad#','instructions ' @ SENDIO ",'nre',"
```

where ***instructions*** consists of one or more instructions listed in the following table.* (For example, to set the coupler to odd parity and no protocol, ***instructions*** would be `P1;C0;` in the `SENDIO` statement.)

Coupler Instructions

Instruction*	Coupler Response
P0;	Sets to even parity.
P1;	Sets to odd parity.
P2;	Sets to zero parity.
P3;	Sets to one parity.
P4;	Sets to no parity (8-bit data).
C0;	Sets to no protocol.
C1;	Sets to ENQ/ACK protocol.
C2;	Sets to XON/XOFF protocol.
E;	Enables activity timeout.
D;	Disables activity timeout.
R;	Clears buffers.
T;	Runs self-test.

* Be sure to include the semicolon in the instruction.

Coupler Status

The following routine determines the values of the coupler's status bytes and assigns them to two variables, S1 and S2. S1 will contain the value of the system status byte and S2 will contain the value of the device status byte. (Refer to appendix C for more information about status bytes.)

```
10 S$ = ENTIO$(' device code ','unl,tad#,sst')
20 S1 = num(S$)
30 S2 = num(S$[2])
```

Terminal Emulator Program

The HP-75 terminal emulator program enables you to link up with another computer through the acoustic coupler. Your HP-75 then becomes a remote terminal for the computer.

To use the terminal emulator program, first read the magnetic card included with the *HP-75 I/O Utilities Users' Library Solutions* book through the card reader. Then enter the terminal emulator program into the HP-75 using either the program listing on pages 17 and 18 or the magnetic card included with the user's library program.

To begin the program, type `run` ***filename*** (using the file name under which you have stored the terminal emulator program) and press RTN. The HP-75 will initialize the interface loop. This program specifically searches the loop for the HP 82168A Acoustic Coupler, the HP 82163 Video Interface, the HP 82161A Digital Cassette Drive, the HP 82162A Thermal Printer, and the HP 82905B Printer. Other devices that may be on the loop are not used by the program.

* Device codes are described in section 9, "HP-IL Operations," in the *HP-75 Owner's Manual.*

After the HP-75 has initialized the loop, it will show the device assignments on its display. If an HP 82163 Video Interface is used, the HP-75 will display the device assignments on the video display.

When the HP-75 has finished assigning devices, it will prompt you with `ready...` on its display. You should now set the coupler to the parity and protocol that the host computer will be using. Also, you can select the display mode desired. To do this, press [EDIT]—the HP-75 will prompt you with:

```
Frame, Print:OFF, Echo:OFF
```

You can select a mode or setting by pressing the key corresponding to the underlined letter in a keyword. For example, to turn Print ON and Print OFF, press [P]. When Print is ON, all information sent and received from the telephone line will be printed, regardless of which device is the display device.

If you select Echo, the program will display all information sent and received over the phone line on the display device and on the printer (if Print is ON). If Echo is OFF, only information received from the phone line will be displayed and printed.

Note: Some host computers use an echo function and might echo information that is received. If you are linked with such a computer, you might receive a double echo when Echo is ON and a single echo when Echo is OFF.

If you press [F] for `Frame`, you will see the following prompt on the HP-75 display.

```
Parity:Even, PRotocol:XON/XOFF
```

If you press [P], the HP-75 will prompt you to select a parity. If you press [R], the HP-75 will prompt you to select a protocol.

After pressing [P], the HP-75 will display:

```
Even, Odd, 0, 1, None
```

With this prompt in the display, you can select the parity that the coupler will use. Be sure to select the parity that the host computer will be using. To select a parity, press [E], [O], [O], [1], or [N]. After selecting a parity, the HP-75 will display the `ready...` prompt again.

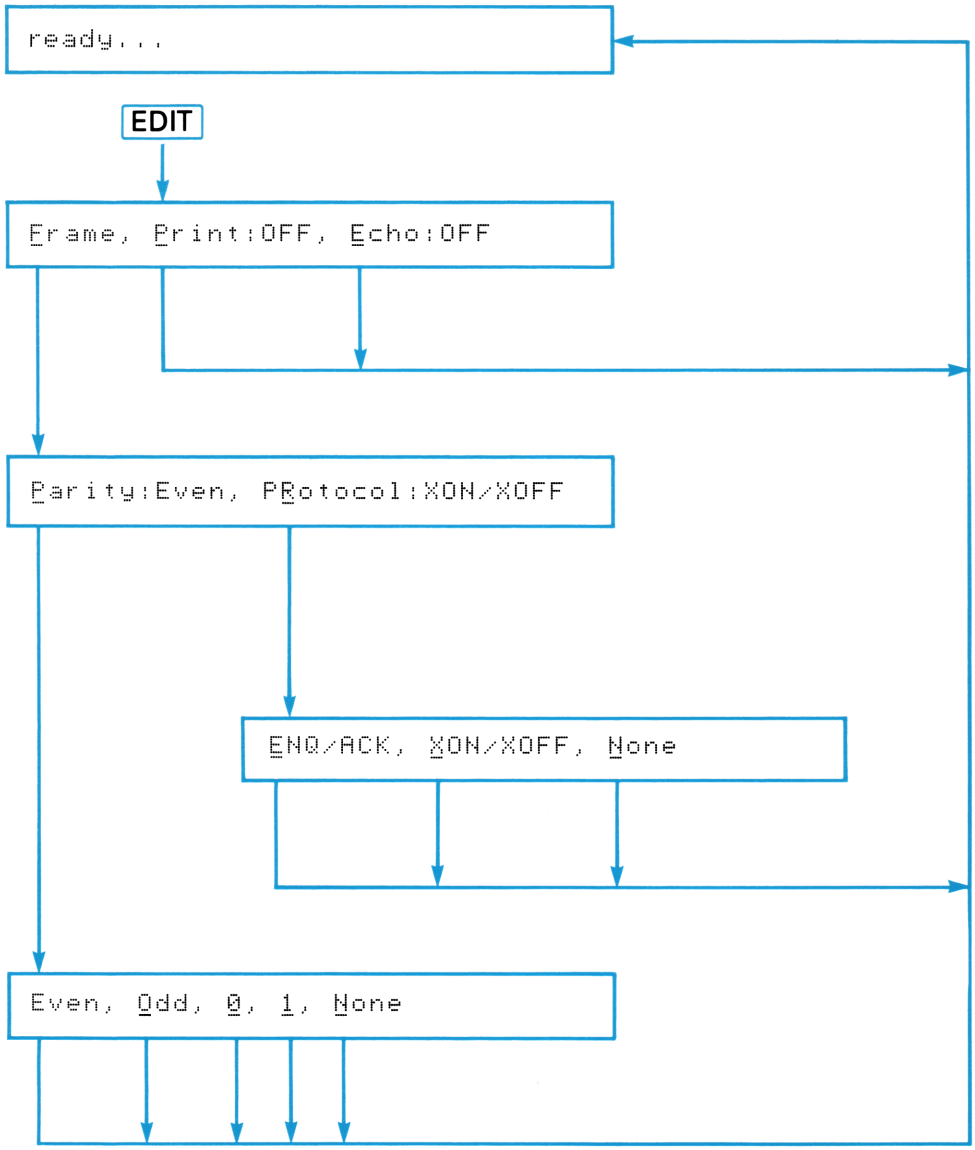
After pressing [R] for protocol, the HP-75 display will show the prompt:

