

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Keysight / Agilent 98625B* at our website: ***Click HERE***

# Direct I/O Computer Systems

# HP 98625B

# HP-IB HIGH-SPEED DISC INTERFACE

## Hardware Reference Manual

Card Assembly: 98625-90001
Date Code: A-2515

HEWLETT PACKARD

HEWLETT-PACKARD COMPANY
Roseville Networks Division
8000 Foothills Boulevard
Roseville, California 95678

Manual Part Number 98625-90001
E1285
Printed in U.S.A.
December 1985

# PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update page may contain write-in instructions.

Each reprinting of this manual will incorporate all past updates; however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with the user-inserted update information. New editions of this manual will contain new information, as well as updates.

First Edition . . . . . December 1985

---

**NOTICE**

The information contained in this document is subject to change without notice.

HEWLETT-PACKARD MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Hewlett-Packard Company.

---

Copyright (c) 1985 by HEWLETT-PACKARD COMPANY

# SAFETY CONSIDERATIONS

**GENERAL** - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

## SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

**WARNING** **The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

**CAUTION** The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

**CAUTION**

## STATIC SENSITIVE DEVICES

When any two materials make contact, their surfaces are crushed on the atomic level and electrons pass back and forth between the objects. On separation, one surface comes away with excess electrons (negatively charged) while the other is electron deficient (positively charged). The level of charge that is developed depends on the type of material. Insulators can easily build up charges in excess of 20,000 volts. A person working at a bench or walking across a floor can build up a charge of many thousands of volts. The amount of static voltage developed depends on the rate of generation of the charge and the capacitance of the body holding the charge. If the discharge happens to go through a semiconductor device and the transient current pulse is not effectively diverted by protection circuitry, the resulting current flow through the device can raise the temperature of internal junctions to their melting points. MOS structures are also susceptible to dielectric damage due to high fields.

*The resulting damage can range from complete destruction to latent degradation.* Small geometry semiconductor devices are especially susceptible to damage by static discharge.

The disc interface 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 components. Hold

**WARNING**

**SAFETY EARTH GROUND - The computer on which this product is installed is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety ground must be provided from the main source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and must be secured against any unintended operation.**

SERVICING

**WARNING**

**Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.**

# PREFACE

This manual contains installation and reference information for the HP 98625B HP-IB High-Speed Disc Interface.

Hewlett-Packard uses a standard 12-chapter format for hardware reference manuals, and this manual conforms to that format. Please be aware, however, that some of the standard chapters do not apply for an interface card such as the HP 98625B, and therefore even though all chapters are included, some are very brief.

Chapter 1 -- General Information

Chapter 2 -- Site Preparation

Chapter 3 -- Installation and Configuration

Chapter 4 -- Preventive Maintenance

Chapter 5 -- Functional Description

Chapter 6 -- Removal and Replacement

Chapter 7 -- Adjustments

Chapter 8 -- Troubleshooting and Diagnostics

Chapter 9 -- Replaceable Parts

Chapter 10 -- Reference

Chapter 11 -- Product History

Chapter 12 -- Diagrams

Index -- Cross-reference index

# CONTENTS

**Chapter 1**
**General Information**

Description . . . . . 1-1
Equipment Supplied . . . . . 1-2
Identification . . . . . 1-2
  The Product . . . . . 1-2
  Interface Card . . . . . 1-2
  Manuals . . . . . 1-3
Test Equipment and Special Tools. . . . . 1-3
Support Strategy. . . . . 1-3
Specifications . . . . . 1-3

**Chapter 2**
**Site Preparation**

**Chapter 3**
**Installation and Configuration**

Inspection . . . . . 3-2
Repacking the Disc Interface . . . . . 3-2
Storage. . . . . 3-2
Power Requirements. . . . . 3-2
Cabling Information. . . . . 3-3
  Backplane Connections . . . . . 3-3
  Peripheral Device Cable Connections . . . . . 3-3
Configuration Switches . . . . . 3-3
  Select Code Switches . . . . . 3-3
  Interrupt Level Switches . . . . . 3-7
  System Controller Switch . . . . . 3-7
  High Speed/Low Speed Switch . . . . . 3-7
Installation. . . . . 3-8
  Connecting Disc Drives . . . . . 3-9
    Physical Arrangement of Equipment . . . . . 3-9
    Limitations . . . . . 3-10
Start-Up and Verification . . . . . 3-10

**Chapter 4**
**Preventive Maintenance**

# CONTENTS (continued)

**Chapter 5**
**Functional Description**

System Interface . . . . . 5-1
Functional Description . . . . . 5-1
HP-IB Controller . . . . . 5-1
Data Flow . . . . . 5-5
Non-DMA Control . . . . . 5-5
DMA Control . . . . . 5-5
Backplane-to-FIFO Circuit . . . . . 5-5
HP-IB Controller-to-FIFO Circuit . . . . . 5-6

**Chapter 6**
**Removal and Replacement**

Removal . . . . . 6-1
Removing the HP-IB Cable(s) . . . . . 6-1
Removing the Disc Interface Card . . . . . 6-2
Replacement . . . . . 6-2
Replacing the Disc Interface Card . . . . . 6-3
Replacing HP-IB Cables . . . . . 6-3

**Chapter 7**
**Adjustments**

**Chapter 8**
**Troubleshooting and Diagnostics**

**Chapter 9**
**Replaceable Parts**

Replaceable Parts . . . . . 9-2
Ordering Information . . . . . 9-2
Exchange PCAs . . . . . 9-3

# CONTENTS (continued)

**Chapter 10**
**Reference**

Technical Manual Reference . . . . . 10-1
Glossary of Terms . . . . . 10-2

**Chapter 11**
**Product History**

**Chapter 12**
**Diagrams**

# General Information

This chapter contains the following information for the HP 98625B HP-IB High-Speed Disc Interface:

- o Description
- o Equipment supplied
- o Test equipment required
- o Support strategy
- o Specifications and technical data

## DESCRIPTION

The HP 98625B HP-IB High-Speed Disc Interface is an interface card used to connect high-speed disc drives to HP 9000 Series 200 and 300 computers. (The high-speed disc drives referred to here are Hewlett-Packard disc drives equipped with Command Set '80 (CS/80) controllers.) HP-IB (Hewlett-Packard Interface Bus) is Hewlett-Packard's implementation of the IEEE Standard 488-1978 and Supplement 488-1978A-1980.)

High-speed data transfers require direct memory access (DMA) capability, thus an HP 98620 Direct Memory Access card should be installed in the computer. Note, however, that the DMA card is not necessary if the computer is running with the HP-UX 5.0 operating system.

# EQUIPMENT SUPPLIED

The HP 98625B HP-IB High-Speed Disc Interface consists of:

| Description | Part Number |
|---|---|
| Disc Interface Card | 98625-66502 |
| Hardware Reference Manual | 98625-90001 |

No cables are furnished with the HP 98625B. Cables may be ordered through the nearest Hewlett-Packard Sales and Service Office (a list of Sales and Service Offices is contained at the back of this manual). To ensure reliable operation, order only the following cables:

| | |
|---|---|
| HP 10833A | 1 meter (3.3 feet) |
| HP 10833B | 2 meters (6.6 feet) |
| HP 10833C | 4 meters (13.2 feet) |
| HP 10833D | 0.5 meters (1.6 feet) |

# IDENTIFICATION

## The Product

Up to five digits and a letter (98625B in this case) are used to identify Hewlett-Packard products. The digits identify the product; the letter identifies the revision level of the product.

## Interface Card

The interface card supplied with the HP 98625B product is identified by a part number on the card. In addition to the part number, the card is further identified by a letter and a four-digit date code (e.g., A-2515). This designation is placed below the part number. The letter identifies the version of the etched circuit on the card. The date code (the four digits following the letter) identifies the electrical characteristics of the card with components mounted. Thus, the complete part number on the card would be as follows:

98625-66502
A-2515

If the date code stamped on the card does not agree with the date code on the title page of this manual, there may be differences between the card and the card described herein. These differences are described in manual supplements available through the nearest Hewlett-Packard Sales and Service Office (a list of Sales and Service Offices is contained at the back of this manual).

## Manuals

The Hardware Reference Manual (this manual) supplied with the HP 98625B product is identified by name and part number. The name, part number, and publication date are printed on the title page of the manual. If the manual is revised, the publication date is changed, and the "Printing History" page (page iii) records these reprint dates.

# TEST EQUIPMENT AND SPECIAL TOOLS

No special tools or test equipment are required to test the HP 98625B card. The card is tested by running a host-resident I/O verification program.

# SUPPORT STRATEGY

Support of the HP 98625B is based on the replacement of the card or cable(s). A failing card should be returned to Hewlett-Packard for repair. See the paragraph *"Exchanging PCAs"* in Chapter 9 for information on exchanging a card. (PCA stands for "Printed Circuit Assembly", and is a term used for cards.)

# SPECIFICATIONS

Specifications for the HP 98625B are listed in table 1-1.

Table 1-1. Specifications (1 of 2)

FEATURES

Transfers data at 1 Mbyte/second in byte mode, 2 Mbyte/second in word mode

Up to seven disc drives can be connected to one interface card

Total cable length up to 15 meters

Direct memory access (DMA) for fast transfers

Compatibility with HP 98625A interface card

Allows status register access during DMA transfers

Switch selectable System Controller/Non-System Controller

Switch selectable high-speed/low-speed HP-IB operation

PHYSICAL CHARACTERISTICS

| | |
|---|---|
| Length: | 15.9 cm (6.25 in) |
| Width: | 19.0 cm (7.5 in) |
| Thickness: | 3.2 cm (1.25 in) |
| Weight: | 310 grams (11 ounces) |
| Shipping Weight: | 1 kg (2.2 pounds) |

OPERATING ENVIRONMENT

Operating:

| | |
|---|---|
| Temperature: | 0 to 55 degrees Centigrade |
| Relative Humidity: | 5 to 95 percent |
| Altitude: | 4572 meters (15000 feet) |

Non-Operating:

| | |
|---|---|
| Temperature: | -40 to 75 degrees Centigrade |
| Relative Humidity: | 5 to 95 percent |
| Altitude: | 4572 meters (15000 feet) |

Table 1-1. Specifications (2 of 2)

POWER REQUIREMENTS

| VOLTAGE | TYPICAL CURRENT (AMPS) | MAXIMUM CURRENT (AMPS) | TYPICAL POWER (WATTS) | MAXIMUM POWER (WATTS) |
|---|---|---|---|---|
| +5V | 600 mA | 980 mA | 3.0 | 4.9 |
| +12V | 8 mA | 40 mA | 0.1 | 0.5 |

# 2

# Site Preparation

Because the HP 98625B HP-IB High-Speed Disc Interface is part of a computer system, no special site planning or preparation is required beyond that which has already been accomplished for the host computer.

# Installation and Configuration

This chapter contains the following information for the HP 98625B HP-IB High-Speed Disc Interface:

- o Inspection
- o Repacking
- o Storage
- o Power requirements
- o Cabling information, including pinouts
- o Switch settings
- o Installing the card and cable(s)
- o Connecting disc drives to the interface card
- o Configuration information
- o Start-up and verification

**CAUTION**

**Some of the components used in this product are susceptible to damage by static discharge. Refer to the safety considerations information at the front of this manual before handling the disc interface card. The cards are shipped in transparent static shielding bags, and should be kept in these bags at all times until they are installed in the computer system. When handling a card outside of its container, do not touch any components. Hold the card by its edges.**

# INSPECTION

After unpacking the disc interface items, it is recommended that the shipping carton and packing material be retained. These will be useful in case any disc interface item has to be returned to Hewlett-Packard at some future date.

