HP 12979A
Input/Output Extender
operating and reference manual

HEWLETT PACKARD

HEWLETT-PACKARD COMPANY
11000 WOLFE ROAD, CUPERTINO, CALIFORNIA, 95014

MANUAL PART NO. 12979-90007
MICROFICHE PART NO. 12979-90009

Printed: OCT 1974
Printed in U.S.A.

HP 12979A
Input/Output Extender
operating and reference manual

HEWLETT-PACKARD COMPANY
11000 WOLFE ROAD, CUPERTINO, CALIFORNIA, 95014

MANUAL PART NO. 12979-90007
MICROFICHE PART NO. 12979-90009

Printed: OCT 1974
Printed in U.S.A.

CONTENTS

ILLUSTRATIONS

TABLES

GENERAL DESCRIPTION

SECTION I

The HP 12979A Input/Output Extender (figure 1-1) provides an additional 16 input/output (I/O) channels for the HP 21MX Computer Series processors. The I/O extender also includes one slot dedicated to the optional dual-channel port controller (DCPC). Two I/O extenders may be used with each processor.

1-1. EQUIPMENT SUPPLIED

The I/O extender is equipped with the following items:

a. I/O extender printed-circuit assembly (PCA), part no. 02155-60003.

b. I/O extension cable assembly, part no. 12979-60006.

c. I/O extension cable assembly, part no. 12979-60007.

d. Power control cable assembly, part no. 12979-60015.

1-2. SUPPORTING DOCUMENTATION

This operating and reference manual provides information for the HP 12979A I/O Extender as used with the HP 21MX Computer Series processors. The following is a list of available supporting documentation.

a. **HP 21MX Computer Series Reference Manual,** part no. 02108-90002.

b. **HP 21MX Computer Series Operator's Manual,** part no. 02108-90004.

c. **HP 21MX Computer Series Installation and Service Manual,** part no. 02108-90006.

d. **HP 12979A Input/Output Extender Installation and Service Manual,** part no. 12979-90006.

e. **HP 12898A Dual-Channel Port Controller Installation Manual,** part no. 12898-90001.

1-3. SPECIFICATIONS

Specifications for the HP 12979A I/O Extender are given in table 1-1.

1-4. OPTIONS

The following options are available for the HP 12979A I/O Extender:

a. Dual-channel port controller (option 001).

b. Second I/O extender (option 010).

c. 220V, 50-Hz operation (option 015).

1-5. DUAL-CHANNEL PORT CONTROLLER (DCPC)

The processor DCPC capability (HP 12897A DCPC) can be extended to the I/O extender by installing the HP 12898A DCPC in the I/O extender. The option consists of the extender DCPC PCA, part no. 12898-60001.

1-6. SECOND I/O EXTENDER

The second I/O extender provides an additional 16 I/O channels. Thus, with two I/O extenders installed, an additional 32 I/O channels are available to the HP 21MX Computer Series processors.

1-7. 220V, 50-HZ OPERATION

Option 015 is a factory-installed option which permits the I/O extender to operate from 220 volts ac.