```
ENQ/ACK, XON/XOFF, None
```

Pressing [E] will select ENQ/ACK protocol, pressing [X] will select XON/XOFF protocol, and pressing [N] will select no protocol. When you have selected a protocol (or no protocol), the HP-75 will display the `ready...` prompt.

Note: Pressing any key other than one corresponding to a keyword in the prompt will return the HP-75 to the `ready...` prompt. This is useful when you want to view the coupler's settings without changing them.

The following diagram shows the sequence of keystrokes needed to enable printing and echo, and to set the protocol and parity on the coupler.



When you have finished initializing the coupler, you can dial up the host computer, listen for the carrier tone, and insert the telephone handset into the coupler. You are now ready to communicate with the computer.

If you need to change any of the coupler settings while connected to a host computer, you can do so by pressing [EDIT] and the appropriate keys.

If at any time you need to do a "break", press [CNTL] and [ESC] simultaneously. If the computer recognizes a break signal over the telephone line, it will halt operations and wait for you to send a system command. (This is the usual response; however, not all computers respond the same way to a break signal.)

If at any time you want to halt the terminal emulator program, press [CLR]. (If you do this, you may need to reinitialize the coupler and redial the host computer.)

HP-75 Terminal Emulator Program Listing

```
1000 !    T E R M - 7 5 C
1010 !       rev 1.3
1020 STANDBY OFF
1030 DELAY 0 @ WIDTH INF @ PWIDTH INF
1040 C1,E1,M1,P1,P2,T1=0
1050 DIM A$[50],C$[3],E$[3],H$[8],K$[2],K1$[4],P$[3],P1$[4]
1060 P$='OFF' @ P1$='EVEN' @ H$='XON/XOFF' @ E$='OFF'
1070 K1$=CHR$(13)&CHR$(131)&CHR$(27)&CHR$(139)
1080 GOSUB 1520
1090 IF NOT M1 THEN PRINT '**** no modem ****' @ BEEP 100,.5 @ END
1100 CLEAR ':ph'
1110 DISP @ DISP 'ready...'
1120 K$=KEY$ @ IF K$='' THEN GOSUB 1180 @ GOTO 1120
1130 ON POS(K1$,UPRC$(K$))+1 GOTO 1150,1140,1230,1200,1790
1140 ! K$=K$&CHR$(10) ! Optional Line Feed.
1150 SENDIO ':ph','unl,lad#',K$
1160 IF E1 THEN PRINT K$;
1170 GOTO 1120
1180 PRINT ENTIO$(':ph','unl,tad#,sda');
1190 RETURN
1200 PRINT '***break***' @ SENDIO ':ph','unl,ren,lad#','B1;'
1210 WAIT .17 @ SENDIO ':ph','lad#','B0;'
1220 SENDIO '','nre','' @ GOTO 1110
1230 DISP @ DISP CHR$(NUM('F')+128)&'rame, ';
1240 DISP CHR$(NUM('P')+128)&'rint:'&P$;
1250 DISP ', '&CHR$(NUM('E')+128)&'cho:'&E$;
1260 K$=KEY$ @ IF K$='' THEN GOSUB 1180 @ GOTO 1260
1270 ON POS('FPE',UPRC$(K$))+1 GOTO 1110,1330,1280,1310
1280 IF P1 AND NOT P2 THEN P$='ON ' @ P2=1 ELSE P$='OFF' @ P2=0
1290 GOSUB 1840
1300 GOTO 1110
1310 IF E1 THEN E1=0 @ E$='OFF' ELSE E1=1 @ E$='ON '
1320 GOTO 1110
1330 DISP @ DISP CHR$(NUM('P')+128)&'arity:'&P1$&', P'&CHR$(NUM('R')+128)&'otoco
l:'&H$
1340 K$=KEY$ @ IF K$='' THEN GOSUB 1180 @ GOTO 1340
1350 ON POS('PR',UPRC$(K$))+1 GOTO 1110,1360,1450
1360 DISP @ DISP CHR$(NUM('E')+128)&'ven, '&CHR$(NUM('O')+128)&'dd, ';
1370 DISP CHR$(NUM('O')+128)&', '&CHR$(NUM('1')+128)&', '&CHR$(NUM('N')+128)&'on
e';
1380 K$=KEY$ @ IF K$='' THEN GOSUB 1180 @ GOTO 1380
1390 ON POS('EOO1N',UPRC$(K$))+1 GOTO 1110,1400,1410,1420,1430,1440
1400 P1$='EVEN' @ C$='P0;' @ GOTO 1820
1410 P1$='ODD ' @ C$='P1;' @ GOTO 1820
1420 P1$='0   ' @ C$='P2;' @ GOTO 1820
1430 P1$='1   ' @ C$='P3;' @ GOTO 1820
1440 P1$='NONE' @ C$='P4;' @ GOTO 1820
1450 DISP @ DISP CHR$(NUM('E')+128)&'NO/ACK, '&CHR$(NUM('X')+128)&'ON/XOFF, ';
1460 DISP CHR$(NUM('N')+128)&'one';
1470 K$=KEY$ @ IF K$='' THEN GOSUB 1180 @ GOTO 1470
1480 ON POS('EXN',UPRC$(K$))+1 GOTO 1110,1490,1500,1510
1490 H$='ENQ/ACK' @ C$='C1;' @ GOTO 1820
1500 H$='XON/XOFF' @ C$='C2;' @ GOTO 1820
1510 H$='NONE   ' @ C$='C0;' @ GOTO 1820
1520 ASSIGN IO ':zz'
1530 I=1
1540 A$='tad'&STR$(I)&',sai'
1550 D=NUM(ENTIO$('',A$))
1560 IF NOT D THEN 1630
1570 IF D=65 AND NOT M1 THEN M1=I
1580 IF D=48 AND NOT T1 THEN T1=I
1590 IF D=33 AND NOT P1 THEN P1=I @ P2=33
1600 IF D=32 AND NOT P1 THEN P1=I
1610 IF D=16 AND NOT C1 THEN C1=I
1620 I=I+1 @ GOTO 1540
1630 A$='' @ I1=1
1640 IF NOT (C1=I1) AND NOT (M1=I1) AND NOT (T1=I1) AND NOT (P1=I1) THEN 1700
1650 IF C1=I1 THEN A$=A$&':ca'
```

```
