HP 98638A

Eight Port

Asynchronous Multiplexer

HP 9000 series 300 Computers

Installation

and Reference Manual

HEWLETT PACKARD

Notice

Printing History

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

Preliminary Edition 1   March 1990

Safety

Safety Notices

This manual includes warnings and cautions that alert the reader to areas of danger or situations that could cause injury to personnel, damage to hardware or loss of data. These are highlighted by using the following conventions:

Warning	**A "Warning" statement alerts the reader to procedures that could result in personnel injury if the procedure is not strictly observed. Do not proceed beyond a "Warning" until the indicated conditions are fully understood.**

Caution	A " Caution" statement alerts the reader to procedures that could result in damage to equipment or loss of data. Do not proceed beyond a Caution notice until the procedures has been understood.

General Safety

The MUX card is shipped in a transparent static shielding bag. The card should be kept in this bag at all times until it is installed in the system. Save this bag for storing or transporting the card. When installing the card in the system, do not touch any of the components. Hold the card only by its edges or metallic front panel. If you have to change the EPROM you must observe the precautions relating to anti-static devices, *see also* "Changing the EPROMS" chapter 7 of this manual.

Radio Frequency Interference

For the United States
Federal Communications Commission (FCC)

The U.S. Federal Communications Commission (in 47 CFR 15.818) has specified that the following notice be brought to the attention of the users of this product.

Warning   This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device in accordance with Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

For Japan

This apparatus is a class 1 ITE which complies with the VCCI standard to prevent radio interference in industrial and commerical environments. However, operating this equipment in a residential area may cause interference. Please note this equipment must be installed and used in accordance with the operating manuals.

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この装置は，第一種情報装置(商工業地域において使用されるべき情報装置)
で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制
協議会 (VCCI) 基準に適合しております。
  従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジ
ョン受信機等に受信障害を与えることがあります。
  取扱説明書に従って正しい取り扱いをして下さい。
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For the German Federal Republic

Funkentstörung Deutschland
Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät HP 98638A in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Wird das Gerät innerhalb einer Anlage betrieben,

- so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der o.g. Genehmigung entsprechen.

- die mit einer FTZ-Serienprüfnummer gekennzeichnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

- Voraussetzung für die Einhaltung der betreffenden Bestimmungen ist die Verwendung von geschirmten Kabeln. Diese sind vom Betreiber bereitzustellen.

Manufacturer's Declaration

This is to certify the equipment, product number HP 98638A, is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation, the right to check the series for compliance with the requirements was granted.

If this equipment is to be operated with a system,

- and if the general license is being claimed, the complete system has to comply with the General Licensing requirements.

- which has its own FTZ-Serial-License, and for which an operating license has been granted or requested, usually no further steps are necessary.

- compliance with applicable regulations depends on the use of shielded cables. These are to be provided by the user.

For UK Only

The HP 98638A has been approved under Approval Number NS/G/1234/J/100003 for indirect connection to public telecommunication systems within the United Kingdom. In addition you must ensure that following rules are adhered to:

1. Interconnection directly, or by way of other apparatus, of ports marked "WARNING, CONNECT ONLY APPARATUS COMPLYING TO BS6301 TO THESE PORTS" with ports not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.

2. WARNING, CONNECT ONLY APPARATUS COMPLYING WITH BS6301 TO THE DATACOM PORTS.

3. Connection to the network must be disconnected before the equipment's power plug is removed.

4. Connection to the network must not be hard-wired.

Preface

This manual describes how to install the HP 98638A Asynchronous Eight Port DIO Multiplexer. It also contains information to help you identify and isolate simple faults associated with the multiplexer and its associated assemblies.

Audience

This manual is primarily aimed at the Systems Administrator or person responsible for the HP9000 series 300 computer. The HP 98638A can be used with all models of the HP9000 series 300 provided a Backplane Expander Unit with DIO-II slots has been installed.

It is assumed that the System Administrator has a basic knowledge of HP-UX operating systems, and should be familiar with the basic concepts of asynchronous serial communications.

Organization

Chapter 1

General Information - This chapter gives an overview of the HP 98638A.

Chapter 2

Installing the HP 98638A - This chapter describes how to install the HP 98638A.

Chapter 3

Technical Description - This chapter gives a basic technical description of the HP 98638A.

Chapter 4

Troubleshooting - This chapter describes how to perform simple troubleshooting tasks..

Chapter 5

Replaceable Parts - This chapter lists the replaceable parts for the HP 98638A.

Chapter 6

Supported Equipment - This chapter lists supported peripheral devices.

Chapter 7

Removing and Replacing Parts - This chapter describes how to change the MUX card and/or the EPROMs.

Conventions

Bold text   Bold text is used for terms commonly used in data communications and within the Hewlett-Packard Company.

Italics   Italic text is used for emphasis

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Chapter 4   **Troubleshooting**

Chapter 5   **Replaceable Parts**

Chapter 6   **Supported Equipment**

Chapter 7   **Removing and Replacing Parts**

General Information

This manual describes the HP 98638A Asynchronous Eight Port DIO Multiplexer, referred to throughout this manual as the DIO-MUX or the HP 98638A. These terms are used interchangeably throughout the manual for sake of convenience.

The HP 98638A is supported by HP-UX software release 6.2 and later.

Description

The HP 98638A provides a means of connecting up to eight asynchronous devices such as terminals, printers, plotters and modems to the HP 9000 series 300 computers.

There are two versions of the HP 98638A available:

1. The HP 98638A for use with peripherals that use the RS-232-C interface standard.

2. The HP 98638A Option 1C8 for use with peripherals that use the RS-422 interface standard.

The standard HP 98638A is supplied as a printed circuit card, referred to throughout the manual as the **MUX card**, an RS-232-C Standard **Active Distribution Panel (ADP)**, and an interconnecting cable, referred to throughout the manual as the **Multiplexed Serial Link (MSL)**. The HP 98638A Option 1C8 version is supplied with an RS-422 ADP instead of the RS-232-C ADP.

The RS-232-C ADP supports both modem and direct connections to terminals, printers and plotters. The RS-422 supports direct connections only. Supported cables are listed in chapter 2, "Installing the HP 98638A".

The MUX card is mounted into a DIO-II slot of a **Backplane Expansion Unit**, typically the HP98568A for the HP 9000 series 300 computers. The ADP can be mounted at the rear of the HP cabinet containing the HP 9000 series 300 computer or externally to a wall or table leg.

The circuit card in the ADP uses surface mount technology (SMT) to ensure high reliability and reduced size. No component changes are possible with SMT fabricated cards. If a fault develops the ADP must be replaced with a new ADP.
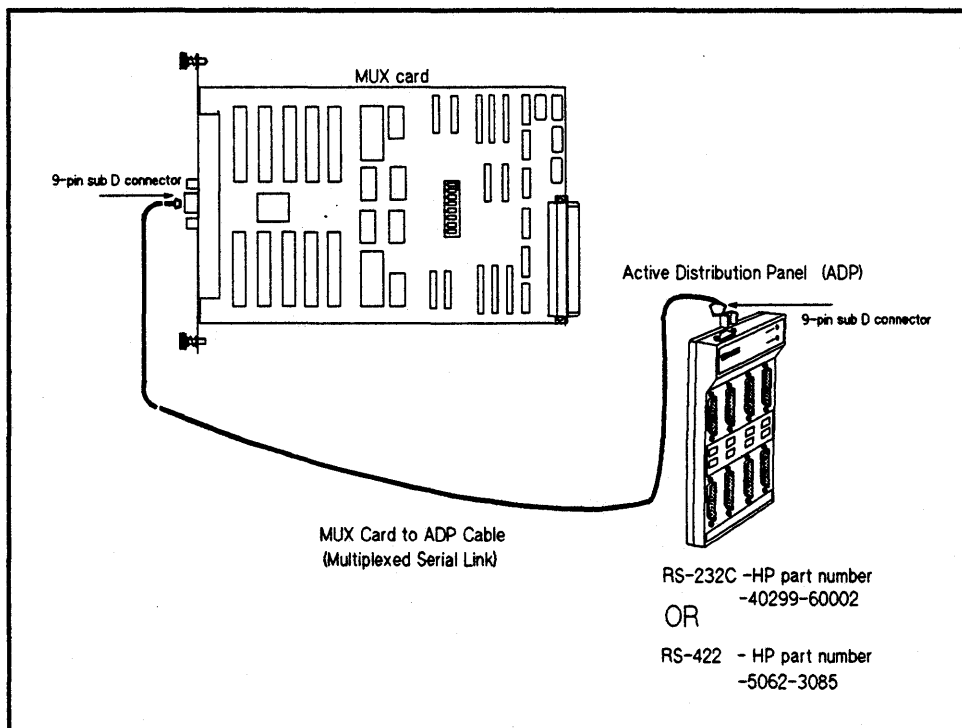
Figure 1 - 1 HP98638A Assemblies

Features

The standard HP 98638A has the following features:

- Eight full duplex asynchronous serial I/O (Input/Output) ports.
- Parity, overrun, and framing error checks to detect transmission faults.
- CTS handshaking between the host and peripheral devices.
- Programmable data transmission rates on all ports.
- EIA RS-232-C and Full Modem CCITT V.24 and V.28 compatibility.
- Built-in firmware self-test.

The HP 98638A with option 1C8 offers the RS-422 standard communications interface.

The following are also available for troubleshooting, fault isolation, and verification at the card level.

Self-test	The self-test is automatically activated at switch on. An error code and "Failed" will be displayed on the system console if the self-test should detect a fault on the MUX card.
Status LEDs	Two LEDs on the front panel of the ADP indicate the operating status of the ADP and the MSL.
Port Loopback	The port loopback test is designed to loopback data on the full data path on the port to be tested, *see* "Loopback Testing" in chapter 4 of this manual.

Full details of the available diagnostics can be found in "Troubleshooting", chapter 4 of this manual.

Functional Specifications

Capacity

- Ports: Eight Ports - full duplex.

- Transmit Buffer Size: 16 characters per port.

- Receive buffer size: 127 characters per port.

Communications

- RS-232-C Modem and Direct Connect.

- Option 1C8 replaces the eight RS-232-C ports with eight RS-422 Direct Connect ports.

- Supported Data Rates: 110, 134.5, 150, 300, 600, 1200, 2400, 4800, 9600 and 19,200 baud.

- Supports eight interactive terminal users running character mode at 19,200 baud.

- Host control on all modem lines.