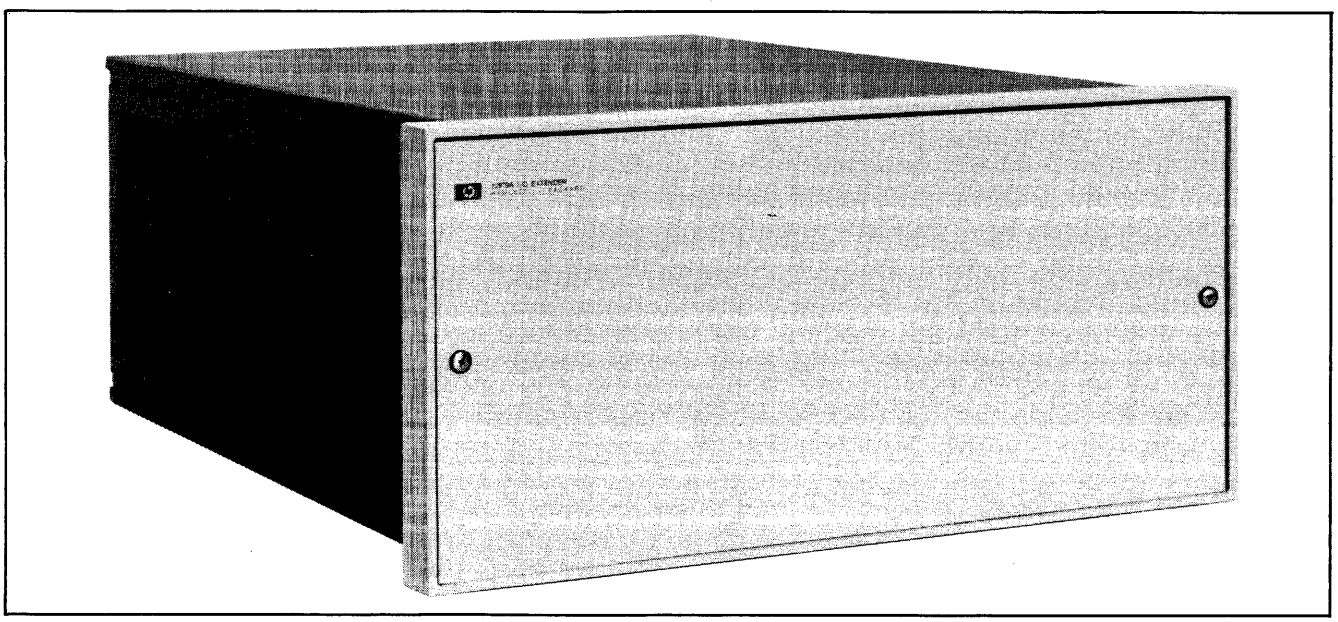


Figure 1-1. HP 12979A Input/Output Extender

Table 1-1. Specifications

POWER FAIL INTERRUPT

Priority:	Highest priority interrupt.
Power Failure:	Detects power failure and generates an interrupt to trap cell for user-written power-failure routine, terminates activities, and halts processor and extender. A maximum of 500 μS is available for the routine.

INPUT/OUTPUT

Priority Interrupt:	Multilevel vectored priority interrupt determined by interface channel assignment.
I/O Channels:	Additional 16 I/O channels to processor; up to 32 additional I/O channels to processor with two I/O extenders.
Current Available to I/O	

SUPPLY	CURRENT
+5V	33.0A
-2V	7.6A
+12V	3.5A*
-12V	3.5A*
+28V	0.1A

*1.75A is available to both front and rear I/O backplanes.

Note: Current availability to I/O assumes that the dual-channel port controller is installed.

PHYSICAL CHARACTERISTICS

Width:	16-3/4 inches (42.55 cm) behind rack mount; 19 inches (48.26 cm) front panel width on sides.
Depth:	23-1/2 inches (59.69 cm) behind front panel; 24-1/2 inches (62.23 cm) overall.
Height:	8-3/4 inches (22.23 cm) in rack mount.
Weight:	35 pounds (16 kg) minimum. 40 pounds (18 kg) maximum.

ELECTRICAL CHARACTERISTICS

Input Line Voltage:	110V or 220V ac (±20%), single phase.
Line Frequency:	47.5 to 66 Hz.
Power:	525W maximum.
Line Overvoltage Protect:	Input crowbar in series with line fuse.

Table 1-1. Specifications (Continued)

ELECTRICAL CHARACTERISTICS (Continued)	
Output Protect:	All voltages protected against overvoltage and overcurrent.
Output Voltage Regulation:	±5%.
Thermal Sensing:	Monitors internal temperature and automatically shuts down if temperature exceeds specified level.
ENVIRONMENTAL LIMITATIONS	
Ambient Temperature:	Operating: 32° to 131°F (0° to 55°C). Nonoperating: -40° to 167°F (-40° to 75°C).
Altitude:	Operating: 15,000 feet (4,573 meters). Nonoperating: 25,000 feet (7,622 meters).
Relative Humidity:	20 to 95% at 77° to 104°F (25° to 40°C).
Shock:	Tested for 30g shock for 11 milliseconds over a 1/2 sine wave shape.
Vibration:	0.012 inches (0.30 millimeters) P-P, 10 to 55 Hz.
VENTILATION	
Air Flow:	Intake on left-hand side; exhaust on right-hand side.
Heat Dissipation:	1795 BTU's (452 kilocalories) per hour, max.
DUAL-CHANNEL PORT CONTROLLER	
Installation:	Plugs into uppermost slot (DCPC) of front I/O PCA cage.
Number of Channels:	Two.
Number of Memory Ports:	One.
Registers/Channel:	Two (word count and address) per channel.
Word Size:	16 bits.
Maximum Block Size:	32,768 words.
I/O Assignable:	Assignable to any two I/O channels.
Transfer Rate:	616,666 words per second maximum.
Priority:	Highest: DCPC Channel 1. Middle: DCPC Channel 2. Lowest: I/O Extender
Current (Supplied by I/O Extender):	-2V supply, 50 mA. +5V supply, 800 mA.