1660 IF M1=I1 THEN A$=A$&':ph'
1670 IF P1=I1 THEN A$=A$&':pr' @ P1=1
1680 IF T1=I1 THEN A$=A$&':tv' @ T1=1
1690 GOTO 1710
1700 A$=A$&':'&CHR$(IP(I1/10)+65)&STR$(MOD(I1,10))
1710 I1=I1+1 @ IF I1<I THEN A$=A$&',' @ GOTO 1640
1720 ASSIGN IO A$
1730 IF P2=33 THEN PRINTER IS ':pr' @ PRINT CHR$(27)&'&l1L' @ P2=0
1740 IF T1 THEN DISPLAY IS ':tv' @ CLEAR ':tv' ELSE DELAY .25
1750 LIST IO
1760 DISPLAY IS *
1770 GOSUB 1840
1780 RETURN
1790 IF T1 THEN DISPLAY IS ':tv'
1800 DISP
1810 END
1820 SENDIO ':ph','unl,ren,lad#',C$ @ SENDIO '','nre',''
1830 GOTO 1110
1840 ON 2*T1+P2*P1+1 GOTO 1850,1860,1870,1880
1850 A$='' @ GOTO 1890
1860 A$=':pr' @ GOTO 1890
1870 A$=':tv' @ GOTO 1890
1880 A$=':tv,:pr'
1890 PRINTER IS A$
1900 RETURN
```

Appendix A

Care, Warranty, and Service Information

Care of the Acoustic Coupler

The HP 82168A Acoustic Coupler requires very little maintenance. However, you should observe the temperature limits listed in appendix B.

Verifying Proper Operation

If at any time you suspect that your HP 82168A Acoustic Coupler or interface loop is not operating properly, you can verify its operation by doing the following:

1. Check that all HP-IL devices are turned on.
2. Check that the POWER indicator is dark red and that it is not flashing. If the coupler has inadequate power, it will not operate properly.
3. Check that the CARRIER indicator is dark green.
4. Check that the dial-up computer system is operating in "answer" mode. (This ensures that the dial-up system is compatible with the coupler, which operates in "originate" mode.) To do this, pick up the telephone and listen for a high-pitched continuous tone.
5. Check that the coupler is using the appropriate protocol and parity. (Refer to "Remote Mode Instructions" in appendix C.) The coupler should use the same protocol and parity as the computer on the other end of the telephone line.
6. Check that the controller and its interface are operating properly.
7. Check that the coupler is not subject to any vibrations or loud noises. Vibration and noise can affect the transmission of acoustic signals.
8. Disconnect the ac adapter/recharger and remove the battery pack from the coupler. After a few seconds, insert the battery pack into the coupler.
9. Ensure that the telephone handset is properly inserted. If it is is not pushed in firmly and properly oriented, it may not transmit acoustic signals properly.
10. Remove the handset and listen for excessive static or noise. If there is any, you should redial the host computer and listen for a clear connection before inserting the handset in the coupler. (Generally, if the telephone line is clear enough for a conversation, it will be clear enough for data transmission.) The quality of the telephone connection can also be affected by carbon granule packing in the handset. To ensure that the granules are not packed, tap the handset with your hand before iserting it into the coupler.
11. If you still suspect the coupler is not operating properly, instruct it to do a self-test by sending it a "T" (Remote mode) instruction using your controller. (Refer to "Remote Mode Instructions" in appendix C.) The coupler will do a self-test of its internal circuitry and set the appropriate bit in the system status register indicating the result of the test. Using your controller, instruct the coupler to send its status. The system status byte will indicate the results of the self-test. (Refer to "Remote Mode Instructions" in appendix C.)

Note: Performing a self-test resets the coupler to its start-up conditions.

If you still experience difficulty after performing these procedures, write or telephone Hewlett-Packard at an address or phone number listed below under "Service."

Limited One-Year Warranty

What We Will Do

The HP 82168A Acoustic Coupler is warranted by Hewlett-Packard against defects in materials and workmanship for one year from the date of original purchase. If you sell your unit or give it as a gift, the warranty is automatically transferred to the new owner and remains in effect for the original one-year period. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you return the product, shipping prepaid, to a Hewlett-Packard service center.