Environmental Specifications

The HP 98638A is suitable for operation in light industrial and commercial environments, and which do not exceed the following environmental specifications:

- Operating temperature: 0 to 70 degrees centigrade (32 to 158 Fahrenheit (F)).

- Non-operating temperature: -40 to +85 degrees centigrade (-40 to 185F).

- Relative humidity (external): 5% to 95%.

Physical Specifications

Table 1-1 Physical Specifications

	MUX Card	ADP
Length (mm)(ins)	290 (11.42")	260 (10.2")
Width (mm)(ins)	210 (8.27")	120 (4.72")
Depth (mm)(ins)		30 (1.18")

Electrical Specifications

Table 1-2 - Maximum Power Available

Voltage	RS-232-C	RS-422
+5Volts	1.8Amps	1.8Amps
+12Volts	0.13Amps	0.2Amps
-12Volts	0.13Amps	

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Installing the HP 98638A

Overview

This chapter describes how to install the HP 98638A, and ensure that it is operating correctly.

The installation of the HP 98638A can be summarized in the following steps:

1. Unpack the MUX card, ADP and MSL cable. Examine the assemblies for signs of damage.

2. Check the configuration switches on the MUX card for correct **select code, interrupt level** and **local/remote** switch settings. See section "Setting the Configuration Switches" in this chapter.

3. Perform a system backup. Switch off the host and identify the DIO-II slot in the Backplane Expander Unit, typically HP 98568A or HP 98570A, which is to accommodate the MUX card.

4. Insert the MUX card into an empty DIO-II slot, and install the ADP in the computer cabinet, or attach to a table leg or wall. Note that the cable connecting the MUX card to the ADP is three meters long.

5. Connect the MUX card to the ADP using the MSL cable.

6. Identify suitable cables to connect the ADP to supported modems, terminals, printers and plotters.

7. Switch on the host.

8. Observe the boot up sequence on the system console. It should display the card's identification number i.e 98642 - RS-232-C, the select codes and its operating status, *see* "Testing the HP 98638A", in this chapter.

Unpacking the HP 98638A

Upon receipt of the HP 98638A carefully remove the packing material, and ensure that all components have been packed with the HP 98638A. Check against the list, "Equipment Supplied", shown below, that the carton contains all the components and options ordered. If anything is missing contact the nearest Hewlett-Packard office and shippers.

Closely examine the carton for signs of damage. If there is damage remove the HP 98638A, place the card on anti-static material and examine it for scratches, dents, broken parts, etc. If the HP 98638A has suffered damage during packing and transit do not attempt to install it. Notify the carrier and the nearest Hewlett-Packard office immediately. Retain the shipping carton and packing material for inspection by the carrier. In any correspondence refer to the Multiplexer by its model and option number, i.e HP 98638A Option 1C8.

Equipment Supplied

The standard HP 98638A is supplied with an RS-232-C ADP. The HP 98638A is also available with an RS-422 ADP option, available as Option 1C8. The standard HP 98638A consists of the following items:

- Printed circuit card assembly (MUX card), HP part number 98638-60001.

- RS-232-C Active Distribution Panel, HP part number 40299-60002.

- MUX card to ADP connection cable, HP part number 40299-60003.

- Installation kit, HP part number 40299-60004.

- Loopback hood, HP part number 5181-2030.

- Fixation kit, HP part number 40299-60006.

- Installation and Reference Manual, HP part number 98638-90001.

For the RS-422 Interface, Option 1C8, all of the above are included, but with the following item in place of the RS-232-C ADP:

- RS-422 Active Distribution Panel, HP part number 5062-3085.

Setting the Configuration Switches

An eight-switch pack on the MUX is divided into three switch groups. The first group is a single switch (switch 1) which selects the LOCAL or REMOTE mode. The second group consists of switches 2 and 3 to select the INTERRUPT level of the card. The third group (switches 4 through 8) is used to set the SELECT CODE of the card.

The default settings of the switches are 0 0 0 1 1 1 0 X. This is indicated in figure 2-1 which shows the switch pack default settings.

Note that the 0s and 1s in table 2-1 correspond to the 0 and 1 on the MUX card.
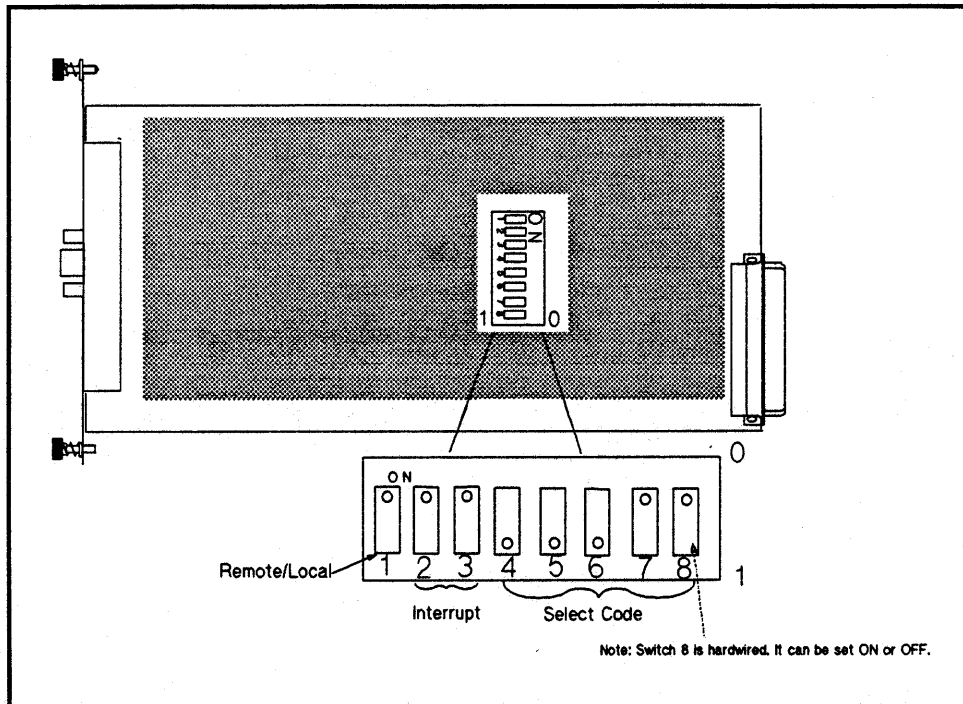
Figure 2 - 1 Switch Pack on MUX Card

Local/Remote Switch Settings

The Local/Remote setting is set by switch 1. When the switch is set in the ON position, port 1 of the ADP can be used as the system console. The switch setting is normally left in position ON, that is, in other words **local mode.**

LOCAL -Switch in this position for normal operation

REMOTE - Switch in this position for console control
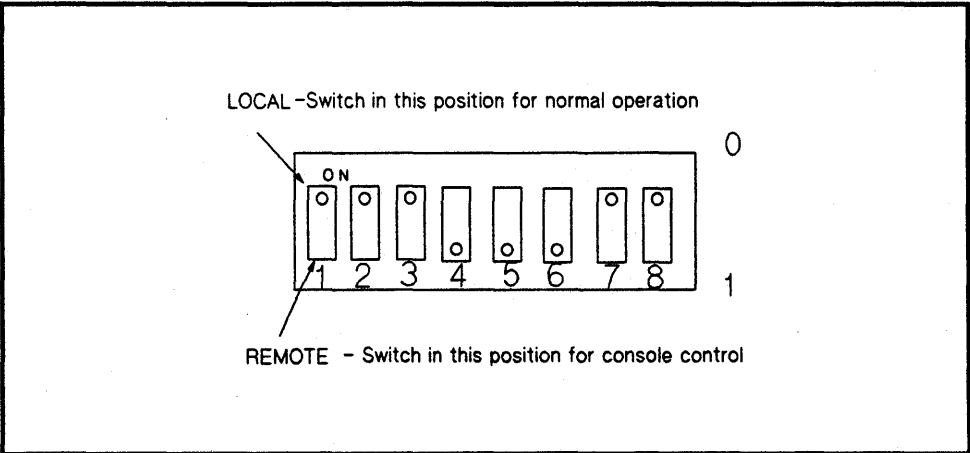
Figure 2 - 2 Local/Remote Switch Setting

Interrupt Level Switches

The default **interrupt level** for the HP 98638A MUX is set at interrupt priority level 3 (0 0), and it is recommended that the switches be left in this position.

The interrupt priority levels are determined by switches 2 and 3. Interrupt levels 1 and 2 are reserved for internal peripheral devices only. Interrupt levels 3 through 6 are available for the DIO MUX. Interrupt level 3 has the lowest priority, level 6 the highest. Table 2-2 shows the possible interrupt priority levels:

Table 2- 2 - Interrupt Level Switch Settings

Switch 2	Switch 3	Interrupt Priority
0	0	3
0	1	4
1	0	5
1	1	6

Select Code Switches

The default select code setting for the MUX is 1 1 1 0 X. This corresponds to **select codes** 28 and 29. Note that two consecutive select codes, starting on an even number, are needed for the HP98638A since two identical four channel multiplexers are implemented on the one card. For example, if you have a second MUX card installed it may be identified by select codes 26 and 27.

Each installed card must have a unique select code so that it can be accessed by the host computer. On the MUX card, the select code is set by switches 4 through 8. Note that switch setting 8 is hardwired, and can be set either on or off. The settings of these switches determine the select code of the MUX card, and the base address in system memory to which the MUX will respond. The settings, memory base addresses, and select codes are shown in table 2 -1. Select codes 0 through 7 should not be used. Select codes 0 through 6 are reserved for internal peripheral devices such as the keyboard, disc drives, CRT display, etc; select code 7 is used by the HP-IB interface. Thus, select codes 8 through 31 are available for the MUX and other interfaces.