If evidence of damage was observed when the carton containing the HP 98625B product was opened, inspect all items carefully. If any item appears to be damaged, notify the nearest Hewlett-Packard Sales and Service Office (a list of sales and service offices is contained at the back of this manual).

If any item does not meet specifications, or if the disc interface does not pass the start-up and verification procedures described later in this chapter, notify the nearest HP Sales and Service Office immediately. Retain the shipping carton and packing material for the carrier's inspection. The HP Sales and Service Office will arrange for repair or replacement of the defective item without waiting for any possible claims against the carrier to be settled.

# REPACKING THE DISC INTERFACE

If it ever becomes necessary to repack the disc interface for reshipment, pack the items in the original carton and packing material, if available. If the original material is not available, good commercial packing material should be used. Commercial packing and shipping companies have the facilities to repack the disc interface. BE SURE TO OBSERVE ANTI-STATIC PRECAUTIONS.

# STORAGE

If the disc interface card is to be stored, it should be placed in the original plastic anti-static bag used for shipping. If the original bag is not available, use one of equivalent quality and size. It is also a good idea to enclose the card and plastic bag in the original shipping carton (or a similar carton if the original one is not available). No special containers are required to store the cables used with the disc interface card.

# POWER REQUIREMENTS

The disc interface card draws its power from the host computer through the backplane. Power requirements for the interface are listed in table 1-1 in Chapter 1. The host computer power supply has ample capability to handle the addition of the disc interface card to the computer system.

# CABLING INFORMATION

## Backplane Connections

No cable is necessary to connect the disc interface card to the host computer. The card plugs directly into the host computer's backplane. A 100-finger edge connector on the card plugs into a matching backplane receptacle.

## Peripheral Device Cable Connections

Cables from 0.5 meter to 4 meters are available for connecting the disc interface to a peripheral device. These cables are listed below and are the only cables that should be used.

| | |
|---|---|
| HP 10833A | 1 meter |
| HP 10833B | 2 meters |
| HP 10833C | 4 meters |
| HP 10833D | 0.5 meter |

Table 3-1 lists the pinouts for the above cables.

# CONFIGURATION SWITCHES

One bank of nine switches are used to set various configuration options on the disc interface card. The location of the switches is shown in figure 3-1. To set the switches, use a ball-point pen or other pointed object. When a switch is OPEN, a binary one is programmed for that bit; if the switch is CLOSED, a binary zero is programmed for the bit. (The 1 and 0 positions are shown on figure 3-1.)

## Select Code Switches

Switches 1 through 5 (see figure 3-1) are used to set the select code of the disc interface card. These switches are set to select code 14 (01110) by the factory. Interface select code settings are shown in table 3-2. Switch 1 sets the Most Significant Bit (MSB); switch 5 sets the Least Significant Bit (LSB).

Table 3-1. Cable Pinouts

| PIN NO. | SIGNAL MNEMONIC | SIGNAL DEFINITION |
|---|---|---|
| 1 | DIO1 | Data Input/Output, Bit 1 |
| 2 | DIO2 | Data Input/Output, Bit 2 |
| 3 | DIO3 | Data Input/Output, Bit 3 |
| 4 | DIO4 | Data Input/Output, Bit 4 |
| 5 | EOI | End Or Identify |
| 6 | DAV | Data Valid |
| 7 | NRFD | Not Ready For Data |
| 8 | NDAC | Not Data Accepted |
| 9 | IFC | Interface Clear |
| 10 | SRQ | Service Request |
| 11 | ATN | Attention |
| 12 | GND | Shield ground |
| 13 | DIO5 | Data Input/Output, Bit 5 |
| 14 | DIO6 | Data Input/Output, Bit 6 |
| 15 | DIO7 | Data Input/Output, Bit 7 |
| 16 | DIO8 | Data Input/Output, Bit 8 |
| 17 | REN | Remote Enable |
| 18 | GND | Ground |
| 19 | GND | " |
| 20 | GND | " |
| 21 | GND | " |
| 22 | GND | " |
| 23 | GND | " |
| 24 | GND | " |

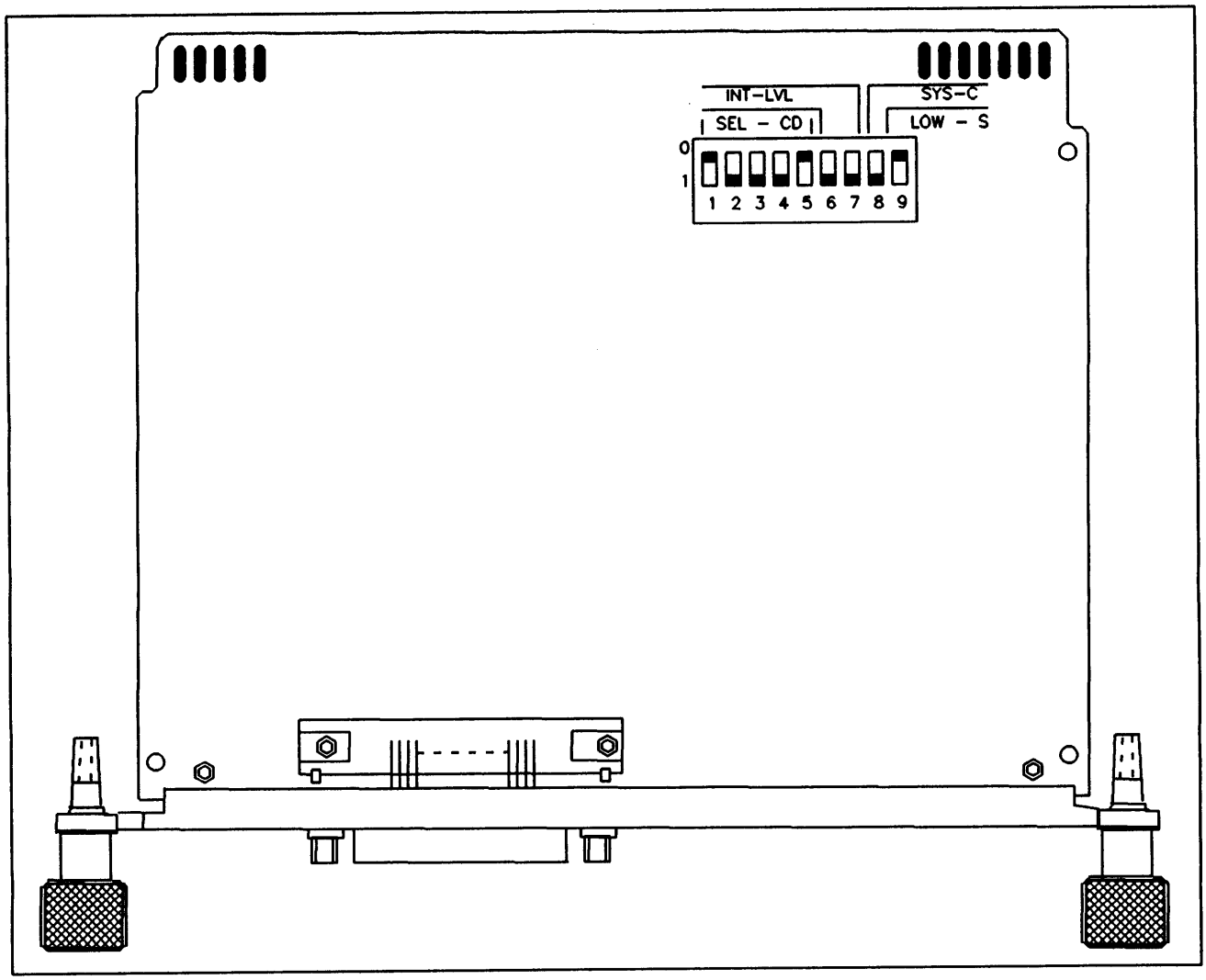



Figure 3-1. Switch Locations

Table 3-2. Select Code Switch Settings

| SWITCH SETTINGS MSB 1 2 3 4 5 LSB | DECIMAL VALUE |
|---|---|
| 0 1 0 0 0 | 8 |
| 0 1 0 0 1 | 9 |
| 0 1 0 1 0 | 10 |
| 0 1 0 1 1 | 11 |
| 0 1 1 0 0 | 12 |
| 0 1 1 0 1 | 13 |
| 0 1 1 1 0 | 14 (Factory Setting) |
| 0 1 1 1 1 | 15 |
| 1 0 0 0 0 | 16 |
| 1 0 0 0 1 | 17 |
| 1 0 0 1 0 | 18 |
| 1 0 0 1 1 | 19 |
| 1 0 1 0 0 | 20 |
| 1 0 1 0 1 | 21 |
| 1 0 1 1 0 | 22 |
| 1 0 1 1 1 | 23 |
| 1 1 0 0 0 | 24 |
| 1 1 0 0 1 | 25 |
| 1 1 0 1 0 | 26 |
| 1 1 0 1 1 | 27 |
| 1 1 1 0 0 | 28 |
| 1 1 1 0 1 | 29 |
| 1 1 1 1 0 | 30 |
| 1 1 1 1 1 | 31 |

## Interrupt Level Switches

Switches 6 and 7 (see figure 3-1) are used to set the hardware interrupt level. Switch 6 sets the MSB; switch 7 sets the LSB. The interrupt level can be set to any value from 3 through 6. The factory setting is 6 (11). Interrupt level switch settings are shown in table 3-3.

Table 3-3. Interrupt Level Switch Settings

| SWITCH SETTINGS MSB 6 7 LSB | DECIMAL VALUE | INTERRUPT LEVEL |
|---|---|---|
| 0 0 | 0 | 3 |
| 0 1 | 1 | 4 |
| 1 0 | 2 | 5 |
| 1 1 | 3 | 6 (Factory setting) |

## System Controller Switch

Switch 8 is used to set the disc interface card as the system controller or non-system controller. When the switch is set to ON (binary zero), the card is non-system controller; if the switch is set to OFF (binary one), the card is system controller. The factory setting is OFF (system controller).

## High Speed/Low Speed Switch

Switch 9 sets the operating speed of the disc interface. This switch is set to ON (binary zero) for high speed, and to OFF (binary one) for low speed. The factory setting is ON (high speed).

# INSTALLATION

The backplane of an HP 9000 Series 200/300 computer can contain from 2 to 16 card slots (depending on the model of the computer). These card slots come in pairs; each cover plate on the back of the computer covers one such pair of slots. The lower slot of each pair can accept any Series 200/300 card (interface, memory, or DMA); the upper slot can accept only memory or DMA cards. Thus, interface cards such as the HP 98625B disc interface must be inserted into the lower slot of a pair.

Install the HP 98625B disc interface card in the backplane as follows:

1. Set the switches on the card according to the information contained in the paragraph *"Configuration Switches"*.

2. Ensure that the computer power switch is OFF.

3. The disc interface card must go into any of the slots just below a pair of cover bolt holes (the bottom slot of a two-slot pair). Remove the metal backplane covers one by one until you find an empty bottom slot.

4. The metal plate on the disc interface card takes the place of a backplane cover. A memory or DMA card may be installed in the slot above the disc interface card.