What Is Not Covered

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 an authorized Hewlett-Packard service center.

No other express warranty is given. The repair or replacement of a product is your exclusive remedy. **ANY OTHER IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS IS LIMITED TO THE ONE-YEAR 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 HEWLETT-PACKARD COMPANY 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 limitation or exclusion may not apply to you.

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

Obligation to Make Changes

Products are sold on the basis of specifications applicable at the time of manufacture. Hewlett-Packard shall have no obligation to modify or update products once sold.

Warranty Information

If you have any questions concerning this warranty, please contact an authorized Hewlett-Packard dealer or a Hewlett-Packard sales and service office. Should you be unable to contact them, please contact:

- In the United States:

  Hewlett-Packard Company
  Portable Computer Division
  1000 N.E. Circle Blvd.
  Corvallis, OR 97330
  Telephone: (503) 758-1010
  Toll-Free Number: (800) 547-3400 (except in Oregon, Hawaii, and Alaska)

- In other countries:

  Hewlett-Packard Intercontinental
  3495 Deer Creek Rd.
  Palo Alto, California 94304
  U.S.A.
  Telephone: (415) 857-1501

Note: Do *not* send units to this address for repair.

Service

Hewlett-Packard maintains service centers in most major countries throughout the world. You may have your unit repaired at a Hewlett-Packard service center any time it needs service, whether the unit is under warranty or not. There is a charge for repairs after the one-year warranty period.

Hewlett-Packard products are normally repaired and reshipped within five (5) working days of receipt at any service center. This is an average time and could possibly vary depending upon the time of year and work load at the service center. The total time you are without your unit will depend largely on the shipping time.

Obtaining Repair Service in the United States

The Hewlett-Packard United States Service Center for the HP 82168A Acoustic Coupler is located in Corvallis, Oregon:

Hewlett-Packard Company
Service Department
P.O. Box 999
Corvallis, Oregon 97339, U.S.A.

or

1030 N.E. Circle Blvd.
Corvallis, Oregon 97330, U.S.A.
Telephone: (503) 757-2000

Service Repair Charge

There is a standard repair charge for out-of-warranty repairs. The repair charges include all labor and materials. In the United States, the full charge is subject to the customer's local sales tax.

Products damaged by accident or misuse are not covered by the fixed repair charges. In these situations, repair charges will be individually determined based on time and material.

Service Warranty

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

Shipping Instructions

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

- A completed Service Card, including a description of the problem and system setup when the problem occurred.
- A sales receipt or other documentary proof of purchase date if the one-year warranty has not expired.

The product, the Service Card, a brief description of the problem and system configuration, and (if required) the proof of purchase date should be packaged in the original shipping case or other adequate protective packaging to prevent in-transit damage. Such damage is not covered by the one-year limited warranty; Hewlett-Packard suggests that you insure the shipment to the service center. The packaged unit should be shipped to the nearest Hewlett-Packard designated collection point or service center. Contact your dealer directly for assistance.

Whether the unit is under warranty or not, it is your responsibility to pay shipping charges for delivery to the Hewlett-Packard service center.

After warranty repairs are completed, the service center returns the unit with postage prepaid. On out-of-warranty repairs in the United States and some other countries, the unit is returned C.O.D. (covering shipping costs and the service charge).

Further Information

Service contracts are not available. Circuitry and designs are proprietary to Hewlett-Packard, and service manuals are not available to customers.

Should other problems or questions arise regarding repairs, please call your nearest Hewlett-Packard service center.

Potential for Radio/Television Interference (for U.S.A. Only)

The HP 82168A Acoustic Coupler generates and uses radio frequency energy and may cause interference to radio and television reception. Your HP 82168A Acoustic Coupler complies with the specifcations in Subpart J of Part 15 of the FCC Rules for a Class B computing device. These specifications provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If your coupler does cause interference to radio or television reception, which can be determined by powering down then powering up the coupler, you can try to eliminate the interference problem by doing one or more of the following:

- Reorient the receiving antenna.
- Change the position of the coupler with respect to the receiver.
- Move the coupler away from the receiver.
- Plug the ac adapter/recharger into a different outlet so that the coupler and the receiver are on different branch circuits.

If necessary, consult an authorized HP dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

Dealer and Product Information

For dealer locations, product information, and prices, please call (800) 547-3400. In Oregon, Alaska, and Hawaii, call (503) 758-1010.

Appendix B

Accessories and Specifications

Accessories

HP-IL cables in the following lengths are available from your authorized Hewlett-Packard dealer:

½ meter (1½ feet)	HP 82167A
1 meter (3 feet)	HP 82167B
5 meters (16 feet)	HP 82167D*

Specifications

Telephone Interface

- Data transmission rate: 300 baud.
- Input buffer capacity: 40 bytes.
- Output buffer capacity: 40 bytes.
- Bell type 113C (compatible with Bell types 103J and 113D).
- Tramsmit level: −12 to −17 dBm
- Transmit frequencies (Hz): 1070, 1270
- Receive frequencies (Hz): 2025, 2225
- Frequency stability control: Crystal.
- Receiver sensitivity: −45 dBm.
- Modulation: Frequency Shift Keyed (FSK).
- Carrier detect delay: 1.5 seconds (average).

Computer Interface

- Type: HP-IL (Hewlett-Packard Interface Loop).
- Default address: undefined.

Power

- Battery voltage: 3.1 to 4.8 Vdc.
- Recharger: Input 90 to 120 Vac, 50 to 60 Hz, 7 W.
  Output 8 Vac, 3 W maximum.
- Power consumption: 440 mW.

Temperature

- Operating temperature: 0° to 45°C (32° to 113°F).