Table 2 - 1 - Select Code Settings

Select Code	SWITCH SETTINGS* 4 5 6 7 8	MEMORY ADDRESS	NOTES
0	0 0 0 0 0	600000	Reserved
1	0 0 0 0 1	610000	Codes
2	0 0 0 1 0	620000	.
3	0 0 0 1 1	630000	.
4	0 0 1 0 0	640000	.
5	0 0 1 0 1	650000	.
6	0 0 1 1 0	660000	Do Not
7	0 0 1 1 1	670000	Use
8	0 1 0 0 0	680000	
9	0 1 0 0 1	690000	
10	0 1 0 1 0	6A0000	
11	0 1 0 1 1	6B0000	
12	0 1 1 0 0	6C0000	
13	0 1 1 0 1	6D0000	
14	0 1 1 1 0	6E0000	
15	0 1 1 1 1	6F0000	
16	1 0 0 0 0	700000	
17	1 0 0 0 1	710000	
18	1 0 0 1 0	720000	
19	1 0 0 1 1	730000	
20	1 0 1 0 0	740000	
21	1 0 1 0 1	750000	
22	1 0 1 1 0	760000	
23	1 0 1 1 1	770000	
24	1 1 0 0 0	780000	
25	1 1 0 0 1	790000	
26	1 1 0 1 0	7A0000	
27	1 1 0 1 1	7B0000	
28	1 1 1 0 0	7C0000	*Default*
29	1 1 1 0 1	7D0000	*Default*
30	1 1 1 1 0	7E0000	
31	1 1 1 1 1	7F0000	

* See figure 2-2 for the 1 and 0 setting.

Inserting the MUX Card

The HP 98638A MUX card is plugged into a free DIO-II slot of a Backplane Expander Unit, typically the HP98568A, connected to the HP 9000 series 300 computer systems.

WARNING   Before attempting to install the card and ADP you must follow the computer "shut down" procedure and TURN OFF the computer power supply. Failure to disconnect the power supply can result in an electric shock and it may damage both the computer and the card. Any resultant damage will NOT be covered by warranty.

Caution   Some of the components used on the MUX card are susceptible to damage by static discharge. Refer to the "Safety" information at the front of this manual before handling the card.

Precautions

You must observe the following precautions when inserting the card into the peripheral interface slot of your computer:

■ Always hold the MUX card by its edges or front panel. DO NOT touch any of the card's components or exposed solder pins.

■ Ensure that the MUX card can slide easily within the guide rails of the card cage.

■ Always use care when pressing the MUX card into the mating connector on the backplane. Damage to the connector pins can occur if too much force is used.

Procedure

The installation procedure outlined in the following pages is applicable to most of the HP 9000 series 300 computers. However, you must refer to the *Peripheral Installation Guide* supplied with your system for details on how to install the Backplane Expander Unit.

Installing the MUX Card into the HP98570A I/O Backplane Expander

The procedure for installing the card into the HP98570A Backplane Expander is illustrated in figure 2-3 and described in the following steps:

1. Ensure that the System Adminstrator has done a system backup, and an operating sytem shutdown.

2. Turn off the power at the main power switch. Remove the lower cover plates from the back of your Backplane Expander Unit. There are two DIO-II slots if you have the HP 98570A and four DIO-II slots if you have the HP 98570A option 004. The lower DIO-II slots are available for the eight port DIO MUX card.

3. Make a note of the **select code** setting you have set on the switch pack for later use.

4. Insert the MUX card, component side facing up, into a free DIO-II slot. Push the card so that it correctly mates with the backplane connector. Tighten the thumb screws on the metal front panel until they are tight, and the panel is flush with the outer edges of the Backplane Expansion Unit.

5. Write the **select code** number on the labels supplied with the MUX card. Affix the label to the front panel.

Note   You must always switch off the host computer before connecting or disconnecting the ADP. Failure to do so may result in a system failure.
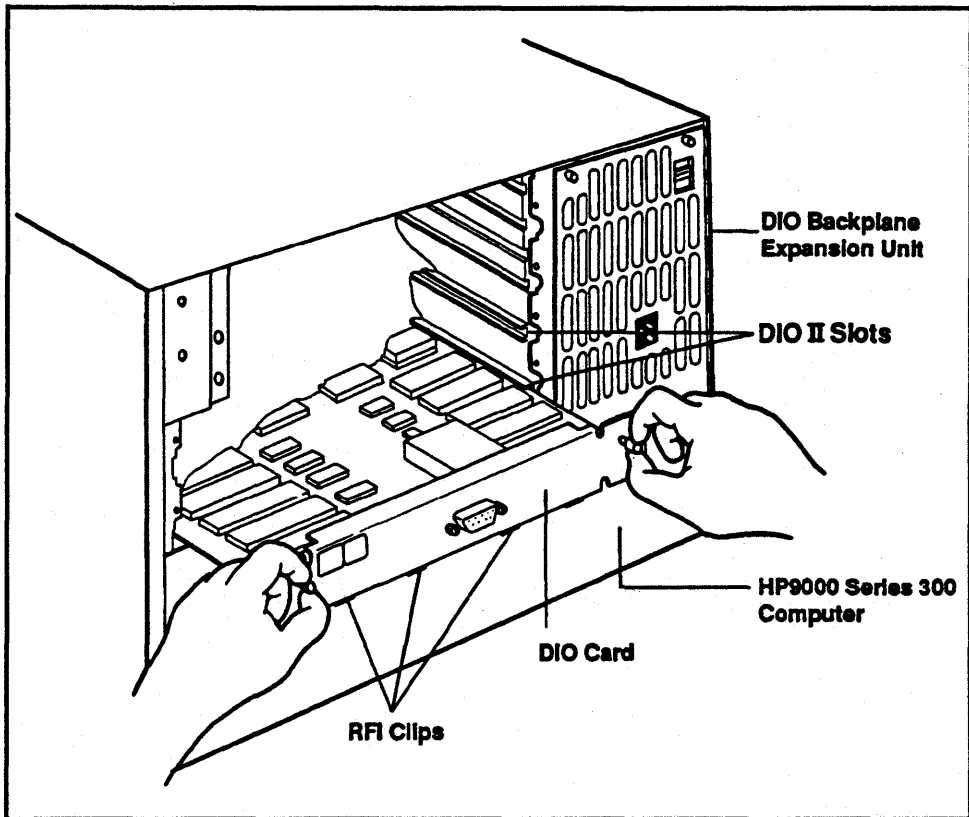
Figure 2 - 3 Inserting the MUX Card

Installing the ADP

The ADP can be installed into an HP computer cabinet, or fastened to a table-leg or wall. A mounting kit is provided with the product, and comprises the following:
- Mounting plate.
- Two M4 screws.
- Four tie-wraps.
- Connector labels.

Rack Mounting

The ADP can be installed in the HP 92211R, HP 45065A and HP 45066A cabinets. Before installation, you will have to fix the mounting plate to the back of the ADP, using the two M4 screws provided. To install the ADP in the cabinet, insert the top lug of the ADP mounting plate in the vertical strut at the required position. Then insert the bottom lug and push the ADP down to locate it. Secure the panel in position by tightening the fixing plate to the top lug as shown.
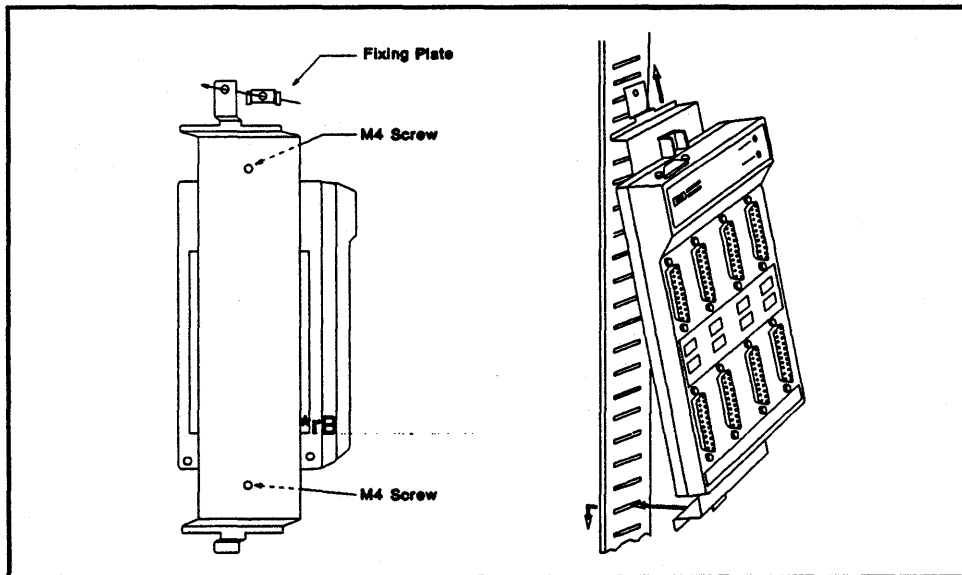
Figure 2 - 4 Rack Mounted ADP

Table-leg Mounting

The product is delivered with four tie wraps, two of which will be needed if you wish to attach the ADP to a table leg. Insert one tie-wrap through the two small slots in one end of the ADP, and then fix loosely around the table leg. Repeat for the other end of the ADP using the second tie-wrap. Position the ADP as required, then tighten the two tie-wraps sufficiently to hold the ADP in position.

Wall Mounting

The ADP is designed to be vertically mounted. To fasten the ADP to a wall, drill two holes in the wall, one vertically above the other, with a distance between centers of 242mm (9.4 inches). The diameter of the drilled hole should be chosen with respect to the type of fixation used. The ADP accepts screws of up to 4mm diameter. The ADP's upper and lower fixing holes are slotted horizontally and vertically respectively, to allow a final adjustment to the positioning if required.

Note   The distance of the ADP from the computer is limited by the MUX card to ADP cable, which is 3 meters (9.4 feet) long. Before siting the ADP permanently make sure that your MUX card to ADP cable will easily connect between the two assemblies.

The ADP to MUX card Connection

The connection cable between the MUX card and the ADP is known as the Multiplexed Serial Link (MSL). It is physically implemented by a shielded 9-wire cable (4 twisted pairs + 1 reserved wire).

The ADP end of cable is terminated a female 9-pin sub D connector. The connector is secured to the sub D male connector on the ADP by means of two knurled screws.

The MUX card end of cable is terminated in a male 9-pin sub D connector, and is secured to the sub D male connector on the metal panel of the MUX card by two knurled screws.

Testing the HP 98638A

When you have completed installing the MUX card and ADP, you should follow the test procedure to verify the installation and correct operation of the assemblies.

Verifying the MUX Installation

1. Switch on power to the host computer. The system initialization cycle is automatically invoked.

2. During the system initialization cycle the system console displays the **select codes** and results of MUX self-tests. The message "Failed" will be displayed if an error is detected.
   - 98642 (RS232C MUX) at 28.
   - 98642 (RS232C MUX) at 29.