5. If there are no empty slots just below a cover bolt hole pair (a bottom slot), you must rearrange the memory boards to accomodate the disc interface card. Remove any memory board in a bottom slot and re-install it in an empty top slot (a slot above a bolt hole pair). It is not necessary to change the address of the memory board; the computer CPU automatically finds the board a new location.

6. If there are no empty slots, a memory board or other interface card must be removed and left out if the disc interface card is to be installed. If a RAM memory board is left out, make sure it is the lowest-address board in the backplane. Refer to the Operating Manual for your computer for information on how to identify the lowest-address memory board.

7. Slide the disc interface card into the slot, component side UP, until the card bottoms against the backplane connector board. Then tighten the thumbscrews until they are finger tight. Be sure that a DMA card (HP 98620) has been installed in the computer.

8. Replace any remaining covers that were previously removed, then use an appropriate HP 10833 cable to connect the disc interface to the first disc drive as explained in the paragraph *"Connecting Disc Drives"*.

# Connecting Disc Drives

If you have any question concerning the compatibility of the disc interface with any specific drive, contact the nearest HP Sales and Service Office.

Use only the HP 10833 cables listed in the paragraph *"Cabling Information"* to connect the disc interface to disc drives. These cables are also used to chain multiple drives together. HP 10833 cables are similar in appearance to standard HP-IB or IEEE-488 cables, but they have additional shielding and other features to minimize RFI and improve noise characteristics. HP 10833 cables can be identified by the model number printed on the cable jacket at each end of the cable. **Do not use any other model cable to connect the interface to disc drives or controllers.**

Chaining cables are usually supplied with disc drives, so none is included with the disc interface. If you need additional cables, order the appropriate HP 10833 cables through the nearest HP Sales and Service Office.

## Physical Arrangement of Equipment

The preferred method of connecting multiple disc drives to the interface is the "Daisy Chain" or linear configuration. This configuration allows shorter cable lengths and maximizes noise and performance safety margins. The recommended arrangement of computer and disc drives is shown in figure 3-2.

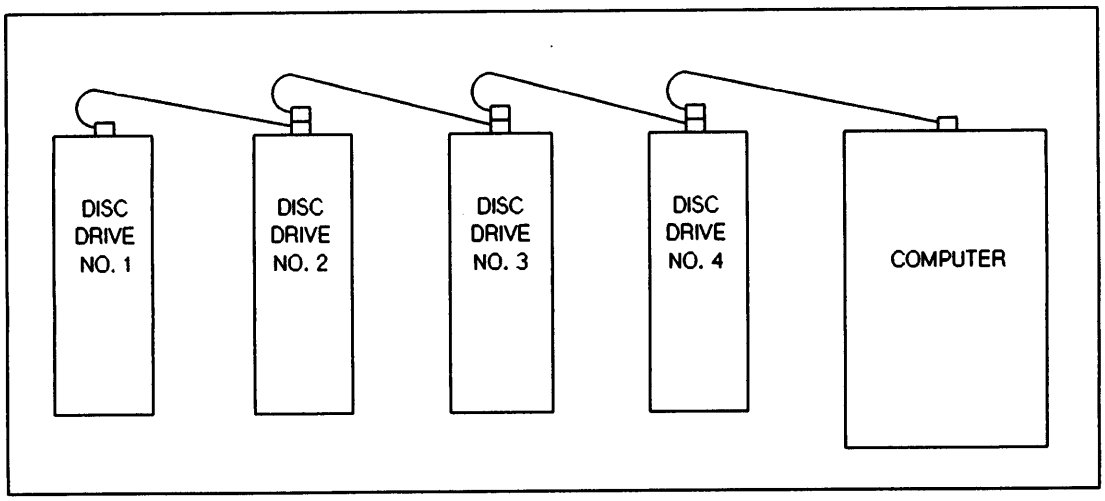



Figure 3-2. Recommended Arrangement of Computer and Disc Drives

### Limitations

Electrical design limits require that the combined bus connections must not exceed 15 equivalent loads and 15 meters total line length for each disc interface card. In addition, line length must not exceed *one* meter per equivalent load. (These restrictions are due to transmission line reflection characteristics and timing constraints for high data rates.) The disc interface presents eight equivalent loads. Most disc drive controllers in the CS/80 series present one equivalent load. Therefore, up to seven discs can be connected to a single interface card. If only one disc is used, line length must not exceed eight meters. Two discs can be connected with up to nine meters of cable, three discs with up to ten meters, and four discs with up to 11 meters. The maximum length of cable that can be connected to a single interface card and up to four discs or equivalent loads is as follows:

**Disc Interface Cable Length Limits**

| Equivalent Loads | Maximum Total Cable Length |
|---|---|
| 1 | 8 meters |
| 2 | 9 meters |
| 3 | 10 meters |
| 4 | 11 meters |

Consult disc operating manuals to verify the number of equivalent loads presented by each controller

# START-UP AND VERIFICATION

Once all disc drives are connected to the interface card, turn the computer and disc drive(s) on. Refer to the *HP Series 200 Computers Installation and Service Manual, part number 09920-90000*, for instructions on powering up the computer, and to the appropriate operating manuals for the disc(s) you are using.

Run the HP 98625 Disc Interface test to verify operation of the disc interface card. Refer to the *HP Series 200 Computers System Tests Manual, part number 09800-10031*, for information on this test. If problems are encountered, contact the nearest HP Sales and Service Office.

# Preventive Maintenance

Preventive maintenance procedures specifically for the HP 98625B are not required. However, when preventive maintenance is accomplished for the host computer system, it might be useful to check the following items:

- o Check the disc interface cables for visible damage and wear.
- o Check that the card is seated properly in the card cage.
- o Check that the cable connector is mounted firmly on the card mating connector.

# Functional Description

## SYSTEM INTERFACE

The HP 98625B HP-IB High-Speed Disc Interface is used to connect high-speed disc drives to HP 9000 Series 200 and Series 300 computers. Basically, the disc interface consists of:

- o A high-speed HP-IB controller contained in a single chip.
- o A Direct Memory Access (DMA) interface/control state machine that manages the interaction between the HP-IB controller chip and the DMA card in the computer,
- o Interface select/control circuitry that interacts with the computer through the computer's backplane.

Data transfers through the disc interface are set up and initiated by the computer through interaction with the interface. A DMA channel in activated, and all data transmission is handled through the DMA channel. Upon completion of the transfer, an interrupt to the computer is generated. The computer then suspends the DMA channel and deactivates the disc interface. DMA capability is required because the high data rates exceed the capabilities of normal CPU-based I/O drivers.

## FUNCTIONAL DESCRIPTION

A functional block diagram of the HP 98625B disc interface is shown in figure 5-1. Refer also to the schematic diagram in Chapter 12 (figure 12-2).

### HP-IB Controller

The HP-IB controller is a single chip that provides a high-speed interface between the HP-IB bus and the rest of the disc interface card. Descriptions of the HP-IB controller signals are shown in table 5-1.

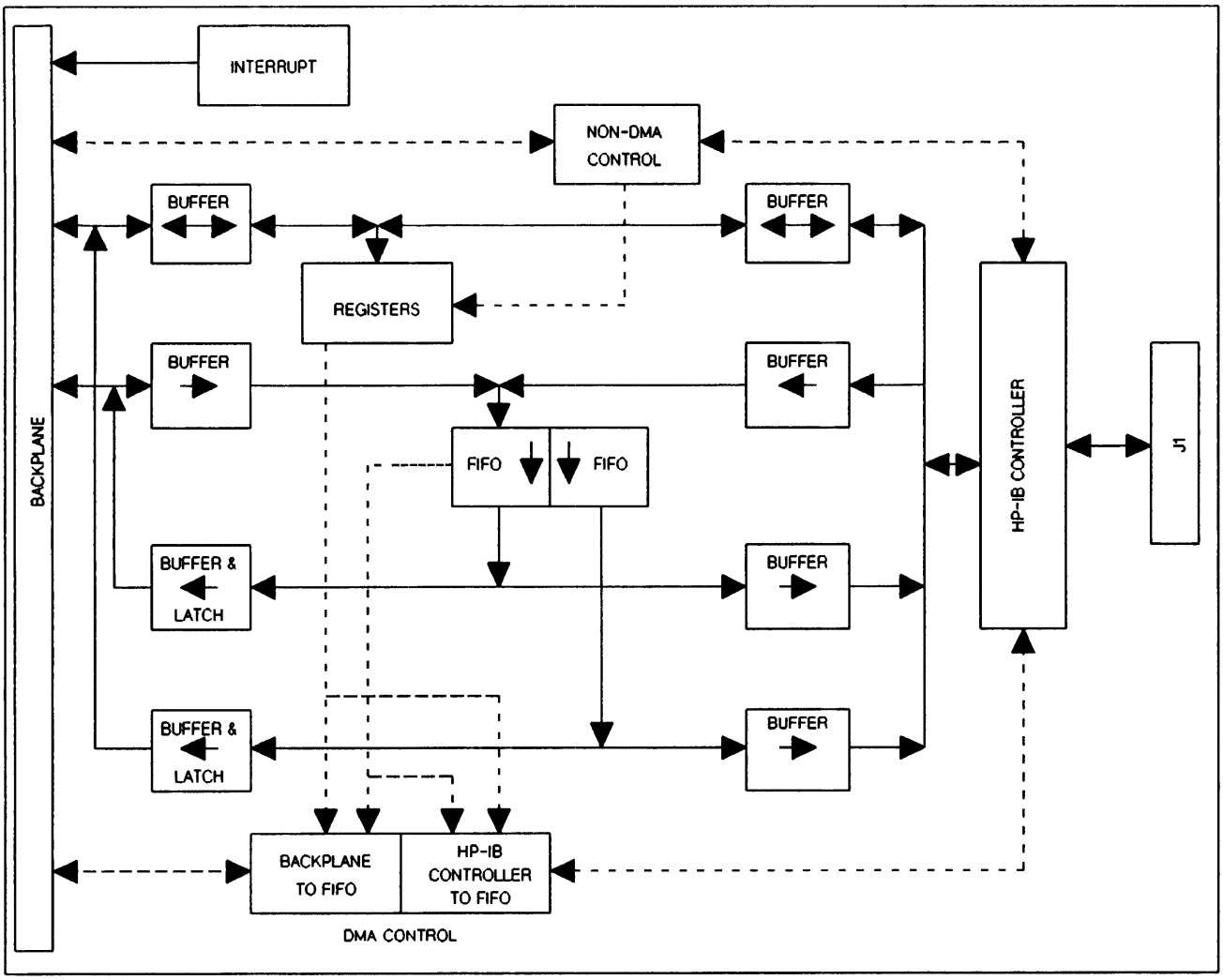



Figure 5-1. High-Speed Disc Interface Functional Block Diagram

Table 5-1. HP-IB Controller Pin Connections (1 of 2)

| PIN NO. | MNEMONIC | TYPE | DESCRIPTION |
|---|---|---|---|
| | HP-IB DATA LINES | | |
| 44 | DIO1- | B | Data Input/Output, Bit 1 |
| 45 | DIO2- | B | Data Input/Output, Bit 2 |
| 46 | DIO3- | B | Data Input/Output, Bit 3 |
| 47 | DIO4- | B | Data Input/Output, Bit 4 |
| 48 | DIO5- | B | Data Input/Output, Bit 5 |
| 2 | DIO6- | B | Data Input/Output, Bit 6 |
| 3 | DIO7- | B | Data Input/Output, Bit 7 |
| 4 | DIO8- | B | Data Input/Output, Bit 8 |
| | HP-IB HANDSHAKE LINES | | |
| 18 | ATN- | B | Attention |
| 16 | RFD | B | Ready For Data |
| 15 | DAC | B | Data Accepted |
| | HP-IB BUS MANAGEMENT LINES | | |
| 6 | DAV- | B | Data Available |
| 5 | EOI- | B | End Or Identify |
| 14 | REN- | B | Remote Enable |
| 13 | IFC- | B | Interface Clear |
| 17 | SRQ- | B | Service Request |
| | INTERNAL DATA LINES | | |
| 30 | D0 | B | These two bits indicate the following bus |
| 29 | D1 | B | conditions when read from register 2:<br>D0 D1<br>-- --<br>0 0 Normal data<br>0 1 Secondary Address<br>1 0 Last byte of subgroup<br>1 1 Last byte of record |
| 28 | DB8 | B | Data, Bit 7 |
| 27 | DB9 | B | Data, Bit 6 |
| 26 | DB10 | B | Data, Bit 5 |
| 25 | DB11 | B | Data, Bit 4 |
| 24 | DB12 | B | Data, Bit 3 |
| 23 | DB13 | B | Data, Bit 2 |
| 22 | DB14 | B | Data, Bit 1 |
| 21 | DB15 | B | Data, Bit 0 |