- Charging temperature: 15° to 40°C (59° to 104°F).
- Storage temperature: −20° to 55°C (−40° to 149°F).

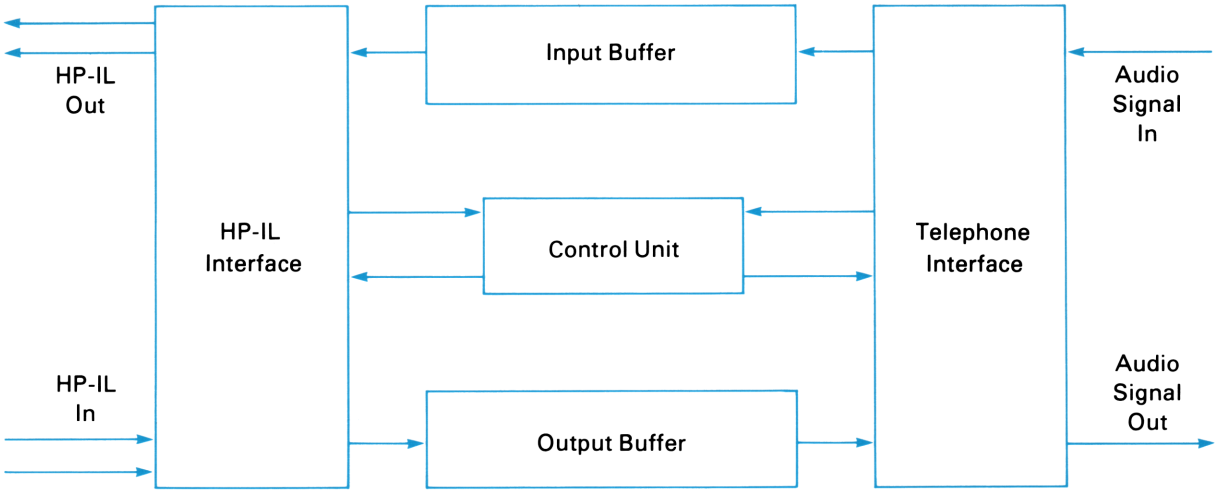
*Not available in all countries.

Appendix C

Technical Description

Internal Design

The HP 82168A Acoustic Coupler has five basic internal components that operate together. These are the control unit, the HP-IL interface, the telephone interface, the input buffer, and the output buffer.



Control Unit

The control unit is the central processor of the coupler. It controls the flow of information between the HP-IL interface and the telephone interface. It also controls how the coupler responds on the interface loop and how it interacts with a computer through the telephone line. The control unit contains several modes and settings that determine how it operates. These can be set by the controller with HP-IL messages. (Refer to "HP-IL Messages," page 28.)

HP-IL Interface

The HP-IL interface controls the flow of HP-IL messages through the coupler. All interactions between the HP-IL controller and the coupler occur through the HP-IL interface. The interface determines which messages are addressed to the coupler, what kind of messages they are, and how the coupler should respond to them. Other messages are interpreted as either instructions for the coupler or data to be sent out over the phone line. Messages that are not addressed to the coupler are simply passed on to the next device on the loop.

Telephone Interface

The telephone interface translates acoustic signals received from the telephone handset into data to be placed in the input buffer. Also, it transforms data in the output buffer into acoustic signals to be sent through the telephone. The telephone interface encodes and decodes parity bits in data according to the selected error detection scheme. (Refer to "Data Error Detection," page 27.)

Input Buffer

The input buffer is a memory area in the coupler in which the control unit stores data received from the phone line. Information placed in this buffer is sent through HP-IL when the coupler is instructed to by the controller. The capacity of the input buffer is 40 bytes.

Output Buffer

The output buffer is a memory area in the coupler in which data to be sent over the phone line is stored. The data received from HP-IL remains in the output buffer until it is transmitted over the phone line. The capacity of the output buffer is 40 bytes.

Telephone Interaction

The coupler can interact with another computer over the phone line using certain protocols (procedures) that specify how data is to be transmitted and received. The coupler also uses an error checking procedure to monitor the integrity of transmitted data.

Control Protocols

The HP 82168A Acoustic Coupler has two control protocols which can be selected to control the manner in which data is transmitted and received over the telephone line. These are the ENQ/ACK and XON/XOFF protocols, which can be selected by the controller using HP-IL messages. (You can also specify that no protocol be used.) The protocol should be set to match the protocol used by the computer at the other end of the phone line.

ENQ/ACK Protocol. Using this protocol, the computer (the sending device) that is sending data over the phone line controls the timing and amount of the data sent. When it transmits a block of data, it will follow it with an ENQ character. The receiving device will then send the computer an ACK character when it has processed the block of data. After receiving the ACK character, the computer can send another block of data, followed by an ENQ.

The coupler can use this protocol only when it is the receiving device. It will respond to an ENQ with an ACK when its input buffer is empty.

XON/XOFF Protocol. Using this protocol, the receiving device controls the transmitting of data over the telephone line. When the receiving device is ready for data , it will send the computer at the other end an XON (DC1) character. The transmitting device will send data until the receiving device sends an XOFF (DC3) character.

> **Note:** Some computers do not immediately stop transmitting when they receive an XOFF character. Instead, they send whatever data is in their output buffers before they stop transmitting. You should determine how the computer on the other end of the telephone line uses this protocol.

When the coupler is the receiving device, it will send the computer on the other end an XON character when its input buffer is empty. When the coupler's input buffer becomes half full of data, it will send an XOFF character. After processing all of the information in its input buffer, it will transmit an XON character.

When the coupler is the transmitting device, it will send data from its output buffer over the telephone line when it receives an XON character from the computer on the other end. It will continue to send data until it receives an XOFF character from the line.

