HEWLETT PACKARD

HP 27110A

HP-IB INTERFACE

Installation Manual

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NOTICE

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This manual provides information for you to install and verify correct operation of the Hewlett-Packard Interface Bus (HP-IB) card. You will also need the appropriate computer system installation manual. These two manuals should provide all the required information. If your installation is such that you need additional information concerning the HP-IB card, order the HP 27132A Technical Reference Package from the nearest Hewlett-Packard Sales and Service Office.

General Guidelines for HP-IB Operation

The following general guidelines should be observed when configuring an HP-IB system:

1. Devices or cable segments should not be added to an HP-IB system that is active.

   If a device is to be added to an active HP-IB system, the possibility of errors will be minimized if the following procedure is used:

   a. Attach all new cables to the new device (the device to be added). Do not attach any unterminated cables to the existing bus.

   b. Power on the new device.

   c. Attach the new device (with power on) and its cable to the existing bus as a unit.

2. Devices which talk at a slower rate may be configured in the same system as high-speed devices, provided all of the requirements for high-speed operation are met.

3. If the card is NOT being used as the System Controller (SCTL switch DOWN), the high-speed load resistors should NOT be installed, regardless of speed configuration. In an HP-IB system, it is the duty of the System Controller to provide the necessary additional high-speed termination resistors. ADDING TERMINATION RESISTORS TO MORE THAN ONE CARD IN AN HP-IB SYSTEM MAY RESULT IN PERMANENT DAMAGE TO ANY OR ALL CARDS IN THE SYSTEM. Also, a powered-down System Controller will not allow the system to be used (as long as the System Controller is connected) because HP-IB bus drivers cannot drive the powered-down termination resistors.

4. Bus configuration is unimportant as long as the guidelines in the following paragraphs are observed.

Medium Speed Operation

In order to ensure proper operation of the HP-IB bus, some rules must be observed regarding the total length of cables being used, as follows:

1. The total length of cable permitted to be used with one interface card must be less than or equal to two meters times the number of devices connected together for standard speed operation (the interface card is counted as one device).

2. The total length of cable in standard speed systems must not exceed 20 meters.

3. At least four out of every five devices should be powered on.

4. Refer to the following paragraph for high-speed operation.

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High-Speed Operation

To achieve the maximum possible data transfer rate within a system, the following guidelines must be followed:

1. Switch S7 should be set to high speed (down). Switch S7 determines the delay between data assertion and DAV during an HP-IB write from the computer to the device. With the switch in normal (up) position, a delay of approximately 500 nsec is realized. In the high-speed (down) position, the delay is reduced to approximately 350 nsec.

2. All devices expected to talk at high speed must use a settling time of 350 nsec or less.

3. All devices expected to talk at the higher rates should use 48 mA three-state drivers.

4. The device capacitance on each HP-IB line (except REN and IFC) should be less than 50 pF per device. In a system configuration, the total device capacitance should be no more than 50 pF for each equivalent resistive load in the system.

5. The optional load resistor pack must be installed for high-speed operation. The 16-pin Dual In-line Package (DIP) is marked 1810-0081, and is carried in a socket on the interface card marked "LOAD RESISTOR STORAGE". Remove the load resistor pack from the storage socket and install it in the socket directly behind connector J2 (peripheral device cable connector), with pin 1 on the package oriented toward the U82 marking next to the socket.

6. Interconnecting cable links should be as short as possible, with a maximum of 15 meters total length per system, and should have at least one equivalent resistive load per meter of cable (the high-speed resistor pack adds seven equivalent resistive loads).

Number of Devices	Maximum Total Cable Length (meters)	Maximum Average Cable Length Between Devices (meters)
1	9	9
2	10	5
3	11	3
4	12	3
5	13	2
6	14	2
7 (maximum)	15	2

No more than eight devices are allowed in the system (the HP-IB interface card counts as one device). A maximum system would therefore be composed of the System Controller, with its high-speed resistor pack, and seven peripherals.

7. All devices should be powered on.

Installation and Checkout

To install and check the operation of the HP-IB card, follow the steps below in the order given:

1. Determine if your computer system can supply the power needed for the HP-IB card. Refer to table 1 for power requirements.