OPERATION

SECTION II

This section provides operating information for the HP 12979A Input/Output Extender. Information includes extender priority, I/O priority, controls, and performance test.

2-1. EXTENDER PRIORITY

The processor may use up to two I/O extenders, each of which provides 16 additional I/O slots for interfacing the processor with peripheral devices. To eliminate extender priority conflicts, programmable jumpers located on each extender control PCA in each I/O extender are used to determine the relative priority of the I/O extenders used.

When one extender is used, for example, then the extender control PCA is configured for one extender as shown in figure 2-1a. If the optional second extender is used, then the extender control PCA in the second extender is configured for extender two as shown in figure 2-1b. Thus, extender number 1 will have the higher priority device PCA's and extender number 2 will have the lower priority device PCA's.

The I/O extender is configured at the factory for extender priority as part of a complete system. If modification of the system is required, it is recommended that a qualified person or an HP service representative perform the reconfiguration of the extender priority. For details, refer to the installation section of the **HP 12979A Input/Output Extender Installation and Service Manual**, part no. 12979-90006.

2-2. I/O PRIORITY ASSIGNMENT

Each peripheral device in the extended system must be connected to the extender through an interface PCA. A priority chain connects all interface PCA's in series to prevent simultaneous interrupt requests from two or more peripherals. The priority of the interface PCA is determined by the I/O slot that the PCA occupies, with slot 0 having the highest priority and slot 20 having the lowest priority. (See figures 2-2 and 2-3.) Interrupts from a higher priority device inhibit lower priority interrupts by breaking the priority chain. If the interrupt mode is used, there can be no vacant slots from 0 to 20 due to the priority chaining scheme except slots of lower priority than the last slot used. For example, if the last interface PCA is installed in slot 15, then slots 16, 17, and 20 can be left vacant.

From a standpoint of time, it is more economical to assign the higher priorities to high-speed devices and lower priorities to low-speed devices. However, if a subsystem could suffer catastrophic data loss if not serviced immediately, then that subsystem should be assigned the highest priority regardless of speed.

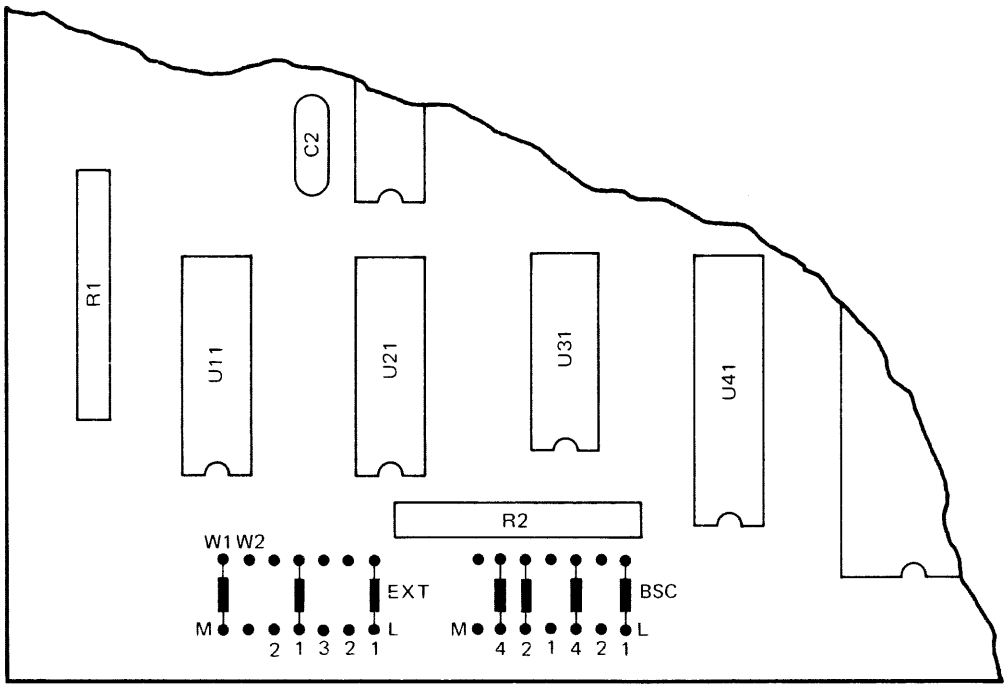
Refer to the individual interface or subsystem documentation for details concerning power requirements, I/O PCA jumper requirements (if any), and priority considerations. I/O interface PCA power requirements is an important consideration in determining the priority assignment of the peripheral devices to be used in the I/O system. Because of cabling requirements for the HP 12978A Writable Control Store (WCS) option, HP does not recommend installing this PCA in the I/O extender.