Data Error Detection

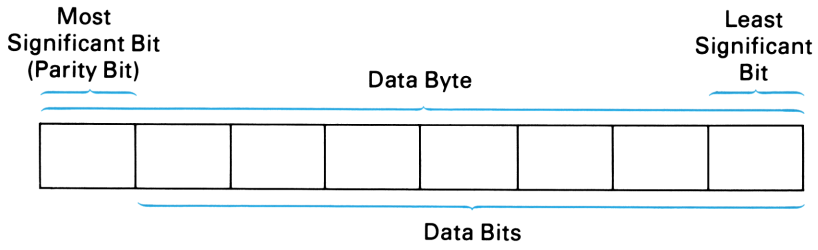
Occasionally, electrical or acoustical noise will introduce interference into a data communication line, producing an error in the data. Because of this, many computer communications systems employ error checking procedures to ensure that data is reliable. One effective procedure used by computers is to encode data with a parity bit. A parity bit is one bit in a byte of data (usually the most significant bit) that is

always set a certain way so that two devices communicating with each other can detect transmission errors. Usually, when a computer detects a parity error, it will notify the user of a data error.

The HP 82168A Acoustic Coupler sends and receives eight-bit data bytes over the phone line; however, it usually uses only seven bits for data. The eighth (most significant) bit can be used as a parity bit. Since this parity bit is used in different ways by different devices, you can select which parity the coupler uses. The parity used by the coupler should be the same as that used by the computer on the other end of the telephone line.

The following parities are available on the coupler:

- Even parity (default). The most significant bit of a data byte is set so that the number of "1"s in the byte is even.
- Odd parity. The most significant bit of a data byte is set so that the number of "1"s in the byte is odd.
- Zero parity. The most significant bit of a data byte is set to "0".
- One parity. The most significant bit of a data byte is set to "1".
- No parity. No bit is reserved for parity. All eight bits can be used for data.



Controlling the Coupler

Most controllers perform a specified operation (such as setting the protocol) by sending a preprogrammed sequence of HP-IL messages around the interface loop. As the operator of the controller, you would not be using the actual HP-IL messages, but would be using the the HP-IL capabilities built into your computer or its extensions. However, some applications might require that you send individual HP-IL messages. Therefore, the coupler's responses to *individual* HP-IL messages are described below.

The coupler operates according to information it receives on the interface loop. Specifically, it responds to the standard HP-IL messages (listed below), including Remote mode instructions. (Refer to "Remote Mode Instructions," page 30.)

Startup Conditions

When the coupler first powers up—including recovery from a low-power condition—it will be set to the following:

- Local mode.
- XON/XOFF protocol.
- Even parity.
- Activity time-out enabled.
- Undefined HP-IL address.

The coupler's address on HP-IL will be undefined until it is assigned a valid address by the controller.

HP-IL Messages

When the HP 82168A Acoustic Coupler receives a message on the interface loop, it responds according to the following list. (It does not respond to messages that are not listed.) Except where noted, it automatically passes the message on to the next device on the loop.

Responses to HP-IL Messages

HP-IL Message	Coupler Response
COMMAND GROUP	
Auto Address Unconfigure	Coupler's address is set to 31 (undefined).
Device Clear	Coupler sets to its startup conditions.
Enable Asynchronous Requests	Coupler is enabled to send Identify—Service Request messages to indicate the need for service. (Disabled by most "universal" command group messages.*)
Enable Listener Not Ready	Coupler is enabled to send a Not Ready For Data message if its output buffer is full. (It is disabled by any command group message.)
Go To Local	If the coupler is a listener, it will be set to Local mode.
Interface Clear	Talker or listener status removed and pending command cleared (unless a Device Clear command).
Listen Address 0-31	If message address matches coupler's address, coupler is removed from talker status and becomes a listener. This enables the coupler to accept data bytes from HP-IL. If message address is 31, coupler is removed from listener status. Coupler is set to Remote mode, if Remote enabled.
Loop Power Down	The coupler will power down.
Not Remote Enable	Disables Remote mode and sets to Local mode.
Parallel Poll Disable	If a listener, the coupler stops responding to Identify messages as parallel polls.
Parallel Poll Enable 0-15	Coupler is enabled to respond to Identify messages as parallel polls. (Refer to "Parallel Polling," page 34.)
Parallel Poll Unconfigure	Coupler stops responding to Identify messages as parallel polls.
Remote Enable	Coupler is enabled to operate in Remote mode when it becomes a listener.
Selected Device Clear	If the coupler is a listener it will respond as for Device Clear.
Talk Address 0-31	If message address matches coupler's address, coupler is removed from listener status and becomes a talker. This enables coupler to send data bytes on HP-IL. If address doesn't match, coupler is removed from talker status.
Unlisten	Coupler is removed from listener status.
Untalk	Coupler is removed from talker status.
READY GROUP	
Auto Address 0-31	If coupler has earlier assigned address, no response. If message address is 31, no response. If message address is less than 31 and coupler doesn't have earlier assigned address, coupler sets address to message address, increments message address by one, and passes revised message to next device in loop.
End Of Transmission—OK	If a talker, sent by coupler after transmitting last data byte from input buffer.
End Of Transmission—Error	If a talker, sent by coupler immediately if a data byte message is returned with an error.
Not Ready For Data	If a talker, makes the previous data byte the last data byte sent.

* Such as Unlisten, Interface Clear, and Device Clear, but not Loop Power Down.

Responses to HP-IL Messages *(continued)*

HP-IL Message	Coupler Response
Ready For Command	Executes any pending Loop Power Down message. Otherwise, no response.
Send Accessory ID	If a talker, the coupler sends one data byte with the value 65.†
Send Data	If a talker, the coupler sends data bytes from the input buffer to HP-IL.†
Send Device ID	If a talker, the coupler sends its model number (HP 82168A) as eight ASCII-coded data bytes.†
Send Status	If a talker, the coupler sends its system status byte followed by its device status byte.†
IDENTIFY GROUP	
Identify Identify-Service Request	If device is set to respond by Parallel Poll Enable message, modifies message according to parallel poll setup and service request status. (Refer to "Parallel Polling," page 34.)