   The bootup sequence continues, and after a period of one minute further messages are displayed:
   - 98642 RS232C Multiplexer at select code 28
   - 98642 RS232C Multiplexer at select code 29

3. When you have the login prompt on the system console, refer to the HP-UX System Administration Manual for HP 9000 series 300 computers, to chapter 4 "Customising the HP-UX System" for details on how to set up terminals and modems.

Note that the 98642 Multiplexer is identified at, for example, select codes 28 and 29 since two 98642 Multiplexers are implemented on the model HP 98638A. Also RS232C will be displayed even though an RS-422 ADP may be connected to the MUX card.

Verifying the ADP Installation

The operating status of the ADP is indicated by two LEDs on the front panel of the ADP. The LEDs are the **Power-on** (green LED) and **Link Status** (yellow LED).

When the host computer is switched on the green LED should be illuminated. Observe the state of the Link Status LED (yellow). It may take one of three possible states:

- ON: Indicates that the ADP does *not* receive a correct synchronization signal from the MUX card. The LED will remain *on* until a correct synchronization signal is received. In this state the ADP keeps sending data to the MUX card.

- BLINKING: The ADP receives correct data from the MUX but the MUX does *not* receive correct synchronization from the ADP. In this state the MUX card keeps sending data to the ADP.

- OFF: Synchronization and data transmission are correct in both directions. For correct operation of the MUX card and the ADP, the **Link Status** LED is OFF.

If you suspect that the HP 98638A is not working satisfactorily, refer to "Troubleshooting", chapter 4 of this manual.

Connecting Peripheral Devices

The HP 98638A eight port asynchronous multiplexer allows you to connect up to eight RS-232-C asynchronous serial devices to your HP 9000 series 300 computer. If you have ordered the Option 1C8 you can connect up to eight RS-422 asynchronous serial devices. All connections to supported devices are made via any of the eight 25-pin female connectors on the ADP. However, you must ensure that the peripheral cable you have is supported by Hewlett-Packard. The following sections list cables supported by Hewlett-Packard.

Supported RS-232-C Cables

Connections can be made to a DCE (Data Communication Equipment) by using a modem cable, for example 92219Q, or to a DTE (Data Terminating Equipment) by using a direct connect cable, for example 40242Y or 40242M.

RS-232-C Direct Connect

For direct connection to RS-232-C asynchronous serial devices the minimum wiring requires pins 1, 2, 3 and 7 to be wired end-to-end.

ADP PIN #	SIGNAL NAME	DTE PIN #
1	PROTECTIVE GROUND	1
2	TRANSMIT DATA	2
3	RECEIVE DATA	3
7	SIGNAL GROUND	7
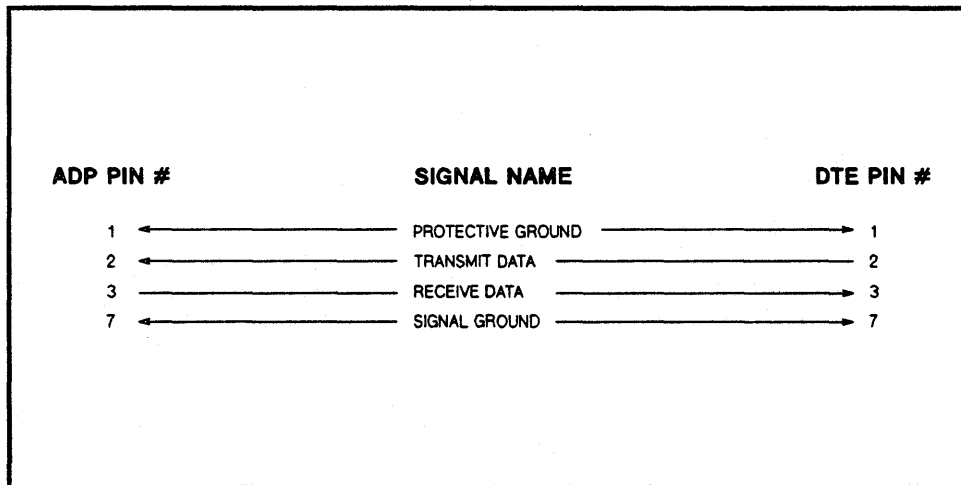
Figure 2 - 5   RS-232C DTE Direct Connection

The following supported RS-232-C cables allow direct connection to asynchronous serial devices:

Cable	Description
13242M	5 meter 25 pin male - 25 pin male. Pins 1 - 8, 12, 15, 17, 20, 22, 24 are wired end-to-end.
13242Y	5 meter 25 pin male - 25 pin male. Pins 1 - 3, 7 are wired end to end. Pins 11 and 19 are crossed.
13242N	5 meter 25 pin male - 25 pin male. Pins 1 - 8, 12, 15, 17, 20, 22, 23, 24 are wired end-to-end. Pins 11 and 19 are crossed.
92219G	3.8 meter 25 pin male - 25 pin male. Pins 1 - 8, 11, 12, 19, 20, 22, 23, 25 are wired end-to-end.

RS-232- C Modem Connect.

To connect the ports of the RS-232-C ADP to supported modems, the following cable is supported:

92219Q	5 meter 25 pin male - 25 pin male.

Note	The 92219Q cable is not symmetrical. There is a DCE (computer end) and a DTE end. In this case the cable is wired as for a HP Standard DCE, which is not exactly the same as the RS-232-C DCE. The following diagrams illustrate the differences.

```
        ADP PIN #                        SIGNAL NAME                      DTE PIN #

            1    ◄───────────────   PROTECTIVE GROUND   ───────────────►  1
            2    ◄───────────────   TRANSMIT DATA       ───────────────   2
            3    ────────────────   RECEIVE DATA        ───────────────►  3
            4    ◄───────────────   REQUEST TO SEND     ───────────────   4
            5    ────────────────   CLEAR TO SEND       ───────────────►  5
            6    ────────────────   DATA SET READY      ───────────────►  6
            7    ◄───────────────   SIGNAL GROUND       ───────────────►  7
            8    ────────────────   DATA CARRIER DETECT ───────────────►  8
           20    ◄───────────────   DATA TERMINAL READY ───────────────   20
           22    ·· ·· ·· ·· ·· ·   RING INDICATOR (t)  ·· ·· ·· ·· ·· ·  22
           23    ◄───────────────   DATA RATE SELECTOR/FREQ. SELECT ────► 23


        (t) RING INDICATOR IS UNUSED IN THIS TYPE OF CONNECTION AND IS NOT IMPLEMENTED IN THIS CABLE.
```
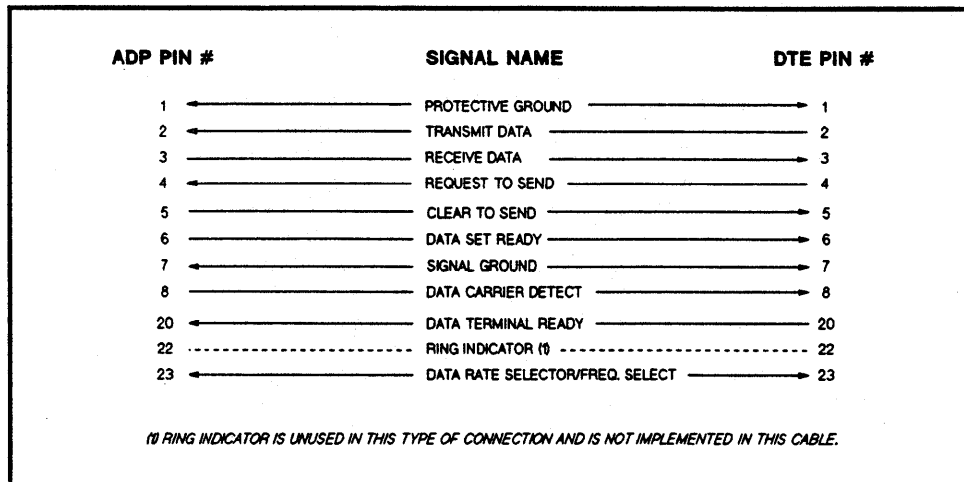
Figure 2 - 6 ADP/DTE Connection: 40242M Cable

```
        ADP PIN #                        SIGNAL NAME                      DCE PIN #

            1    ◄───────────────   PROTECTIVE GROUND   ───────────────►  1
            3    ────────────────   TRANSMIT DATA       ───────────────►  2
            2    ◄───────────────   RECEIVE DATA        ───────────────   3
            8    ────────────────   REQUEST TO SEND     ───────────────►  4
           22    ◄───────────────   CLEAR TO SEND       ───────────────   5
           20    ◄───────────────   DATA SET READY      ───────────────   6
            7    ◄───────────────   SIGNAL GROUND       ───────────────►  7
            4    ◄───────────────   DATA CARRIER DETECT ───────────────   8
            6    ────────────────   DATA TERMINAL READY ───────────────►  20
            9    ◄───────────────   RING INDICATOR      ───────────────   22
           23    ────────────────   DATA RATE SELECTOR/FREQ. SELECT ────► 23
```
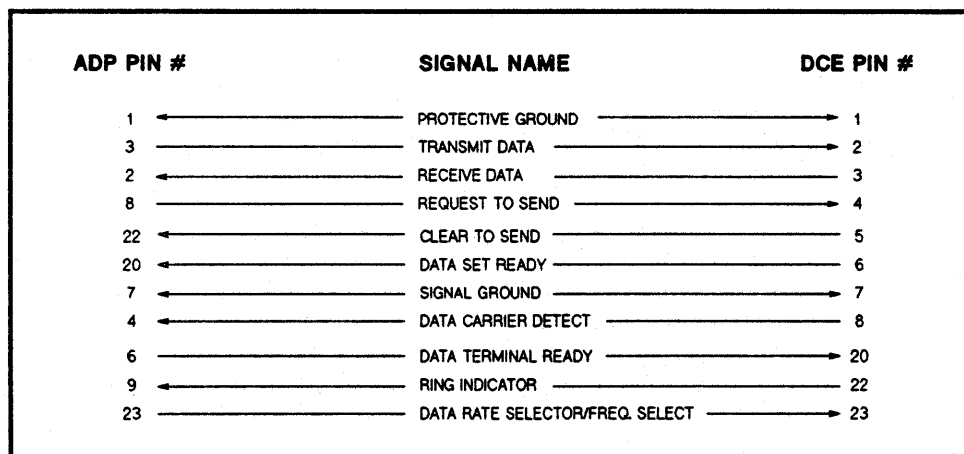
Figure 2 - 7 ADP/DCE Connection: 92219Q Cable

Supported RS-422 Cables

The ports of the RS-422 ADP are wired as for a HP Standard DCE. The RS-422 uses two seperate wires for each signal. Although this doubles the number of wires used, it permits very high data rates and minimizes the problem of varying ground potential. In the RS-422, pin 7 may be used for the Signal Ground, however this is not advised for cable lengths over 10 meters. For cable lengths greater than 10 meters you are advised not to connect the Protective Ground nor the Signal Ground

---

Caution   Ensure that the potential difference between signal ground of the Multiplexer and a connnected terminal *does not* exceed 7 volts. If the potential difference exceeds 7 volts the RS-422 drivers will be irrevocably damaged.