Table 5-1. HP-IB Controller Pin Connections (2 of 2)

| PIN NO. | MNEMONIC | TYPE | DESCRIPTION |
|---|---|---|---|
| 33 | A13 | I | Register address lines used to access |
| 34 | A14 | I | HP-IB controller resisters, along with |
| 35 | A15 | I | IB:WRT and IB:SEL |
| 7 | SCTRL | I | Makes card System Controller |
| 40 | PON | I | When zero, card is set to low speed |
| 39 | W | I | Write enable, read disable (IB:WRT) |
| 36 | IOGO- | I | Initiates a register read/write |
| 32 | CHSEL- | I | Enables IOGO- |
| 41 | DMARQ- | O | DMA reset, indicating that the HP-IB controller FIFO is ready |
| 38 | INT- | O | Requests interrupt |
| 37 | IOEND- | O | Handshake complete |
| 19 | TRIG | | Not used |
| 12 | CIC | O | Enables ATN driver when true and SRQ driver when false |
| 11 | HSE | O | Transceivers use active pullups Oversus open collector) |
| 10 | DEE | O | DAV/EOI enable (send DAV and EOI, versus receive) |
| 9 | DIOE | O | Data Input/Output Enable |
| 43 | VDD | P | +12V |
| 1 | GND | P | Ground |
| 8 | VCC | P | +5V |
| 31 | VDC | P | +5V |
| 42 | RS | T | Delay stabilizing resistor |
| 20 | RTL | I | Return To Local (tied permanently false) |

Line Types: B = Bidirectional
I = Input
O = Output
P = Power
T = Timing

## Data Flow

Data flow is provided by the buffers, latches, and FIFO registers shown in figure 5-1, and consists of the following cases:

- o Byte transfers from the DMA card to the HP-IB controller circuit
- o Byte transfers from the HP-IB controller circuit to the DMA card
- o Word transfers from the DMA card to the disc interface card FIFO, and byte transfers from FIFO to the HP-IB controller circuit
- o Byte transfers from the HP-IB controller circuit to FIFO, and word transfers from FIFO to the DMA card
- o Programmed I/O reads and writes to registers even while any of the above transfers are in progress

## Non-DMA Control

The non-DMA control circuitry provides timing and address decoding and all control signals required to perform non-DMA data transfers from both the card and HP-IB controller registers. This circuitry receives signals from both the backplane and the HP-IB controller, and provides control to the backplane and HP-IB controller circuit.

## DMA Control

The DMA control circuitry provides timing and control signals for all DMA transfers. It handles data flow for the first four types of data transfers listed above under *"Data Flow"*. This circuit receives signals from the backplane, HP-IB controller, FIFO, and registers, and provides control to these circuits.

## Backplane-to-FIFO Circuit

The backplane-to-FIFO circuit is a state machine that controls the transfer of data between the FIFO and the backplane. Based on status from card registers, this circuit provides control and handshake signals to the FIFO and backplane for both input and output DMA.

# HP-IB Controller-to-FIFO Circuit

The HP-IB controller-to-FIFO circuit is a state machine that provides the necessary handshake signals for the transfer of data between the HP-IB controller and the FIFO for both input and output DMA. If word-wide DMA is being performed, data to/from the FIFO is byte-packed because the HP-IB controller can handle only byte-wide data.

# Removal and Replacement

This chapter contains removal and replacement procedures for the HP 98625B HP-IB High-Speed Disc Interface. Because the support strategy for the HP 98625B is based on the replacement of the card or cable(s), these are the only items for which removal and replacement procedures are provided.

## REMOVAL

**CAUTION**

**Power must be off to the computer system and the associated peripheral device before attempting to remove any card or cable from the system.**

### Removing the HP-IB Cable(s)

Remove the HP-IB cable(s) as follows:

1. Determine the disc drive(s) to which the cable(s) are connected.
2. Turn disc drive(s) power off.
3. Turn computer system power off.
4. Disconnect cable(s) from the disc drive(s).
5. Disconnect the cable from connector J1 on the disc interface card.

## Removing the Disc Interface Card

**CAUTION**

**Some of the components used on the card are susceptible to damage by static discharge. Refer to the safety considerations information at the front of this manual before handling the card. When handling the card, do not touch any components. Hold the card by its edges.**

Remove the disc interface card as follows:

1. Turn computer system power off.
2. Disconnect the cable from connector J1 on the disc interface card.
3. Loosen the screws on either side of the card and pull the card out of the card cage.

# REPLACEMENT

**CAUTION**

**Power must be off to the computer system and the associated peripheral device before attempting to install any card or cable in the system.**

# Replacing the Disc Interface Card

**CAUTION**

**Some of the components used on the card are susceptible to damage by static discharge. Refer to the safety considerations information at the front of this manual before handling the card. When handling the card, do not touch any components. Hold the card by its edges.**

Replace the card as follows:

1. Turn computer system power off.
2. Insert the card in the appropriate slot in the card cage. Refer to Chapter 3 to determine the correct slot. Once the card is installed, tighten the screws finger tight.

# Replacing HP-IB Cables

Replace HP-IB cables as follows:

1. Turn power off for the disc drive(s) to which the cable(s) are to be connected.
2. Turn computer system power off.
3. Connect the cable to the disc drives in accordance with the instructions given in Chapter 3.
4. Once all disc drives have been connected, connect the HP-IB cable to connector J1 on the disc interface card.

Once the card and cable(s) are installed, verify correct operation by following the procedures listed in *Start-Up and Verification* in Chapter 3.

# Adjustments

The only adjustments on the disc interface card are setting the configuration switches. Refer to Chapter 3 for this information.

# 8

# Troubleshooting and Diagnostics

Because the HP 98625B HP-IB High-Speed Disc Interface card is considered to be a field-replaceable unit, troubleshooting the card consists merely of running the host computer system disc interface test. Refer to Chapter 3 for information on powering up the computer system and running this test. There are no other diagnostics programs available for the disc interface card.

If problems are encountered, contact the nearest Hewlett-Packard Sales and Service Office.

# Replaceable Parts

This chapter contains information on replaceable parts for the HP 98625B HP-IB High-Speed Disc Interface. The following informaation is included:

- o How to order listed and non-listed parts for the disc interface
- o Replaceable parts tables for the disc interface
- o Names and addresses of manufacturers indexed by their code numbers
- o Information for exchanging the disc interface card

**NOTE**

Customer repair, including replacing parts on the disc interface, is not recommended by Hewlett-Packard. Customers who perform component level replacement will invalidate the 90-day warranty and render the card ineligible for exchange. Component level replacement is performed, however, by some types of customers and by Hewlett-Packard service personnel, and it is for such users that replaceable parts information is intended.

# REPLACEABLE PARTS

Table 9-1 contains a list of disc interface replaceable parts in reference designation order. The following information is listed for each part:

1. Reference designation of the part.
2. The Hewlett-Packard part number.
3. Part number check digit (CD).
4. Total quantity (QTY) of each part used in the interface.
5. Description of the part.
6. A five-digit code number that corresponds to the manufacturer of the part.
7. The manufacturer's part number.

# ORDERING INFORMATION

To order replacement parts or to obtain information on the parts used in the disc interface, address the order or inquiry to the nearest Hewlett-Packard Sales and Service Office (Sales and Service Offices are listed in the back of this manual).

To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number (with the check digit), and indicate the quantity you require. The check digit will ensure accurate and timely processing of your order.

To order a part that is not listed in the replaceable parts table, specify the following information:

1. Identification of the disc interface or part.
2. Description and function of the part.
3. Quantity required.

# EXCHANGE PCAS

If the disc interface PCA (printed circuit assembly, or card) is to be returned to Hewlett-Packard for service or repair, attach a tag identifying the owner and indicating the type of service or repair to be accomplished. Include the part number and date code of the card.

Pack the card in the original factory packaging material, if available. If the original packaging material is not available, standard factory packaging material can be obtained from the nearest Hewlett-Packard Sales and Service Office. If standard packaging material is not available, wrap the card in suitable cushioning material (Air Cap TH-240 Cushioning or equivalent) and place the card in a corrugated carton (200-pound test material). Seal the carton securely and mark it FRAGILE to ensure careful handling.

Table 9-1. HP 98625B Disc Interface Replaceable Parts (1 of 2)