DATA/END GROUP	
Data Byte	If talker, sends next data byte.†
Data Byte—Service Request	If listener and in Remote mode, accepts data byte as a device instruction. If listener and in Local mode, transmits data byte over the phone line. If service is required by coupler, message is modified to Data Byte—Service Request message.
End Byte End byte—Service Request	If listener and in Remote mode, accepts data byte as a device instruction. If listener and in Local mode, transmits data byte over the phone line. If service is required by coupler, message is modified to End Byte—Service Request message.

† Indicates that a message different from the received message is sent to the next device in the loop.

Remote Mode Instructions

Remote mode instructions are HP-IL data bytes that are interpreted as device instructions by the coupler when it is in Remote mode. These instructions tell the coupler how it should interact with a computer on the telephone line.

You can set the coupler to Remote mode by sending it a Remote Enable message and then making the coupler a listener. It will then respond to Remote Mode instructions. The coupler can be returned to Local mode using the Go To Local message or the Not Remote enable message. However, if the coupler is set to Local mode with a Go To Local message, it will be set back to Remote mode whenever it becomes a listener.

The HP 82168A Acoustic Coupler responds to the following instructions when it is in Remote mode and a listener:

Remote Mode Instructions

Instruction	Coupler Response
P0	Sets to even parity (default).
P1	Sets to odd parity.
P2	Sets to zero parity.
P3	Sets to one parity.
P4	Sets to no parity.
M0 ⋮ M255	Sets the system service request mask with the binary equivalent of the number. (Default is M0.)
E	Enables activity timeout (default).
D	Disables activity timeout.
T	Runs self-test. Sets coupler to startup condition. (Refer to appendix A, "Verifying Proper Operation.")
R	Clears input and output buffers.
B0	Break off (default).
B1	Break on.
C0	Sets to no protocol.
C1	Sets to ENQ/ACK protocol.
C2	Sets to XON/XOFF protocol (default).

Remote mode instructions sent to the coupler are terminated with either a semicolon or a linefeed character. For example:

C1; Selects ENQ/ACK protocol.
R(LF) Clears input and output buffers.

Status Byte Definitions

When instructed to by the controller, the coupler sends two status bytes through HP-IL: the *system* status byte and the *device* status byte.

System Status Byte

System Status Conditions. The system status byte sent to the controller indicates one of the conditions shown in the following table.

System Status Conditions

Condition Number	Condition	Definition
1	All OK.	
2	Output buffer not full.	Coupler is ready to receive data bytes from HP-IL.
3	Input buffer empty and output buffer full.	Coupler is not ready to send or receive data bytes from HP-IL.
4	Input buffer not empty.	Coupler is ready to send information to HP-IL.
5	Data error.	An error has been detected on a data frame received from the telephone line.
6	Manual intervention required.	Carrier tone is lost.
7	Low battery power.	The battery does not have enough power to operate the coupler.
8	Self-test failure.	The coupler's self-test indicates improper operation.

When the coupler is first powered up, the system status condition All OK occurs. When a carrier tone from the telephone line is detected, the All OK condition ends and the Output Buffer Not Full condition occurs. This means the coupler is ready to receive information from HP-IL to transmit over the telephone line.

If another status condition also occurs, the system status byte will have the value of the highest numbered status condition. Thus, if Output Buffer Not Full and Input Buffer Not Empty are both occuring when the coupler is instructed to send its status, the status byte value for Input Buffer Not Empty will be sent.

Status Byte Values. For each status condition, there are two corresponding status byte values that can be sent. When the coupler first powers up, it is enabled to send only the lower of the two status byte values. These values are shown in the following table.

System Status Byte Values

Condition Number	Corresponding Status Byte Value	
	Decimal	Binary*
1	192 or 128	1X000000
2	225 or 161	1X100001
3	227 or 163	1X100011
4	226 or 162	1X100010
5	195 or 131	1X000011
6	194 or 130	1X000010
7	193 or 129	1X000001
8	198 or 134	1X000110

* X indicates either 0 or 1.

Service Requests. The coupler sends status information to the controller only when the controller sends it a Send Status message. However, the coupler can be enabled to request service from the controller when any status condition that you specify occurs. (The coupler requests service from the controller by setting a designated bit in a Data Byte, End Byte, or Identify message to "1".) When the controller receives the service request, it can then instruct the coupler to send its status.

After requesting service and being instructed to send its status, the coupler will send its system status byte followed by its device status byte. The system status byte will have a value corresponding to the condition that initiated the service request. The value sent will be the higher of the two values corresponding to that condition, indicating that the coupler requested service. After the status byte corresponding to that condition is sent, the coupler will not request service for that condition until it occurs again.

Using the Remote mode "M*n*" instruction, the controller can enable the coupler to request service for any combination of system status conditions. Before sending the "M*n*" instruction, the value of *n* must be determined. Using the table below, add the values of the conditions to be enabled. Then, using your controller, set the coupler to Remote mode and send it "M*n*;", where *n* is the sum of the values.

System Status Condition Values

System Status Condition	8	7	6	5	4	3	2	1
Condition Value	128	64	32	16	8	4	2	1

For example, to enable the coupler to request service for Output Buffer Not Full and Input Buffer Not Empty conditions, add 2 and 8 to get 10. Then set the coupler to Remote mode and send it "M10;". Whenever one of those two conditions occurs, the coupler will request service until either the condition is no longer occuring or the coupler is instructed to send its status.

Multiple System Status Conditions. When the coupler is sending and receiving data through HP-IL and over the telephone, its system status conditions can change frequently and several status conditions can occur at the same time. Generally, when the controller instructs the coupler to send its status, the system status byte sent will have the value corresponding to the highest numbered status condition occurring at that time. However, if the coupler is instructed to send its status after it requested service, it will send a system status byte with the value corresponding to the highest numbered condition occurring that the coupler was enabled to request service for.