Multiplexer   Destination Device

Voltage must NOT exceed 7 Volts between
Signal Grounds
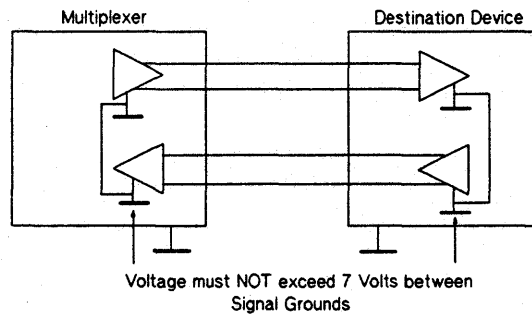
To connect to HP 2392A and 700/92 terminals, use cable HP part number 5181-2035 which is wired as shown in the figure below. Note that those cable pairs highlighted in figure 2-8 are used for cable symmetry only, and do not convey any signals.

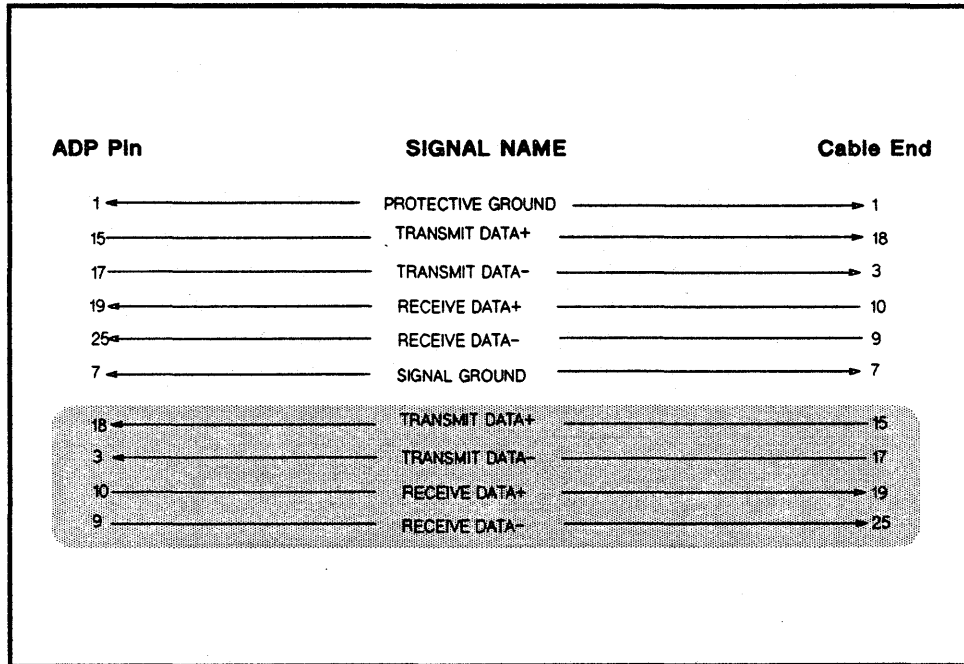| ADP Pin	SIGNAL NAME	Cable End
1 ◄───────────	PROTECTIVE GROUND	───────────► 1
15───────────	TRANSMIT DATA+	───────────► 18
17───────────	TRANSMIT DATA-	───────────► 3
19 ◄───────────	RECEIVE DATA+	─────────── 10
25 ◄───────────	RECEIVE DATA-	─────────── 9
7 ◄───────────	SIGNAL GROUND	───────────► 7
18 ◄───────────	TRANSMIT DATA+	─────────── 15
3 ◄───────────	TRANSMIT DATA-	─────────── 17
10───────────	RECEIVE DATA+	───────────► 19
9───────────	RECEIVE DATA-	───────────► 25

Figure 2 - 8 RS-422 Cable Wiring

Technical Description

Introduction

The aim of this chapter is to provide you with a basic functional description of the HP 98638A. It does not attempt to give a detailed circuit description since any troubleshooting, other than replacing Field Replaceable Units (FRU), is not supported by Hewlett-Packard. However, those users who may like to know about the architecture of the card and ADP may find this chapter useful. A certain degree of knowledge about the HP 9000 series 300 computer systems and data communications is assumed.

The standard HP 98638A is, in most cases, the primary RS-232-C interface for your computer in that it allows you to interface up to eight peripheral devices via the ADP ports. The RS-232-C ADP offers both modem and direct connections to asynchronous serial devices. If you have the RS-422 ADP, Option 1C8, you can use direct connections only to supported asynchronous serial devices.

The HP 98638A comprises three major functional assemblies:

- The MUX card.

- The RS-232-C *or* RS-422 Active Distribution Panel.

- The MUX card to ADP cable (MSL).

The MUX card

The MUX card is the interface between the HP 9000 series 300 DIO bus and the MSL/ADP. It fits into any free DIO-II slot in a Backplane Expansion Unit, typically the HP 98570A. The MUX card manages the data communications between the DIO bus and the ADP. The data is multiplexed and transmitted at 921.6 kbps over the MSL using a version of Manchester coding. The MUX card is **memory mapped** to the host. This means that the host communicates with the MUX card via the Read and Write cycles to a particular portion of the host's memory space. This portion of memory is selected by a **select code**, *see also* "Select Code Switches", chapter 2 of this manual. As two identical channel sets are implemented on the HP 98638A, two **select codes** are required to identify the MUX.

MUX Card Description

The eight port multiplexer card consists of two identical four port multiplexers mounted on the same card. To simplify the description only one of the four port multiplexers is described in this section.

The functional block diagram shown in figure 3-1 shows the basic four port multiplexer, which is described in the following paragraphs.

Each four port multiplexer is built around the following major components:

- Z-80A CPU (Central Processing Unit).

- Two Z-80A SIO (Serial Input/Output).

- Two Z-80A CTCs (Counter/Timer Circuit).

- Backplane Interface Circuitry.

- 8K x 8-bit EPROM.

- 2K x 8-bit static RAM.

- Shared Memory Controller.

- FIFO Input and Output registers.

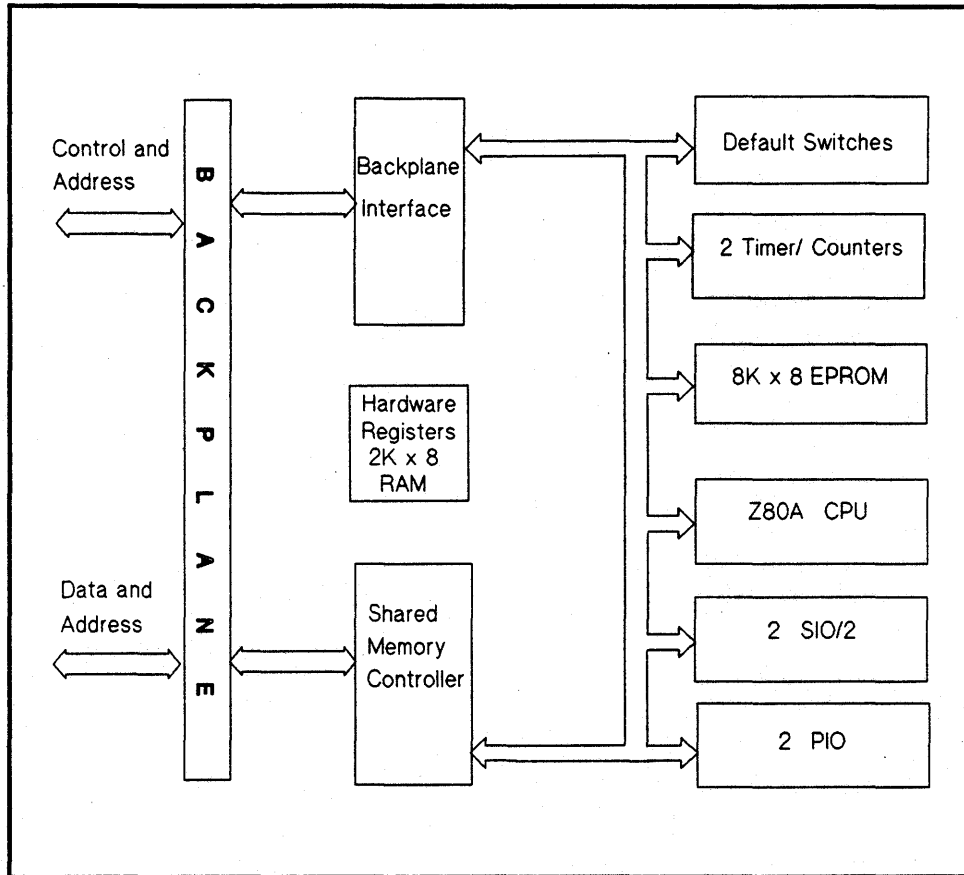- Parallel Input/output (PIO) Controllers.

Figure 3 - 1 Functional Block Diagram of MUX Card

Z-80A CPU

The Z-80A microprocessor is the heart of the MUX card in that it executes the program that controls all the functions of the card. It controls the two Z-80A SIO, the CTC, the EPROM, the RAM, and the interface circuitry.

Z-80A SIO (Serial Input/Output)

The SIO is a programmable serial input/output controller with independent, full duplex channels with seperate control and status lines. There are two SIOs per four port multiplexer. The SIO accepts the asynchronous bit stream from the ADP and converts it into 8-bit bytes. The bytes are buffered in the FIFO, in the receive buffer space corresponding to the channel.

Z-80A CTC (Counter/Timer Circuit)

The CTC contains four independent counter/timer channels used to generate baud rates and system timing intervals. Three of these timers can supply outputs for other devices, the fourth can only cause an interrupt to the Z-80A microprocessor.

Backplane Interface Circuitry

The backplane interface circuitry provides the communication interface between the host computer and the MUX card.