The extended I/O system is configured at the factory for I/O priority assignments as part of a complete system. The I/O extender PCA, part no. 02155-60003, interfaces the processor to the extender. The I/O extender PCA is located in the lowest used I/O slot in the processor. In other words, there may be vacant I/O slots in the processor following the installed I/O extender PCA. For example, if the last I/O interface PCA installed in the processor I/O PCA cage is slot 11, then the I/O extender PCA is installed in slot 12 with the remaining I/O slots in the processor left vacant.

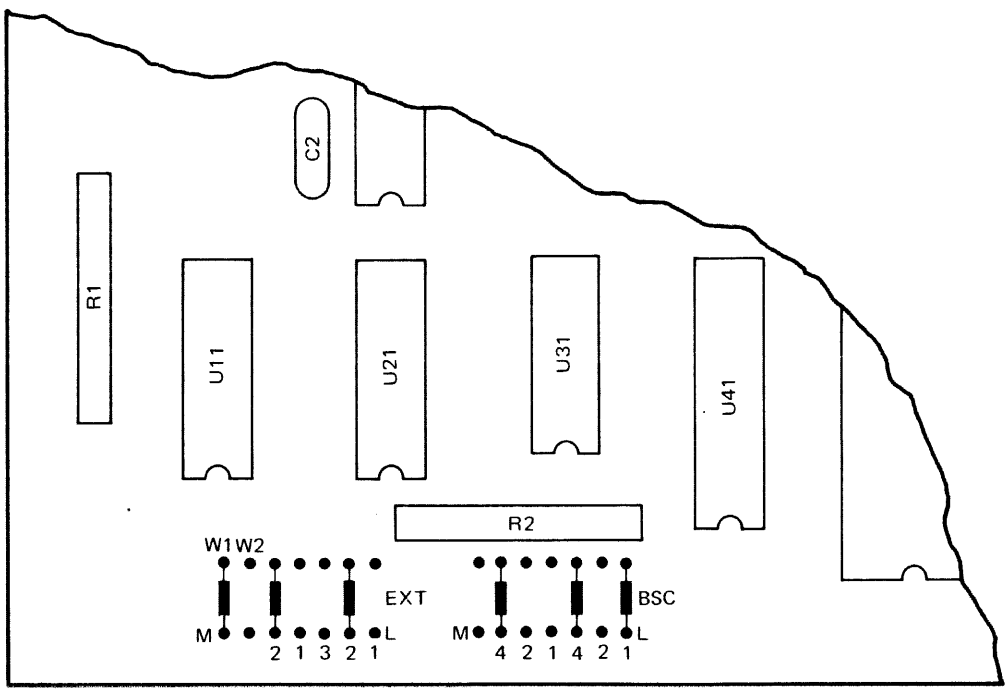
On the extender control PCA, the base select code (BSC) is configured in accordance to the select code that the I/O extender PCA occupies in the processor I/O section. (The I/O extender PCA is the lowest priority device used in the processor I/O section.) If the I/O extender PCA is installed in select code 12_8, then the BSC jumper configuration on the extender control PCA is configured as BSC 12_8, which completes the priority chain between the processor and the I/O extender. Figure 2-1a illustrates the BSC jumper configuration required for select code 12_8. Note that the **absence** of a jumper is a logic 1.

If the optional second I/O extender is used, then the BSC in the second I/O extender is assigned the next sequential select code following the last select code used in the first extender. For example, if the last select code used in the first I/O extender is select code 31_8, then the BSC jumper configuration on the extender control PCA in the second I/O extender is configured as BSC 32_8. (See figure 2-1b.) The priority chain is thus completed between the processor, the first I/O extender, and the second I/O extender.