2. Set switch S7 up (standard speed) or down (high speed) depending on whether or not the card is going to require the normal or fast settling mode of operation. All high-speed devices should be labeled appropriately. Check that the optional load resistor pack (see the "High-Speed Operation" paragraph) is installed if high-speed devices are going to be connected to the card.

3. Set switch S6 up (System Controller ON) or down (System Controller OFF) depending on whether the card is going to operate as the System Controller.

4. Set switches S1 through S5 to the card's HP-IB address. If the card is to be the System Controller (switch S6 UP), set the address to 30 decimal (S1 DOWN, S2 through S5 UP).

5. Turn off power to the computer and the HP-IB devices. Insert the HP-IB card into the desired slot in the I/O channel. Make sure that the components on the card are on the same side as the other installed cards. When installing the card, use care not to damage the components or traces on the card or on adjacent cards. Press the card firmly into place.

7. Connect the appropriate cable from J2 (see table 3) on the card to the device.

8. Turn on computer system power.

9. A self-test is contained on the HP-IB card. The host computer system determines if the self-test is run automatically at power-on or must be invoked by the user. Refer to the appropriate manual for your system for a description of self-test initiation.

   When the self-test executes, the LED located on the card should light briefly and go out. This indicates that the card passed self-test. If the LED does not light at all, the card is defective. If the LED stays on, the card did not pass self-test. If either of the latter two events occurs, return the card to Hewlett-Packard (refer to the "Reshipment" paragraph for details).

   If the LED flashes continuously, the address switches have been set to an illegal address (31 decimal, all address switches UP). Set the address switches (S1 through S5) to a valid address (zero through 30) and issue a system reset. The LED should go out, indicating a valid address has been read and the card has passed self-test.

Reshipment

If the HP-IB card is to be shipped to Hewlett-Packard for any reason, attach a tag identifying the owner and indicating the reason for shipment. Include the part number of the HP-IB card.

Pack the HP-IB card in the original factory packing material, if available. If the original material is not available, good commercial packing material should be used. Reliable commercial packing and shipping companies have the facilities and materials to repack the item. BE SURE TO OBSERVE ANTI-STATIC PRECAUTIONS.

Table 1. Maximum Power Requirements

VOLTAGE	CURRENT	POWER DISSIPATION
+5V +12V	1.7A 0.035A	8.7W 0.42W

Table 2. Configuration Switch Definitions

SWITCH	FUNCTION	SETTINGS
S8	Self-Test Mode	UP = Self-Test Mode 1 DOWN = Self-Test Mode 0
S7	Data Settling Time Selection	UP = Normal Speed DOWN = High Speed
S6	System Controller Selection	UP = System Controller DOWN = Not System Controller
S1 - S5	HP-IB Address Selection	S5 = MSB S1 = LSB UP = Logic One DOWN = Logic Zero

The factory settings for the configuration switches are as follows:

S1	S2	S3	S4	S5	S6	S7	S8
--	--	--	--	--	--	--	--
DOWN	UP	UP	UP	UP	UP	UP	DOWN

Table 3. HP-IB Cables

HP-IB CABLE	LENGTH (meters)
10833A	1
10833B	2
10833C	4
10833D	0.5

Table 4. Device Connector J2

PIN NO.	SIGNAL MNEMONIC	SIGNAL DEFINITION
A1	SAFETY	Cable outer shield
A2	SAFETY	Cable outer shield
A3	ATN	Attention
A4	SRQ	Service Request
A5	IFC	Interface Clear
A6	NDAC	Not Data Accepted
A7	NRFD	Not Ready For Data
A8	DAV	Data Valid
A9	EOI	End Or Identify
A10	DIO4	Data Input/Output, Bit 4
A11	DIO3	Data Input/Output, Bit 3
A12	DIO2	Data Input/Output, Bit 2
A13	DIO1	Data Input/Output, Bit 1
B1	GND	Ground
B2	GND	.
B3	GND	
B4	GND	
B5	GND	.
B6	GND	
B7	GND	.
B8	GND	Ground
B9	REN	Remote Enable
B10	DIO8	Data Input/Output, Bit 8
B11	DIO7	Data Input/Output, Bit 7
B12	DIO6	Data Input/Output, Bit 6
B13	DIO5	Data Input/Output, Bit 5

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