EPROM

The MUX card firmware is held within the 8k x 8 bit EPROM. The EPROM can only be accesed by the Z-80A CPU.

Static RAM

The 2k x 8-bit static RAM is used for I/O buffering and storage of temporary data. The RAM, along with some hardware registers are used to exchange information between the 680X0 host CPU and the Z-80A. The entire RAM and hardware registers are in addressing space dedicated to shared memory, thus any memory loocation in RAM can be addressed by either microprocessor. Most of the RAM space is reserved for transmit and receive FIFOs.

Shared Memory Controller

The Shared Memory Controller circuitry arbitrates the RAM resources on the MUX card between the Z-80A CPU and the host CPU. The 2k byte RAM uses a shared data and shared address bus; the memory controller decides who has control of the bus at any given time.

FIFO Input/Output Registers

The FIFO input/output registers are used to pass information between the host computer and the MUX card. The host will transmit data to the card only when there is room in the Transmit FIFO corresponding to a particular port. When the data appears in the Transmit FIFO registers, an interrupt is issued by the host indicating to the card that the buffer needs to be transmitted.

Parallel Input/output Controller

Parallel Input/output (PIO) controllers manage the modem signal lines for the asynchronous RS-232-C ports. Each input modem line is polled every 17.7 milliseconds. Any signal change is reported to the host by an **Input Modem Line Change Interrupt** if the host wants it. The host generates an **Output Modem Line Change Interrupt** to the MUX card every time it wants to make an output modem line change. The Z-80A microprocessor immediately writes the new value inside the corresponding PIO port. All input/output modem signals are directly hardwired betweem the PIOs and the ADPs.

The Active Distribution Panel (ADP)

The ADP serves as the electrical and physical interface between the MUX card and supported asynchronous serial devices. Two communication interface standards are available:

- RS-232-C standard for modem and direct connections.
- RS-422 standard for direct connections.

The ADP consists of a panel with eight 25-pin female connectors that provide the physical connection to supported asynchronous serial devices.

The functions of the ADP are as follows:

- Encode and decode the Multiplexed Serial Link (MSL) protocol.
- Multiplex and demultiplex the data flow.
- Drive/receive the signals on each of the eight ports.

Features

The RS-232-C ADP and RS-422 ADP have the following general features:

- Surge protection on all data lines.
- Link Status and power-on indicators.
- Balanced transmission lines on the MSL output.

The RS-232-C ADP has the following specific features:

- Eight full duplex channels operating at speeds up to 19.2 kbps, and conforming to the EIA RS-232-C standard.
- Four input and four output modem lines per port.

The RS-422 ADP has the following specific features:

- EIA RS-422 standard.
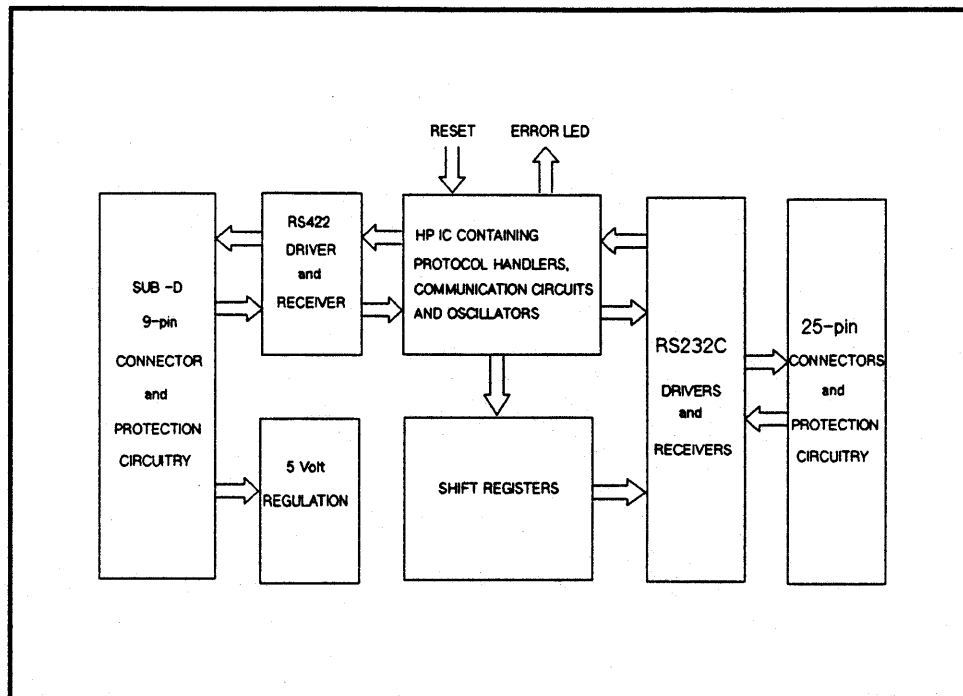
Figure 3 - 2 Block Diagram of the RS-232-C ADP

ADP Description

The functional block diagram of the ADP, as shown in figure 3-2, illustrates the data flow through the ADP. All the communications, protocol handling and synchronization are performed by a proprietary Hewlett-Packard IC (integrated circuit). The remainder of the circuitry associated with the ADP comprises the RS-232-C drivers and receivers for the modem ports and the MSL interface.

Note	The RS-422 ADP is basically identical to the RS-232-C except that the RS-232-C output driver/receivers are replaced by RS-422 driver/receivers.

ADP Pin-out

All eight ports of the HP 98638A with RS-232-C ADP permit the use of modems. On each port there are seven modem signals available which are indicated by either an *output* or *input* signal as shown in table 3-1.

Table 3-1   RS-232-C ADP 25 - Pin Connector Signals

ADP Pin	Function	DTE Signal
1	Protective Ground	GND
2	Receive Data	RD
3	Transmit Data	TD
4	Data Carrier Detect	DCD (Input)
5	General Purpose Output	GPO (Output)
6	Data Terminal Ready	DTR (Output)
7	Signal Ground	SG
8	Request to Send	RTS (Output)
9	Ring Indicator	RI (Input)
10-19	Not Connected	
20	Data Set Ready	DSR (Input)
22	Clear to Send	CTS (Input)
23	Data Signal Rate	DSR
24-25	Not Connected	

Direct Connections

The Direct Connect is used specifically with RS-422, and with RS-232-C whenever no modem control is desired. It is mainly used for directly connected asynchronous serial devices. In the RS-232-C configuration the following signals on the ADP are processed.

Table 3-2 RS-232-C Direct Access Signal Pin-Out

ADP Pin	Function	DTE Signal
2	Receive Data	RD
3	Transmit Data	TD
4	Data Carrier Detect	DCD (Input)
5	General Purpose Output	GPO (Output)

For RS-422 the signals shown in table 3-3 are processed.

Table 3-3 RS-422 Direct Access Pins

ADP Pin	Function	Cable End
1	Protective Ground	1
15	Transmit Data +	18
17	Transmit Data-	3
19	Receive Data +	10
25	Receive Data-	9
7	Signal Ground	7

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4

Troubleshooting

Introduction

This chapter describes how to perform simple troubleshooting tasks on the HP 98638A Eight Port Asynchronous Multiplexer.

Maintenance on the HP 98638A is restricted to the replacement of **Field Replaceable Units, (FRUs)**. The HP 98638A contains the following FRUs:

Table 4-1 Field Replacable Units

FRU	HP part number
Mux Card	98638-60001
RS-232-C ADP	40299-60002
RS-422 ADP	5062-3085
MSL Cable	40299-60003
EPROMs	98638-81002 (two required)

Faulty units are identified and isolated by adopting a logical sequence of diagnostic procedures. To help you adopt a logical troubleshooting procedure, the chapter is organized into the following sections:

- Interpret the results of the diagnostics self-test.

- Interpreting the ADP status indicators.

- Simple troubleshooting charts and techniques.

Diagnostic Tools

There are three types of diagnostic tools available to troubleshoot and isolate faults on the HP 98638A, these are as follows:

- Self-test diagnostics invoked on switch on.

- ADP status indicators.

- Loopback testing using a loopback hood and loopback utility.

Essentially, the multiplexer forms the primary RS-232-C (or RS-422 if you have ordered Option 1C8) interface between your computer and attached peripheral devices. If a malfunction develops then it is a matter of determining where the problem lies. It could be associated with your computer, associated with the MUX or associated with an asynchronous serial device. To help you determine exactly where a fault may lie the troubleshooting chart, shown in figure 4-3 should be of assistance. The steps indicated in the chart are self-explanatory. System faults are fully documentated within the systems documentation. For problems associated with your peripheral device you should refer to the troubleshooting documentation supplied with the device. For most Hewlett-Packard asynchronous serial devices, comprehensive test facilities are built in which should help you isolate the problem.

If you have isolated the fault to the HP98638A and its assemblies, then the following sections will enable you to isolate the fault to a Field Replaceable Unit. Once the faulty unit is found, replace it with a new or exchange unit.

Self-tests

The self-test diagnostics are automatically invoked on switch on. The self-test automatically tests the major components on the MUX card, and displays the results on the system console during the boot-up sequence. If the self-test detects an error the message "Failed" is displayed:

- 98642 (RS232 MUX) at 28
- 98642 (RS232 MUX) at 29 "Failed"

The boot up sequence continues, and after a period of one minute further messages are displayed that indicate the error code.

98642 RS232C Multiplexer at select code 28   01

The possible error codes that can be displayed are shown in table 4-2:

Table 4-2 - Possible Error Codes displayed on Screen

Error Code (as shown on screen)	Description
01:	INT-COND/INTERRUPT register test
02:	MNI/RESET ID register test
03:	Semaphore register test
04:	ROM test
05:	RAM test
06:	CTC 0 test - algorithm 1
07:	CTC 0 test - algorithm 2
08:	CTC 1 test - algorithm 1
09:	CTC 1 test - algorithm 2
10:	SIO 0 CH A test (internal loopback)
11:	SIO 0 CH B test (internal loopback)
12:	SIO 1 CH A test (internal loopback)
13:	SIO 1 CH B test (internal loopback)

Note that the self-test executes the component tests in the order shown in table 4-2, and terminates at the first failure encountered. Any components of the diagnostic test beyond the one in which the failure occurred are not tested.

ADP Status Indicators

Two LEDs on the front panel of the Active Distribution Panel indicate its operating status.

- A green LED, when illuminated, indicates power is applied to the ADP.

- A yellow LED indicates the **Link Status**.