If modification of the system is required, it is recommended that a qualified person or an HP service representative perform the reconfiguration of the I/O priority assignment. For details, refer to the installation section of the **HP 12979A Input/Output Extender Installation and Service Manual**, part no. 12979-90006.



a. EXTENDER NO. 1 WITH BSC 12_8



b. EXTENDER NO. 2 WITH BSC 32_8

NOTE: BSC JUMPER OUT = LOGIC 1

Figure 2-1. Extender Control PCA Jumper Positions

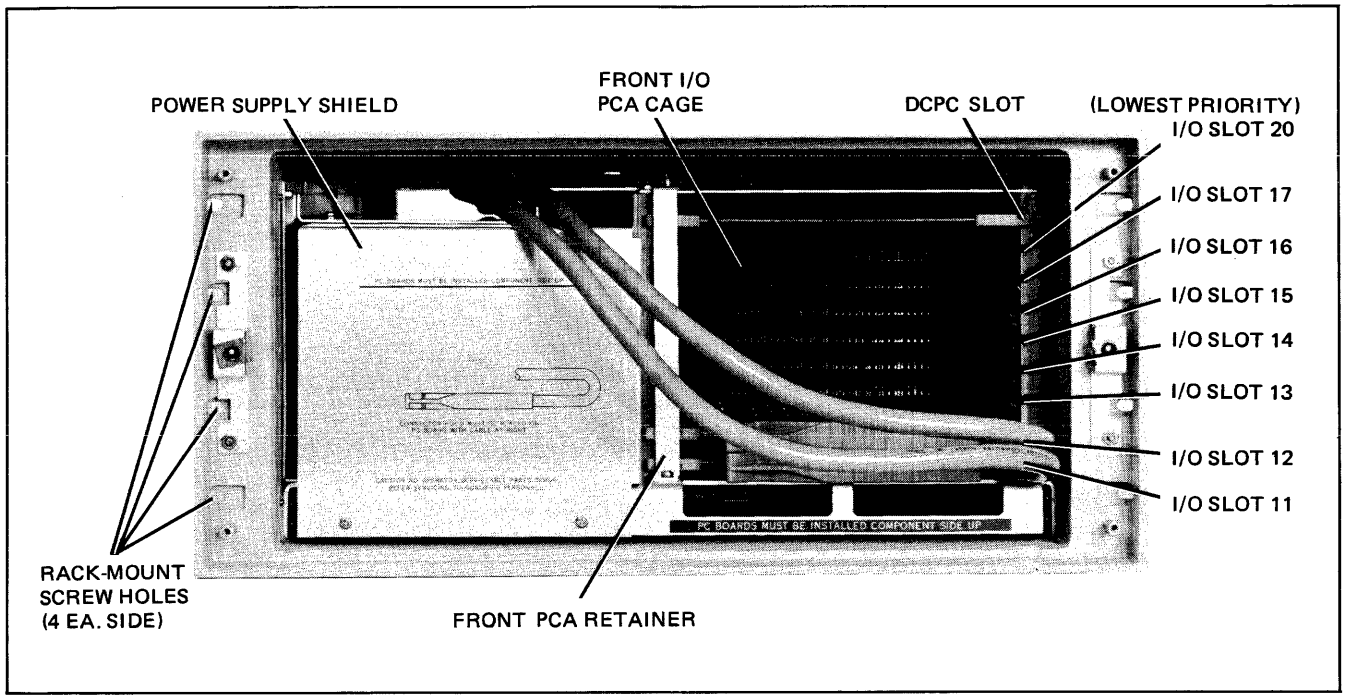


Figure 2-2. HP 12979A I/O Extender Front View

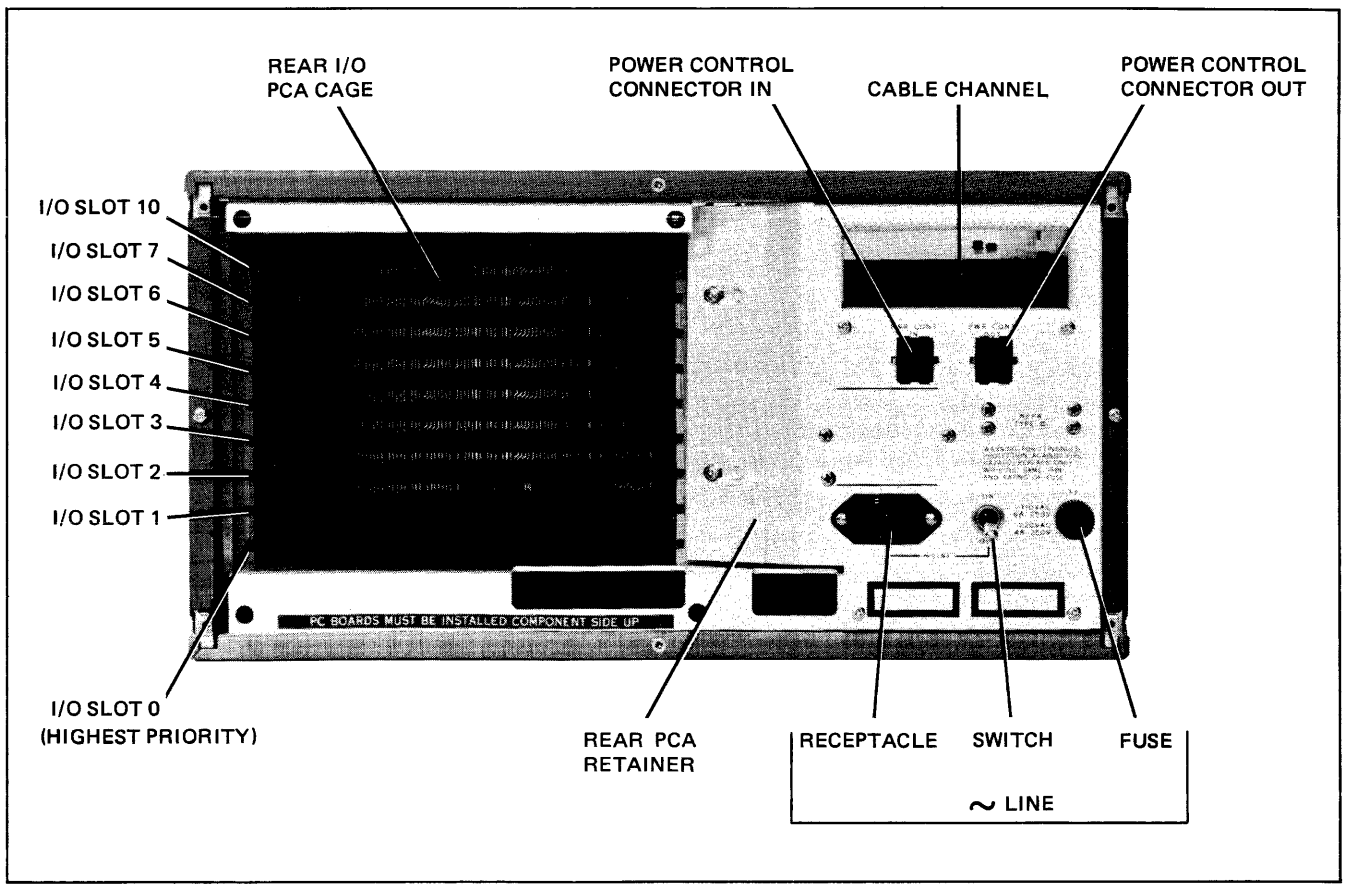


Figure 2-3. HP 12979A I/O Extender Rear View

2-3. CONTROLS

The ∿ LINE switch is located on the extender rear panel. This switch controls the application of ac power to the extender power supplies and ventilating fans. There is no indicator light associated with this switch.

2-4. PERFORMANCE TEST

The HP 12979A I/O Extender is checked for proper operation by performing a diagnostic check. The diagnostic check of the extender consists of performing diagnostic test programs and evaluating them. A description of the diagnostic test procedures is found in the **Manual of Diagnostics.** Part numbers of the diagnostic manuals and diagnostic tapes are as follows:

DIAGNOSTICS	MANUAL	TAPE
Input/Output Channel	12979-90010	12979-16001
Power Fail/Auto Restart	02100-90216	24321-16001

If the diagnostic tests are completed without an error halt, the I/O extender is operating correctly. If the diagnostic test indicate an error halt, notify your nearest HP Sales and Service Office. (A list of HP Sales and Service Offices is given in the back of this manual.)