Example: The Output Buffer Not Full and Input Buffer Not Empty conditions occur. (The coupler is enabled to request service for these conditions.) The coupler requests service for these conditions, and the controller instructs it to send its status. The coupler sends the controller a system status byte with the value 226 (corresponding to Input Buffer Not Empty) and the device status byte. The coupler would not request service again for the Input Buffer Not Empty condition until that condition ends and occurs again. Since the Output Buffer Not Full condition is still occurring, the coupler requests service. When instructed to send its status, the coupler sends the higher numbered value corresponding to the Input Buffer Not Empty condition because it is still occurring. From this point, the coupler will not request service again for these conditions, even though both are still occurring. If these conditions end, then the coupler can request service when they occur again.

The four higher-numbered status conditions are treated differently by the coupler than the four lower-numbered conditions. Each of the higer-numbered status conditions will end when their corresponding status byte value is sent to the controller. Thus, if a Low Battery condition occurs and the coupler requests service, the Low Battery system status condition will end when the value 193 (or 129) is sent to the controller. However, the battery pack may continue to have insufficient power, even though the Low Battery status condition is no longer occurring. This situation can occur for any of the four higher-numbered status conditions.

Device Status Byte

The device status byte is the second byte sent to the HP-IL controller when the coupler's status is requested. It is different from the system status byte in that the system status byte indicates only one status condition while the device status byte indicates all device status conditions. Each bit in the device status byte indicates something different to the controller. The following table shows what each bit indicates if set to "1".

Device Status Byte

Bit Number	Bit Value	Condition
7	—	Always set to "0".
6	64	Service is requested by the coupler.
5	32	Always set to "1".
4	16	Framing error detected. A stop bit was not received from the phone line.
3	8	Parity error detected. The next data byte to be sent over HP-IL was received from the telephone line with a parity error.
2	4	Buffer overflow. The coupler has stopped receiving data in the input buffer but the data in the buffer is valid.
1	2	Data available. The coupler has one or more bytes of data in the input buffer.
0	1	Clear to send. The carrier signal is detected.

The value of the device status byte is determined by adding all the bit values of the corresponding device status conditions that are occurring.

For example, if device status bits 2 and 4 are set to "1", indicating a framing error and buffer overflow, and the other bits are set to "0", the device status byte will have the value 20.

System and Device Status Conditions

Some combinations of a system status condition and a device status condition indicate something more specific about the coupler than either of the two conditions alone. Several combinations and their meanings are shown in the following table.

System and Device Status Conditions

System Status Condition	Device Status Condition	Definition
Input Buffer Not Empty	Data Available	The coupler has data from the telephone line in the input buffer.
Input Buffer Empty And Output Buffer Full	Buffer Overflow	The coupler has received more data from HP-IL than it can hold in its output buffer. The coupler sends the controller a Not Ready For Data message and passes the Data Byte that caused this condition back to the controller.*
Data Error	Buffer Overflow	The coupler has received more data from the telephone line than its input buffer can hold. Some data from the telephone line may be lost.
Data Error	Parity Error	Next Data Byte to be sent over HP-IL was received from the telephone line with a parity error.
Data Error	Framing Error	A stop bit was not received after a byte of data from the telephone line was received. The computer on the other end of the telephone line may be sending data improperly.†
Output Buffer Not Full	Clear To Send	The coupler detects a carrier tone.

*If the coupler is not enabled to send a Not Ready For Data message, it will pass the data byte that caused the overflow condition back to the controller, and hold the next data byte sent to it until the output buffer has room.

†If succesive data bytes from the phone line cause a framing error, it could mean the computer on the other end is sending a break signal to the coupler (in which case the data bytes are null bytes).

Parallel Polling

When the controller detects that service is being requested on the loop, it must determine which device is requesting it. The controller could sequentially instruct each device on the loop to send its status until it determines which one requested service. However, time is saved by sending only one byte around the loop and having each device modify a preassigned bit to indicate whether or not it requested service. (This is called "parallel polling.")

A controller that has parallel polling capability can initialize the loop and enable individual devices to respond to a parallel poll. To do this, the controller sends each device a Parallel Poll Enable message that specifies which bit in an Identify message to modify and how to modify it to indicate whether or not it requested service.

When the controller performs a parallel poll, it sends an Identify message around the loop. Each device that is enabled to respond to parallel poll modifies a specified bit in the Identify message according to the table below.

Parallel Poll Response to Identify Message

Enable Message Received	Designated Bit	Effect on Designated Bit of Subsequent Identify Messages	
		If Service Requested	If No Service Requested
Parallel Poll Enable 0	0	0 → 0* 1 → 1*	0 → 1 1 → 1
Parallel Poll Enable 1	1		
Parallel Poll Enable 2	2		
Parallel Poll Enable 3	3		
Parallel Poll Enable 4	4		
Parallel Poll Enable 5	5		
Parallel Poll Enable 6	6		
Parallel Poll Enable 7	7		
Parallel Poll Enable 8	0	0 → 1* 1 → 1*	0 → 0 1 → 1
Parallel Poll Enable 9	1		
Parallel Poll Enable 10	2		
Parallel Poll Enable 11	3		
Parallel Poll Enable 12	4		
Parallel Poll Enable 13	5		
Parallel Poll Enable 14	6		
Parallel Poll Enable 15	7		

*Also, a control bit in the Identify message is modified to indicate a service request.

For example, suppose the coupler receives a Parallel Poll Enable 6 message from the controller, and the coupler subsequently receives an Identify message, indicating that a parallel poll is being performed. If the coupler did not request service, and the sixth bit of the Identify message was set to "0", the coupler would set that bit to "1".

Subject Index

Page numbers in **bold** type indicate primary references; page numbers in regular type indicate secondary references.

T

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W

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HP 82168A Acoustic Coupler
Owner's Manual

HEWLETT PACKARD

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