Any communication problems between the MUX and ADP can be detected by observing the **Link Status** LED on the front panel of the ADP. Its normal state is OFF. However, the **Link Status** LED may take one of three possible states:

- ON: Indicates that the ADP does *not* receive a correct synchronization signal from the MUX card. The LED will remain ON until a correct synchronization signal is received. In this state the ADP keeps sending data to the MUX card.
- BLINKING: The ADP receives correct data from the MUX but the MUX does *not* receive correct synchronization from the ADP. In this state the MUX card keeps sending data to the ADP.
- OFF: Synchronization and data transmission are correct in both directions.

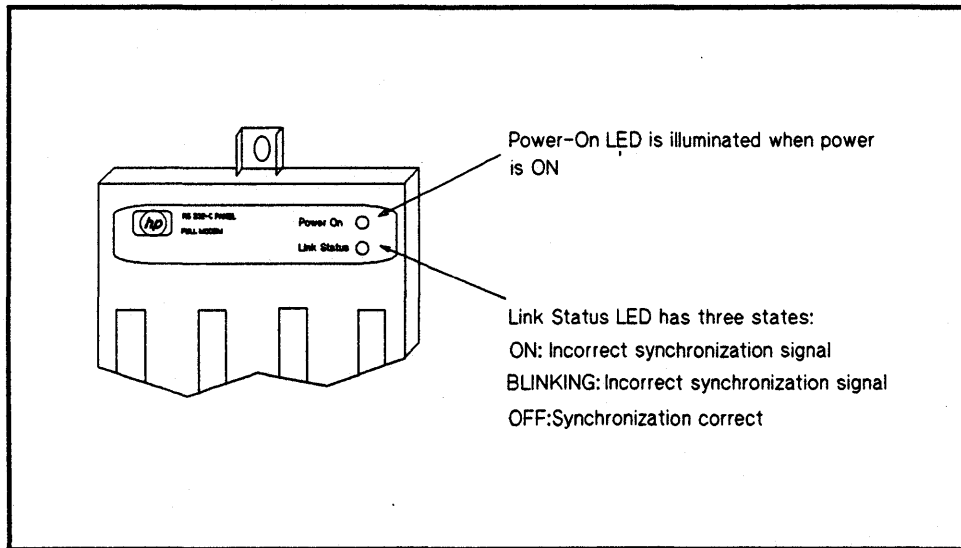Power-On LED is illuminated when power is ON

Link Status LED has three states:
ON: Incorrect synchronization signal
BLINKING: Incorrect synchronization signal
OFF: Synchronization correct

Figure 4 - 1 ADP Status LEDs

Loopback Testing

The comparison of the transmitted data with the received data verifies the proper flow of data in a multiplexer. If the received data does not match the transmitted data, then the multiplexer is not functioning correctly. In the case of the HP 98638A data is looped back from the ADP connectors to verify the function of the system bus, the MUX card, the MSL, and the line driver/receivers. The test uses an external loopback connector connected to a particular port on the ADP. The loopback connector is a 25-pin male sub D connector with the part number engraved in the plastic housing of the hood.

Testing the HP 98638A Using the Loopback Hood

You can test the HP 98638A by using the loopback hood. Simply connect the loopback hood to the port to be tested then run the loopback program. The loopback program is supplied on a cassette and loaded onto your system if you want to run the diagnostics utility.Contact your Hewlett-Packard Support Center for details on obtaining the loopback utility.
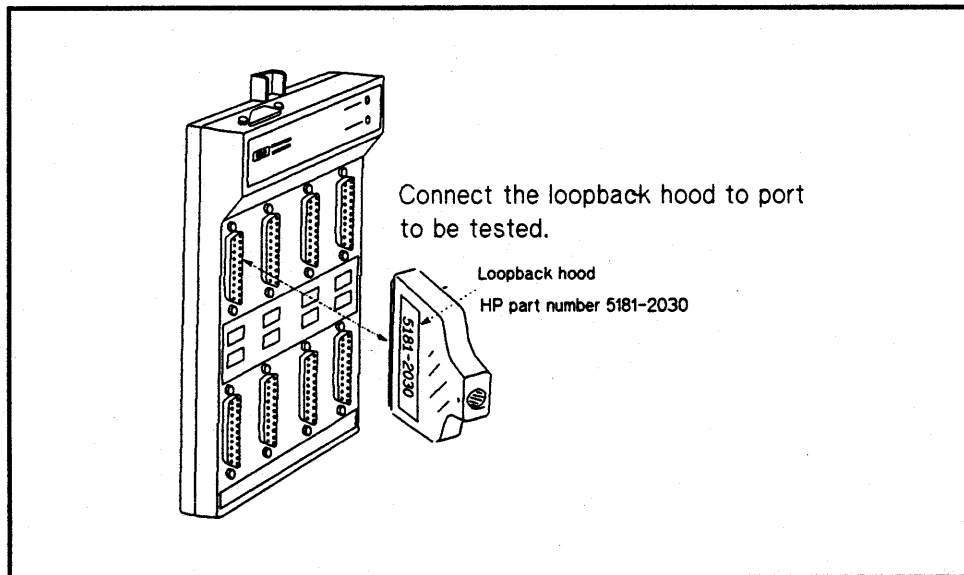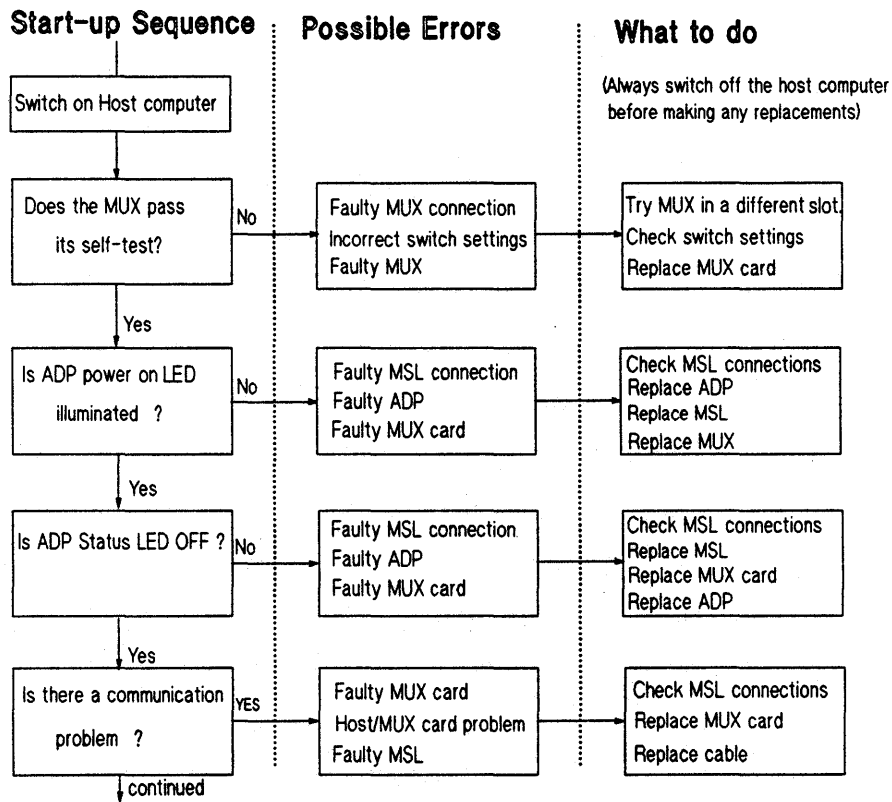
Connect the loopback hood to port to be tested.

Loopback hood
HP part number 5181-2030

Figure 4 - 2 Connecting the loopback hood.

Flowchart and Techniques

Troubleshooting on the MUX can be complex since the fault can be associated with a peripheral device, the host computer, or the MUX itself. To simplify the troubleshooting process you can use the diagnostic tools that are part of the functionality of the HP 98638A. These are the ADP's **Power-on** and **Link Status** LEDs and the diagnostic loopback tests facility. The flow chart, shown in figure 4-3, depicts a troubleshooting process that should help to isolate a malfunction to a Field Replaceable Unit (FRU) by using the HP 98638A

Start-up Sequence | Possible Errors | What to do

(Always switch off the host computer before making any replacements)

Start-up Sequence		Possible Errors	What to do
Switch on Host computer			
Does the MUX pass its self-test?	No →	Faulty MUX connection Incorrect switch settings Faulty MUX	Try MUX in a different slot Check switch settings Replace MUX card
↓ Yes			
Is ADP power on LED illuminated ?	No →	Faulty MSL connection Faulty ADP Faulty MUX card	Check MSL connections Replace ADP Replace MSL Replace MUX
↓ Yes			
Is ADP Status LED OFF ?	No →	Faulty MSL connection Faulty ADP Faulty MUX card	Check MSL connections Replace MSL Replace MUX card Replace ADP
↓ Yes			
Is there a communication problem ?	YES →	Faulty MUX card Host/MUX card problem Faulty MSL	Check MSL connections Replace MUX card Replace cable
↓ continued			

built-in diagnostics tools. The steps described in the flow chart are self explanatory.