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A1 | 98625-66502 | 1 | 1 | PC DISC INTRFC | 28480 | 98625-66502 |
| C2 | 0160-4832 | 4 | 17 | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C3 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C4 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C5 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C6 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C7 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C9 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C10 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C11 | 0180-0228 | 6 | 1 | CAPACITOR-FXD 22UF+-10% 15VDC TA | 56289 | 150D226X9015B2 |
| C12 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C13 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C14 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C15 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C16 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C17 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C18 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C19 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| C20 | 0160-4832 | 4 | | CAPACITOR-FXD .01UF +-10% 100VDC CER | 28480 | 0160-4832 |
| J1 | 1251-7651 | 5 | 1 | CONN-RECT CHAMP 24-CKT 24-CONT | 28480 | 1251-7651 |
| R1 | 2100-3214 | 0 | 1 | RESISTOR-TRMR 100K 10% C TOP-ADJ 1-TRN | 28480 | 2100-3214 |
| R2 | 0757-0199 | 3 | 2 | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-T0-2152-F |
| R3 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-T0-2152-F |
| SW1 | 3101-2762 | 4 | 1 | SWITCH-SL 9-1A DIP-SLIDE-ASSY .1A 30VDC | 28480 | 3101-2762 |
| U14 | 1820-3167 | 7 | 1 | IC CNTR TTL LS BIN SYNCHRO POS-EDGE-TRIG | 28480 | 1820-3167 |
| U15 | 1820-1196 | 8 | 2 | IC FF TTL LS D-TYPE POS-EDGE-TRIG COM | 01295 | SN74LS174N |
| U17 | 1813-0285 | 9 | 1 | XTAL-CLOCK-OSCILLATOR 20.0000-MHZ 0.01% | 28480 | 1813-0285 |
| U24 | 1820-1470 | 1 | 4 | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS157N |
| U25 | 1820-2488 | 3 | 3 | IC FF TTL ALS D-TYPE POS-EDGE-TRIG | 01295 | SN74ALS74N |
| U31 | 1820-2485 | 0 | 1 | IC RCVR TTL LS BUS OCTL | 01295 | SN75160N |
| U32 | 1810-0081 | 7 | 1 | NETWORK-RES 18-DIP MULTI-VALUE | 28480 | 1810-0081 |
| U33 | 1820-2058 | 3 | 2 | IC MISC TTL S QUAD | 07263 | MC3448AL |
| U34 | 1820-2058 | 3 | | IC MISC TTL S QUAD | 07263 | MC3448AL |
| U35 | 1820-1428 | 9 | 2 | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS158N |
| U36 | 1820-1208 | 3 | 1 | IC GATE TTL LS OR QUAD 2-INP | 01295 | SN74LS32N |
| U37 | 1820-2488 | 3 | | IC FF TTL ALS D-TYPE POS-EDGE-TRIG | 01295 | SN74ALS74N |
| U41 | 1TL1-0001 | 1 | 1 | IC MEDUSA | 28480 | 1TL1-0001 |
| U43 | 1820-1428 | 9 | | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS158N |
| U45 | 1820-1470 | 1 | | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS157N |
| U46 | 1820-3695 | 6 | 2 | 74 AS374 | 28480 | 1820-3695 |
| U47 | 1820-1144 | 6 | 1 | IC GATE TTL LS NOR QUAD 2-INP | 01295 | SN74LS02N |
| U53 | 1820-1470 | 1 | | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS157N |
| U55 | 1820-1204 | 9 | 1 | IC GATE TTL LS NAND DUAL 4-INP | 01295 | SN74LS20N |
| U56 | 1820-4192 | 0 | 1 | PROG PAL16R8I5CN | 28480 | 1820-4192 |
| U57 | 1820-1201 | 6 | 2 | IC GATE TTL LS AND QUAD 2-INP | 01295 | SN74LS08N |
| U61 | 1820-2024 | 3 | 6 | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U62 | 1820-3608 | 1 | 2 | IC INV TTL AS HEX | 28480 | 1820-3608 |
| U63 | 1820-1470 | 1 | | IC MUXR/DATA-SEL TTL LS 2-TO-1-LINE QUAD | 01295 | SN74LS157N |
| U64 | 1820-1918 | 2 | 1 | IC BFR TTL LS LINE DRVR OCTL | 01295 | SN74LS241N |
| U65 | 1820-1197 | 9 | 1 | IC GATE TTL LS NAND QUAD 2-INP | 01295 | SN74LS00N |
| U66 | 1820-1201 | 6 | | IC GATE TTL LS AND QUAD 2-INP | 01295 | SN74LS08N |
| U67 | 1820-3608 | 1 | | IC INV TTL AS HEX | 28480 | 1820-3608 |
| U71 | 1820-3217 | 8 | 1 | IC CNTR TTL ALS BIN UP/DOWN SYNCHRO | 28480 | 1820-3217 |
| U72 | 1820-1196 | 8 | | IC FF TTL LS D-TYPE POS-EDGE-TRIG COM | 01295 | SN74LS174N |
| U73 | 1820-2024 | 3 | | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U74 | 1820-1216 | 3 | 1 | IC DCDR TTL LS 3-TO-8-LINE 3-INP | 01295 | SN74LS138N |
| U75 | 1820-1568 | 8 | 1 | IC BFR TTL LS BUS QUAD | 01295 | SN74LS125AN |
| U76 | 1820-4213 | 6 | 1 | IC-PAL20R8 PRGM | 28480 | 1820-4213 |
| U81 | 1820-2024 | 3 | | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U82 | 1820-2024 | 3 | | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U83 | 1820-2075 | 4 | 2 | IC TRANSCEIVER TTL LS BUS OCTL | 28480 | 1820-2075 |
| U84 | 1820-2024 | 3 | | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U85 | 1820-4193 | 1 | 1 | PROG PAL16L8I5CN | 28480 | 1820-4193 |
| U87 | 1820-2488 | 3 | | IC FF TTL ALS D-TYPE POS-EDGE-TRIG | 01295 | SN74ALS74N |

Table 9-1. HP 98625B Disc Interface Replaceable Parts (2 of 2)

| Reference Designation | HP Part Number | CD | Qty | Description | Mfr Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| U91 | 1820-2621 | 6 | 4 | IC RGTR TTL S | 01295 | SN74S225N |
| U92 | 1820-2621 | 6 | | IC RGTR TTL S | 01295 | SN74S225N |
| U93 | 1820-2102 | 8 | 2 | IC LCH TTL LS D-TYPE OCTL | 01295 | SN74LS373N |
| U94 | 1820-2621 | 6 | | IC RGTR TTL S | 01295 | SN74S225N |
| U95 | 1820-3695 | 6 | | 74AS374 | 28480 | 1820-3695 |
| U97 | 1820-1427 | 8 | 1 | IC DCDR TTL LS 2-TO-4-LINE DUAL 2-INP | 01295 | SN74LS156N |
| U101 | 1820-2024 | 3 | | IC DRVR TTL LS LINE DRVR OCTL | 01295 | SN74LS244N |
| U102 | 1820-2102 | 8 | | IC LCH TTL LS D-TYPE OCTL | 01295 | SN74LS373N |
| U103 | 1820-2075 | 4 | | IC TRANSCEIVER TTL LS BUS OCTL | 28480 | 1820-2075 |
| U104 | 1820-2621 | 6 | | IC RGTR TTL S | 01295 | SN74S225N |
| U105 | 1810-0719 | 8 | 1 | NETWORK-RES 16-DIP 1.5K OHM X 15 | 28480 | 1810-0719 |
| U107 | 1820-1645 | 2 | 1 | IC BFR TTL LS BUS QUAD | 01295 | SN74LS126AN |
| U204 | 1820-2740 | 0 | 1 | IC COMPTR TTL LS MAGTD 2-INP 8-BIT | 01295 | SN74LS688N |
| XU32 | 1200-0539 | 7 | 1 | SOCKET-IC 18-CONT DIP DIP-SLDR | 28480 | 1200-0539 |
| | 0380-1332 | 9 | 2 | STANDOFF-HEX M/F | 28480 | 0380-1332 |
| | 0515-0076 | 3 | 2 | SCREW-MACH M3 X 0.5 6MM-LG 90-DEG-FLH-HD | 28480 | 0515-0076 |
| | 0515-0104 | 8 | 2 | SCREW-MACH M3 X 0.5 8MM-LG PAN-HD | 28480 | 0515-0104 |
| | 0590-1445 | 0 | 2 | THREADED INSERT-NUT M3 X 0.5 CARB-STL | 28480 | 0590-1445 |
| | 2190-0577 | 1 | 2 | WASHER-LK HLCL NO. 10 .194-IN-ID | 28480 | 2190-0577 |
| | 98625-00001 | 7 | 1 | I/O COVER | 28480 | 98625-00001 |
| | 98625-26502 | 7 | 1 | PC BOARD | 28480 | 98625-26502 |

Table 9-2. Manufacturer's Code List

| Mfr Code | Manufacturer Name | Address | | Zip Code |
|---|---|---|---|---|
| 01295 | TEXAS INSTR INC SEMICOND COMPNT DIV | DALLAS | TX | 75222 |
| 07263 | FAIRCHILD SEMICONDUCTOR DIV | MOUNTAIN VIEW | CA | 94042 |
| 24546 | CORNING GLASS WORKS (BRADFORD) | BRADFORD | PA | 16701 |
| 28480 | HEWLETT-PACKARD CO CORPORATE HQ | PALO ALTO | CA | 94304 |
| 56289 | SPRAGUE ELECTRIC CO | NORTH ADAMS | MA | 01247 |

# 10

# Reference

This chapter contains a list of other technical manuals which will be of assistance to you, and a glossary of terms.

## TECHNICAL MANUAL REFERENCE

Other Hewlett-Packard technical manuals which contain information for the HP 9000 Series 200 are listed below:

HP Series 200 Installation Guide, part number 09920-90001

HP Series 200 Computers Installation and Service Manual, part number 09920-90000

HP Series 200 Computers System Tests Manual, part number 09800-10031

# GLOSSARY OF TERMS

The following terms are defined as they are used in Hewlett-Packard computer networking products manuals. The glossary is an all-inclusive list of terms used in a broad range of technical manuals and therefore some of the terms defined might not be used in this manual.

**Acoustic coupler** — A modem which has a cradle and form-fitting rubber cups to hold a telephone handset.

**Acoustic modem** — See acoustic coupler and modem.

**ACU** — Automatic Calling Unit. A device that automatically places a telephone call after receiving instructions from the calling device.

**AFI** — Asynchronous FIFO Interface

**AIS - Alarm Indication Signal** — See blue alarm condition.

**ASCII** — American Standard Code for Information Interchange, a data communications code set.

**ASI** — Asynchronous Serial Interface

**Asynchronous** — Asynchronous communication is a method of transmitting data without sending a clock signal. Each character consists of one start bit, five to eight data bits, an optional parity bit, and one or two stop bits.

**Automatic In** — A computer-to-PBX connection sequence which allows the computer to initiate an incoming connection on a specified channel and from a specified device through the PBX. No telephone number is given; the device location (telephone number) is associated with the given channel by an administrative process on the PBX.

**Automatic Out**

A computer-to-PBX connection sequence which allows the computer to initiate an outgoing connection on a specified channel to a specified device through the PBX. No telephone number is given; the device location (telephone number) is associated with the given channel by an administrative process on the PBX.

**Baud**

Refers to the speed of signal units. When one bit is used as a signal unit, baud speed and bits-per-second (bps) are the same. When two bits are combined to form a signal unit, the baud rate is half the bps (the signal unit is called a "dibit" and has four levels, or states).

**B-channel**

The data channel in a DS1 frame. For the 1.544 Mbps facility, channels 1 to 23 are the data channels; and for the 2.048 Mbps facility, channels 1 to 15 and 17 to 31 are the data channels.

**Binary Synchronous Protocol**

See BSC.

**Bisync**

See BSC.

**Blue Alarm Condition**

A condition caused by the data endpoint being in the internal loopback mode or by a maintenance busy out. All ones are being sent on the B-channel (data channel).

**Blue Signal**

The blue signal consists of an unframed all ones sequence on the DS1 line.

**bps**

Bits per second, the speed of data transmission over a communications channel.

**Break**

As used in asynchronous serial data communications, a break condition is defined as a signal "space" condition for at least two character times.

**Broadcast**

A communication method of sending a message to all devices on a link simultaneously.

**BSC**

Binary Synchronous Protocol. A character-oriented, half-duplex protocol.

**Buffer**

A segment of contiguous random-access memory locations used for temporary storage of input/output messages.

**Card**

The Printed Circuit Assembly (PCA).

**Carrier Group Alarm Condition**

This condition occurs at a PBX when it cannot frame on the DS1 signal received from the host computer for 3 seconds (the red alarm condition), or the PBX received a yellow alarm condition.

**CCITT**

Comite Consultatif International Telephonique et Telegraphique, an international standards group.

**Channel**

As used in data communications, a channel is a path within a data communications line through which information flows.

**CIO**

Counter/Timer and Parallel I/O circuit

**CRC**

Cyclic Redundancy Check. A method of using a polynomial to perform error checking. The polynomial is an algebraic function used to create a constant from the message bit pattern. This constant, generated and accumulated in both the transmitter and receiver, is used to divide the binary numeric value of the character. The quotient is discarded and the remainder added to the next character, which is again divided. This continues until the last character, when the remainder is transmitted to the receiver for comparison with the receiver's remainder. An equal comparison indicates no errors, while an unequal comparison indicates an error in the transmission.