Start-up Sequence | Possible Errors | What to do

```
              │
              ▼
   ┌─────────────────────┐  Yes   ┌──────────────────┐      ┌──────────────────────────┐
   │   Is there still a   ├──────▶ │   Configuration   ├────▶│Check special files on host│
   │communications problem│        │     problem       │     │Run loopback utility on    │
   └──────────┬───────────┘        └──────────────────┘      │problem ports.             │
              │                                               └──────────────┬───────────┘
              │        ◀─────────────────────────── Pass ─────┘         Fail │
              │                                               ┌──────────────▼───────────┐
              │                                               │Check MSL connections     │
              │                                               │Replace MUX Card          │
              │                                               │Replace ADP               │
              │                                               │Replace MSL               │
              │                                               └──────────────────────────┘
              ▼
   ┌─────────────────────┐  Yes   ┌──────────────────┐      ┌──────────────────────────┐
   │   Is there still a   ├──────▶ │Faulty ADP to device│    │Check ADP to device       │
   │communications problem│        │    cable (s)      │     │cable (s)                 │
   └──────────┬───────────┘        └──────────────────┘      │Check devices             │
              │ No                                            └──────────────────────────┘
              ▼
```
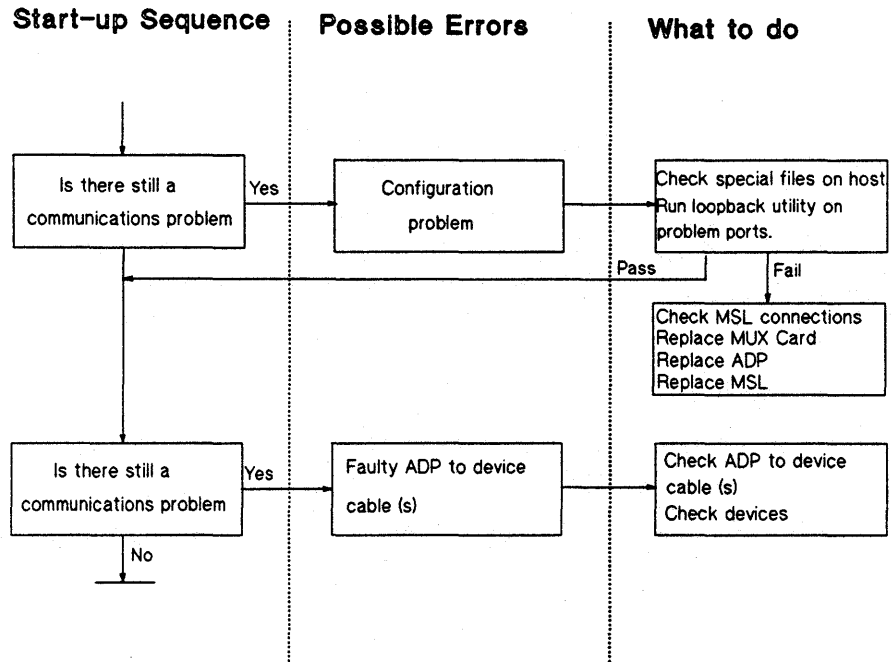
Figure 4 - 3 Troubleshooting Flowchart

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Replaceable Parts

This chapter contains information for ordering replaceable parts for the HP98638A Eight Port Asynchronous Multiplexer.

If you need to order any of the Field Replacable Parts you will need to give the following information:

- Description of the part.

- The Hewlett-Packard part number.

Field Replaceable Units

The troubleshooting strategy for the HP98638A is to locate and replace a malfunctioning unit. For the HP98638A the Field Replaceable Units are as follows:

Table 5-1 Field Replaceable Units

FRU	HP part number
Mux Card	98638-60001
ADP-RS232C	40299-60002
ADP-RS422	5062-3085
MSL Cable	40299-60003
EPROMs	98638-81002 (two required)

Ordering Information

To order a part listed in table 5-1, quote the Hewlett-Packard part number, its description, and indicate the quantity required. Address the order or inquiry to the nearest Hewlett-Packard Sales and Support Office.

Spare Parts

Spare parts, other than those designated Field Replacable Parts are ordered through your nearest Hewlett-Packard, Service and Support Center. Spare parts available are shown in table 5-2:

Table 5-2 - Available Spare Parts

40299-60002	RS-232-C ADP
5062-3085	RS-422 ADP
40299-60003	MSL Cable
40299-60004	Installation Kit
40299-60006	Fixation Plate Assembly
5181-2030	Loopback hood
98638-90001	Manual
98638-810xx	EPROMS (part numbers subject to change)

Supported Equipment

This chapter contains information concerning equipment supported with the HP 98638A.

Supported Modems

The modems listed here are supported from an RS-232-C modem port to another terminal or serial printer. A pair of modems is needed for each connection; one to connect the modem port of the telecommunications line, and the other to connect the terminal or serial printer to the other end of the telecommunications line. Asynchronous modem connections on the HP 98638A can support full duplex modems only.

Table 6-1 Supported Modems

Modem	Baud Rate
Bell 212A	300/1200
RacalMilog MPS 1222	300/1200
Hayes Smart Modem	2400
HP 37212B	300/1200/2400-V.22
HP 50759A	300/1200/2400

Note   Only modems which have BS 6301 approval are recommended by Hewlett-Packard.

Supported Plotters, Printers and Terminals

Table 6-2 Supported Plotters, Printers and Terminals

Plotters	Printers	Terminals
7550A	2993A	2392
	2934A	2393
	2562A	2394
	2563B	2397
	2686D	700/43
	33447A	700/22
	2684D/P	700/32
		700/45
		700/92
		700/94
		700/96
		700/98
		2625A
		2627A
		2628A

Removing and Replacing Parts

This chapter describes how to replace MUX card and/or the EPROMs on the MUX card.

Changing the MUX Card and/or EPROMs

You will need to have available the following tools if you have to replace the MUX card and/or the existing EPROMs on the MUX card with replacement EPROMs .

- Integrated circuit extractor tool.

- Integrated circuit insertion tool.

- A correctly earthed anti-static wrist strap.

Procedure:

1. Ensure that the host computer is switched OFF and power leads disconnected.

2. Disconnect the MSL Cable from the MUX card.

3. Release the captive screw on either side of the MUX card. Grip the front panel, and carefully remove the card from the Backplane Expansion Unit. Place the card on an anti-static mat. The EPROMS, U14 and U67, are found midway between the front and rear connectors, either side of the MUX card, (see figure 7-1).

4. Using the IC extractor tool, carefully remove the existing EPROMs. Using an IC insertion tool, carefully insert the replacement EPROMs. Note that two identical EPROMs are used. Refer to figure 7-1 to ensure that the EPROM is inserted into the IC holder in the correct orientation.

5. Carefully slide the MUX card into the Backplane Expansion Unit on the host, turn the captive screws clockwise until tight, reconnect the MSL cable and switch on.
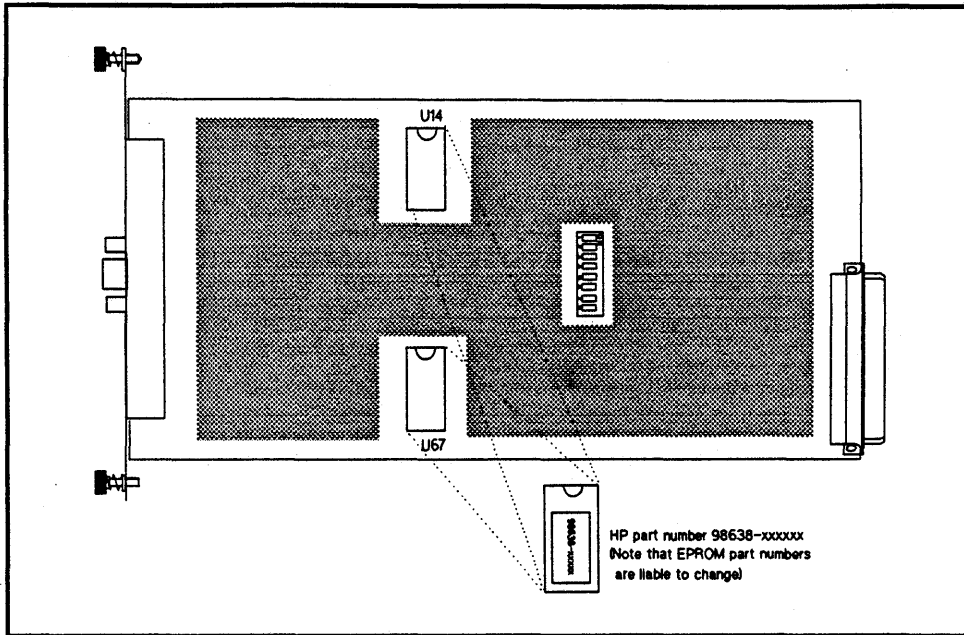
Figure 7 - 1 Changing the EPROMs on the MUX card

Caution	The EPROMs are static sensitive devices and thus extra care must be exercised when handling these components. Always wear an anti-static wrist strap. Always use the IC insertion tool to insert an EPROM as the pins of the EPROM can be easily bent and damaged whilst being inserted into the EPROM holder.

GLOSSARY

Asynchronous transmission

Method of transmitting information at a speed determined by circuit functions rather than timing signals. Asynchronous transmission always contains start and stop bits to identify the beginning and end of each character.

Backplane Expansion Unit

Allows you to expand the I/O backplane of your HP 9000 series 300 computers to accommodate accessories such as the HP 98638A Eight Port Multiplexer.

Baud

The number of line signal variations per second. It is also used to indicate the rate at which data is transmitted on a line.

CCITT

Consultative Committee for International Telegraphy and Telephony (Europe)

DIO Bus

A standard Hewlett Packard I/O Backplane for Interface cards

DIO II

A designated slot in the Backplane Expansion Unit capable of accommodating the HP 98638A MUX card.

DCE

Data Circuit-terminating Equipment:distinguishes the network side of a User/network interface.

EIA

Electronic Industries Association

EPROM

Erasable Programmable Read Only Memory: a read-only memory in which data can be erased and re-programmed bit by bit.

FCC

Federal Communications Commission

FTZ

Fermeldetechnisches Zentralamt

GND

Ground.

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronic Engineers

Loopback Test

A test of the communication link performed by connecting the loopback connector to the port to be tested. The received data is then compared to the transmitted data. If the transmitted data does not match the received data then the multiplexer is not functioning correctly.

Modem

Modulator/Demodulator: a device for converting digital data into analog signals prior to transmission over an analogue communications link. It also reconverts the analogue signal, at the receiver, back into digital format.

MUX

A Multiplexer: device used to enable a number of lower bit rate devices to share a higher bit rate transmission line.

PIO

The PIO is a programmable parallel I/O controller with two independent ports including their own handshake lines. The Z80 PIO can be programmed to operate in four modes: Output (Mode 0), Input (Mode 1), bidirectional (Mode 2) and Control (Mode 3).

Port

A connector on the ADP that is capable of having a modem attached for communication with a remote data terminal.

RAM

Random Access Memory: a type of memory which allows direct access to any location without having to follow a sequence of storage locations.

ROM

Read Only Memory: a type of memory which can only be read and not written to or changed.

SIO

Serial Input-Output Universal Synchronous/Asynchronous Receiver /Transmitter: A programmable serial I/O controller with two independent full duplex channels with seperate control and status lines. Each channel can be independently programmed. The SIO is a member of the Z80 family of integrated circuits.

"Start-Stop"

A serial data transmisssion method where each character or byte is transmitted as a self-contained piece of information, needing no additional synchronization or timing information to be transmitted.

V.24 and V.28

Definition of the interchange circuit pins between DTE's (Data Terminating Equipment) and DCE's (Data Circuit-terminating Equipment).

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