**CRC-16**

An error detection scheme used in data communications.

**CRC-CCITT**

An error detection scheme defined by the Comite Consultatif International Telephonique et Telegraphique (CCITT).

**Cyclic Redundancy Check**

See CRC.

**D4 Framing**

Framing format used on most existing 1.544 Mbps facilities.

**D-Channel**

Refers to the control channel (or the signalling channel) of a DS1 frame. This is channel 24 in the 1.544 Mbps signalling facility and channel 16 in the 2.048 Mbps signalling facility.

**Data Circuit-terminating Equipment**

See DCE.

**Data Endpoint**

The point at which the DMI data channel protocol is terminated. Data endpoints can be at the host computer or at the PBX. Data endpoints are classified by the physical serial interface they would present (the interface need not physically exist as in the case of a host data endpoint, a terminal containing the DMI data channel protocol conversion, or in cases requiring conversion to another protocol at the PBX before reaching a standard serial interface). Data endpoints which would present a serial interface to terminal equipment (hosts, CRT terminals, etc.) are classified as DCEs. Data endpoints presenting serial interfaces to communications equipment (modems, multiplexers, etc.) are classified as DTEs.

**Data Mode 0**

The data channel protocol mode which supports 64 Kbps data transmission.

**Data Mode 1**

The data channel protocol mode which supports 56 Kbps data transmission.

**Data Mode 2**

The data channel protocol mode which supports standard synchronous or asynchronous data transmission up to 19.2 Kbps using an HDLC framing strategy to perform rate adaptation.

**Data Mode 3**

The data channel protocol which supports virtual circuit service for subrate and/or statistical multiplexing of data streams.

**Data Set**

Another name for modem.

**Data Terminating Equipment**

See DTE.

**DCE**

Data Circuit-terminating Equipment. Equipment used to convey information between locations (e.g., a modem). In most references, an entry node of the network.

**DCPC**

Dual Channel Port Controller.

**Dibit**

A two-bit signal unit.

**Digital Multiplexed Interface**

See DMI.

**Digital Signal Level 0**

See DS0.

**Digital Signal Level 1**

See DS1.

**DIP**

Dual In-line Package. A type of integrated circuit package.

**Distributed System**

See DS.

**DMA**

Direct Memory Access. The transfer of data directly to or from memory.

**DMI**

Digital Multiplexed Interface. A specification for interfacing a host computer to a PBX.

**Download**

The process of transferring a block of information from one computer system to another, or from a computer to a microprocessor on a card which is a part of the computer.

| | |
|---|---|
| **Driver** | In a hardware sense, a driver refers to a circuit which is capable of supplying specific current and voltage requirements. In a software sense, a driver is a program that is capable of controlling a specific input/output device. |
| **DS** | Distributed System. A term used to refer to networks using Hewlett-Packard Distributed Systems hardware and software products. |
| **DS0** | Digital Signal Level 0. Term used in North America for the basic digital channel rate (64 Kbps). |
| **DS1** | Digital Signal Level 1. Term used in North America for the first level 1.544 Mbps PCM multiplexed signal. |
| **DTE** | Data Terminating Equipment. The local node or user terminal where information enters and exits from the data link, or the computer where information is processed and stored. |
| **Echoplex** | A mode in the full-duplex communication channel where any character transmitted by a terminal is echoed back to the terminal. |
| **EIA** | Electronics Industries Association. |
| **EIA RS-232-C** | A North American data communications standard which specifies the mechanical and electrical requirements. The standard uses a 25-pin D-connector as the standard interface in a data communications network, with lettered pin assignments for ground, data, control, and timing circuits. The operating range is from 0 to 20,000 bps in bit-serial operation, synchronous, and asynchronous. |
| **EIA RS-423** | A data communications standard similar to EIA RS-232-C. |

| | |
|---|---|
| **$F_e$ Framing** | Extended Framing Format ($F_e$). This format is replacing the D4 framing format in North America on 1.544 Mbps facilities. It incorporates error measuring and data link in addition to providing framing. |
| **Firmware** | Software code packaged in read-only memory (EPROM/ROM). |
| **FCS - Frame Checking Sequence** | A 16-bit sequence derived from an algorithm common to DCE and DTE. The sequence is appended to each frame and used as a verification of data transmission. |
| **Full-duplex** | Communications systems or equipment capable of simultaneous two-way data communication. No turnaround time is required. |
| **Half-duplex** | Communications system or equipment capable of transmission in either direction, but not both directions simultaneously. The transmission flow must be halted each time the direction of travel is reversed. This halt is called "turnaround time" and typically requires from 50 to 250 milliseconds, depending upon line length. The halt is required to reverse the direction of the echo suppressors in the telephone line and to allow modems to stabilize. |
| **Handshaking** | The alternating exchange of predetermined signals between two communicating devices for purposes of control. |
| **Hardwired Direct Connection** | A direct connection between a computer and a terminal or between two computers over a relatively short distance using copper wire pairs, or coaxial cable, or fiber optics. The signals are transmitter in digital format. |
| **HDLC** | High Level Data-Link Control. Types of protocols which eliminate much of the handshaking (and resultant time-consuming line turnarounds). |
| **High Level Data-Link Control** | See HDLC. |
| **Host** | The computer housing the circuit card. |

| | |
|---|---|
| **HP-DLC-II** | Hewlett-Packard Data-Link Control II. A Hewlett-Packard HDLC standard defining the elements and procedures for a balanced, bit-oriented, Level-II protocol. HP-DLC-II is compatible with CCITT X.25 LAP-B, and LAP-B implementations by TELENET and TRANSPAC packet-switching networks. |
| **HP-IB** | Hewlett-Packard Interface Bus. Hewlett-Packard's implementation of the IEEE Standard 488-1978 and Supplement 488-1978A-1980. |
| **Interface** | A device providing electrical and mechanical compatibility between two communicating devices. |
| **Integrated Services Digital Network** | See ISDN. |
| **ISDN** | Integrated Services Digital Network. A CCITT recommendation for interfacing a host computer to a PBX. |
| **ISO** | International Standardization Organization. |
| **Jitter** | In data communications, the variation of the signal from the reference timing position. This variation can include amplitude, time, frequency, or phase distortion. |
| LAN | Local Area Network |
| LANIC | Local Area Network Interface Controller |
| **LAP-B** | Link Access Protocol-Balanced. A CCITT Recommendation X.25 Level II protocol. LAP-B, a bit-oriented protocol, uses the principles and terminology of ISO's HDLC. |
| **LED - Light Emitting Diode** | A component used on many printed circuit assemblies to provide a visual indication of desired information. |
| **Line** | As used in data communications, line refers to the physical equipment and configuration used in telecommunications. |

| | |
|---|---|
| **Link** | Communication lines, modems, and other equipment which permit the transmission of information in data format between two or more devices. |
| **Link Accessed Protocol-Balanced** | See LAP-B. |
| **LOW** | A blind sampling technique used to support any data format up to 1800 bps. It actually operates in data mode d2 at the 19.2 Kbps synchronous rate. |
| **MIL-180** | A military interface between a modem and a line controller equivalent to RS-232-C. |
| **Modem - Modulator-Demodulator** | Equipment capable of digital-to-analog and analog-to-digital signal conversion for transmission and reception via common carrier telephone lines. |
| **Modulus** | Used by LAP-B and HDLC in the sequential numbering of I-frames; modulus equals eight. |
| **MUX** | Multiplexer. An interface which multiplexes several independent data streams over one physical communications link. |
| **Multiplexer** | See MUX. |
| **Octet** | A sequence of eight bits, i.e., a byte. |
| **Parity Checking** | Parity means that the bit counter of character ones should be either all odd or all even. A bit is inserted into the character to obtain parity where necessary. The insertions are called redundant because they can be removed from the message without loss of information. An all odd count per character is called odd parity. An all even count is called even parity. The output device supplies parity and the input device checks for parity. |
| **PBX** | Private Branch Exchange. A telephone exchange. |
| **PCA - Printed Circuit Assembly** | Circuit cards are commonly referred to as PCAs. |

| | |
|---|---|
| **PCM** | Pulse-Coded Modulation. |
| **PLL** | Phase-Locked Loop. |
| **Polynomial Checking** | See CRC. |
| **Primary Rate Access** | Term used in ISDN documentation to describe the first multiplexing level for PCM transmission systems. There are two versions of Primary Rate Access: 1.544 Mbps and 2.048 Mbps. |
| **Primary System** | A preconfigured operating system included with all HP 1000 Computer systems. It can be reconfigured to meet specific system I/O and memory requirements. |
| **Red Alarm Condition** | The PBX cannot frame on the DS1 signal received from the host for three seconds. |
| **Redundancy Checking** | See parity checking. |
| **SCC** | Serial communications controller. |
| **SDLC - Synchronous Data Link Control** | An IBM High-Level Data Link Control protocol. |
| **Self-Clocking Data** | The transmission of data when the clock information is part of the data. |
| **Simplex** | The message flow is always in one direction. An input terminal can only receive, never transmit; an output terminal can only transmit, never receive. |
| **Synchronous** | A transmission method whereby the characters are transmitted in a continuous stream with no intervals between each character. There are no start or stop bits as in asynchronous mode. Both the transmitter and receiver must maintain precise timing. Synchronous transmission requires a clock be sent along with the data on a separate line. |

**System Parameter**

As used in HP manuals, a parameter necessary for DCE/DTE communication; its value is agreed upon before network communication is attempted.

**TELENET**

A packet-switching network owned and operated by GTE.

**TRANSPAC**

The French packet-switching network.

**Wink-In**

A computer-to-PBX connection sequence which allows the computer to initiate a connection to a device through the PBX by using a telephone number to select the device.

**Yellow Alarm Condition**

The host cannot frame on the DS1 signal from the PBX.

**ZCS Coding**

Zero Code Suppression Coding. A technique which must be used on 1.544 Mbps facilities when no other method of meeting ones density constraints exists. The technique consists of forcing a zero bit to a one whenever an all zero octet appears in a channel.

# 11

# Product History

The HP 98625B is a redesign of the HP 98625A, with a difference in the completion of a DMA transfer.

The HP 98620 DMA card waits 65 nsec (or 1.6 µsec) for the HP 98625A card to make another DMA request. If another DMA request is made within this time, the HP 98625A card will be allowed another transfer. As long as the HP 98625A card can continue to request transfers, it will be granted the backplane and the CPU will wait until the backplane is free again.

By making DMA transfers word-wide, only half the transfers are necessary and the chances of tieing up the backplane for long periods of time are reduced. Also, by putting a FIFO buffer on the HP 98625B card, data can be buffered and a DMA request only needs to be made when the buffer is full or after a designated amount of time since the last request.

There was a possibility of data loss on the HP 98625A card when status registers were read. This has been corrected on the HP 98625B.

The HP 98625B is fully compatible with the HP 98625A.

# 12

# Diagrams

This chapter contains a parts location diagram and a schematic diagram for the HP 98625B HP-IB High-Speed Disc Interface.

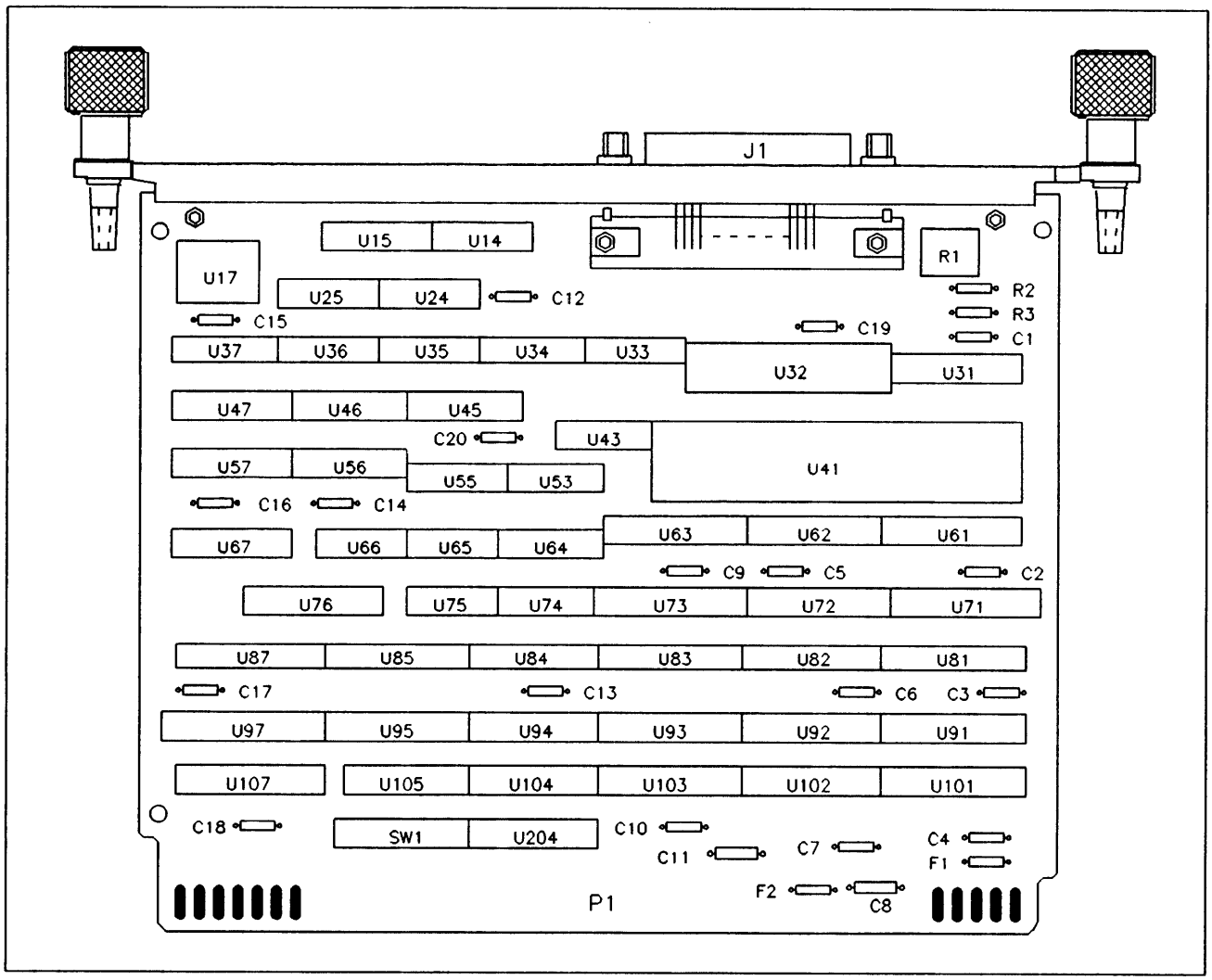



Figure 12-1. Parts Location Diagram

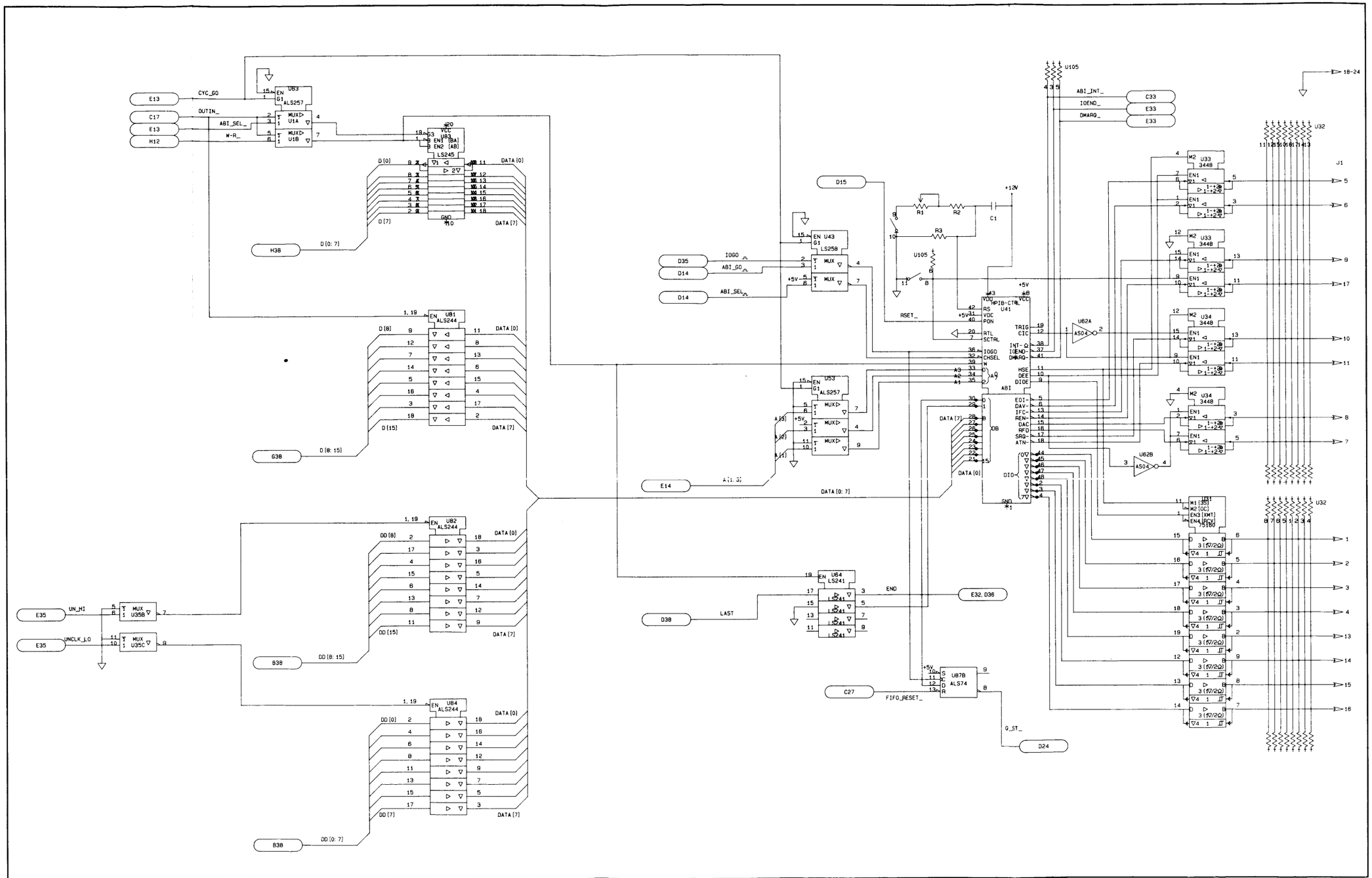



Figure 12-2. Schematic Diagram (1 of 4)

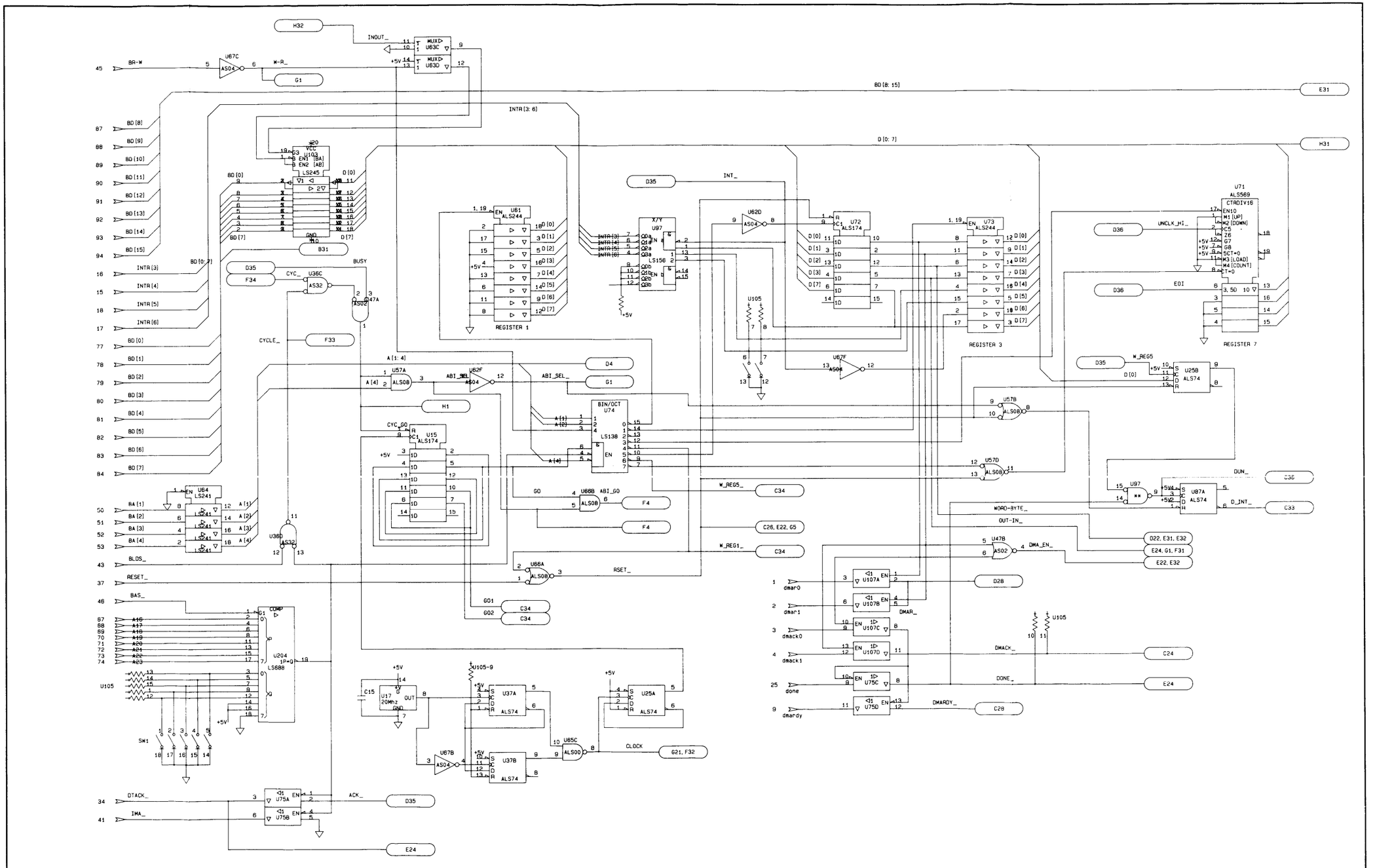



Figure 12-2. Schematic Diagram (2 of 4)

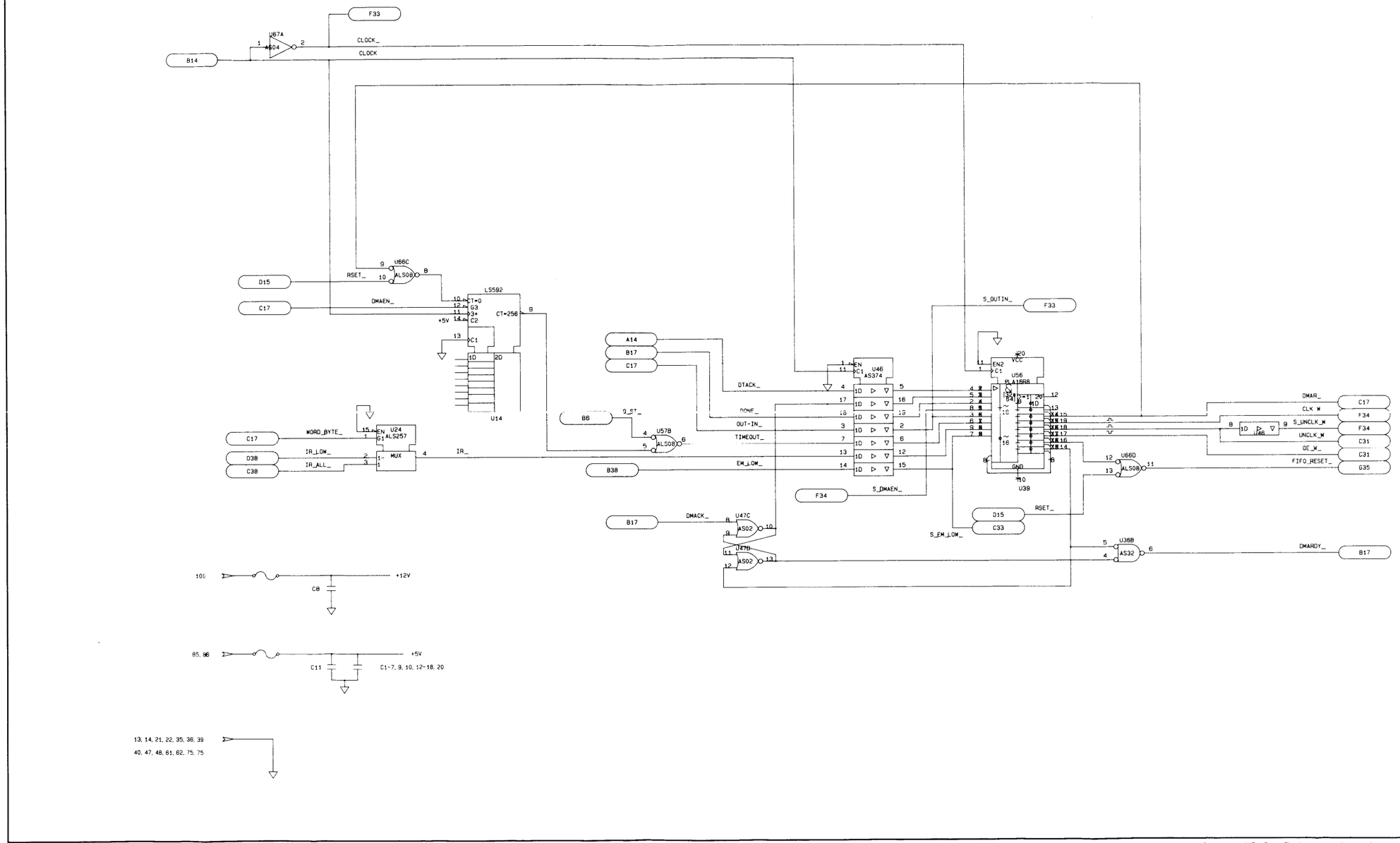



Figure 12-2. Schematic Diagram (3 of 4)

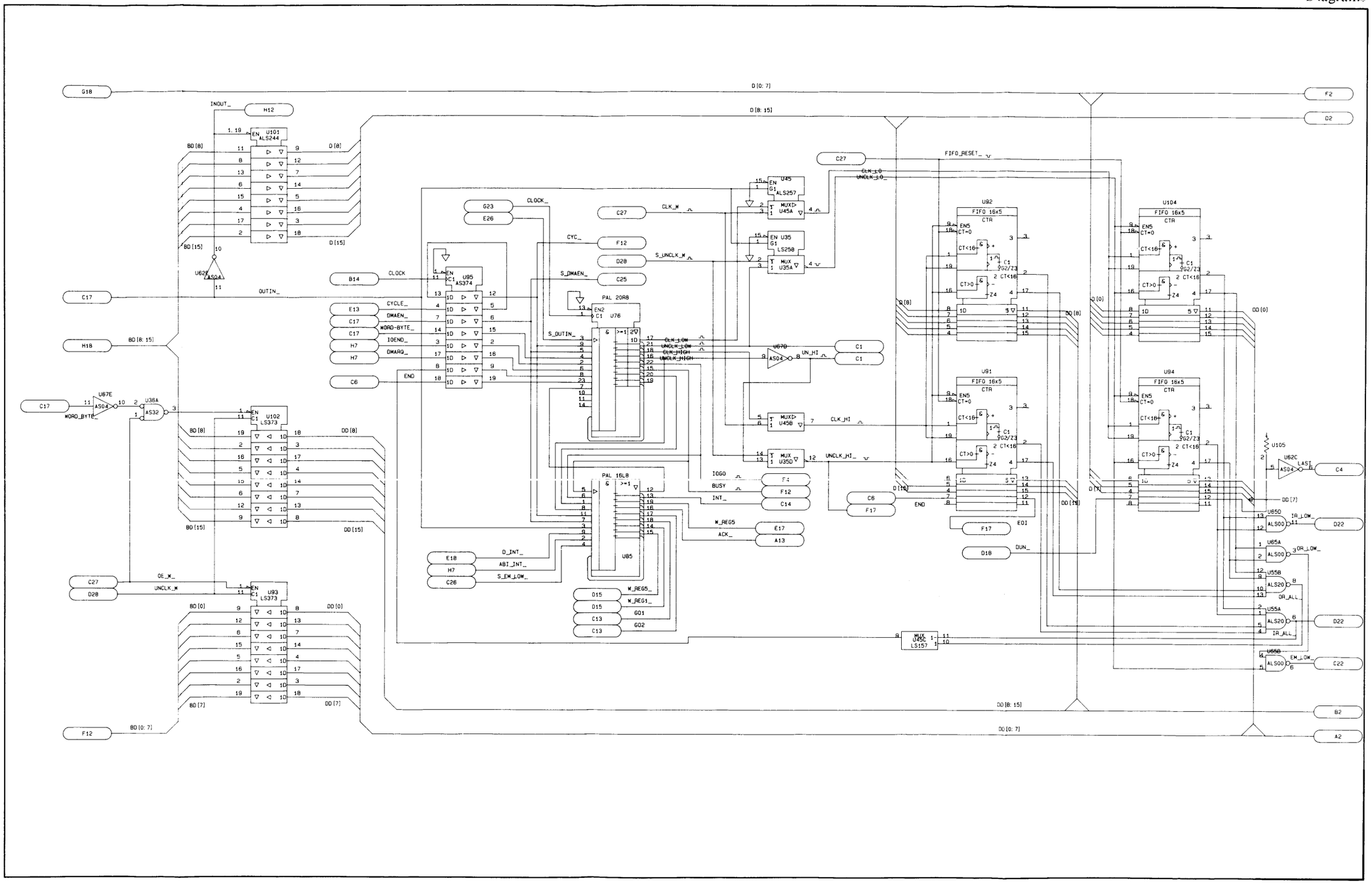



Figure 12-2. Schematic Diagram (4 of 4)

# INDEX

## B

Backplane connections, 3-3
Backplane-to-FIFO circuit, 5-5

## C

Cables, 3-3
Cabling information, 3-3
Configuration switches, 3-3
Connecting disc drives, 3-9
Connections
  backplane, 3-3
  peripheral device, 3-3
Controller, HP-IB, 5-1
Control, DMA, 5-5
Control, non-DMA, 5-5

## D

Damage from shipping, 3-2
Data flow, 5-5
Description, 1-1
Description, functional, 5-1
Direct memory access card, 1-1
Disc drives, 3-9
DMA card, 1-1
DMA control, 5-5

## E

Equipment supplied, 1-2
Exchange PCAs, 9-3

## F

Features, 1-3
Functional description, 5-1

## G

Glossary of terms, 10-2

## H

High speed/low speed switch, 3-7
How to order replaceable parts, 9-2
HP 98620 DMA card, 1-1
HP-IB controller, 5-1
HP-IB controller-to-FIFO circuit, 5-6

## I

Identification, 1-2
Inspection, 3-2
Installation, 3-8
Interrupt level, 3-7

## N

Non-DMA control, 5-5

## O

Operating environment, 1-3
Operating the disc interface, 3-10
Operating voltages, 3-2
Ordering replaceable parts, 9-2
Other technical manuals, 10-1

## P

Packing the disc interface for reshipment, 3-2
Peripheral device cable connections, 3-3
Power consumption, 3-2
Power requirements, 1-3

## R

Reference information, 10-1
Removal, 6-1
Removing the disc interface card, 6-2
Removing the HP-IB cable, 6-1
Repacking, 3-2
Replaceable parts, 9-2
Replacement, 6-2
Replacing the card, 6-3

Replacing the HP-IB Cable(s), 6-3
Reshipment, 3-2
Returning a card to HP, 9-3

## S

Select code, 3-3
Setting the configuration switches, 3-3
Setting the interrupt level, 3-7
Setting the select code, 3-3
Setting the speed, 3-7
Setting the system controller switch, 3-7
Shipping damage, 3-2
Special tools, 1-3
Specifications, 1-3
Start up, 3-10
Storage, 3-2
Support strategy, 1-3
Switches, 3-3
System controller switch, 3-7
System interface, 5-1

## T

Technical manuals, 10-1
Test equipment, 1-3
Tools required for maintenance, 1-3

## V

Voltage requirements, 3-2

# READER COMMENT SHEET

**Direct I/O Computer Systems**

**HP 98625B HP-IB HIGH-SPEED DISC INTERFACE**
**Hardware Reference Manual**

**98625-90001 December 1985**

We welcome your evaluation of this manual. Your comments and suggestions help us to improve our publications. Please explain your answers under Comments, below, and use additional pages if necessary.

Is this manual technically accurate? ___ Yes ___ No

Are the concepts and wording easy to understand? ___ Yes ___ No

Is the format of this manual convenient in size, arrangement, and readability? ___ Yes ___ No

Comments:

This form requires no postage stamp if mailed in the U.S. For locations outside the U.S., your local HP representative will ensure that your comments are forwarded.

---

**FROM:** **Date** _____

Name _____

Company _____

Address _____

_____

_____

FOLD FOLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

# BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 256 ROSEVILLE, CALIFORNIA

POSTAGE WILL BE PAID BY ADDRESSEE

Publications Manager, Marketing
HEWLETT-PACKARD COMPANY
Roseville Networks Division
8000 Foothills Boulevard
Roseville, CA 95678-6598

FOLD FOLD

Part No. 98625-90001
Printed in U.S.A. 12/85
E1285

HEWLETT PACKARD

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP