AMS 315

INSTALLATION MANUAL

Century Data Systems
A Xerox Company

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September 1984

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RECORD of REVISIONS	
REVISION	NOTES
0	ORIGINAL ISSUE
1	Manual Corrections—1983
2	Update—1983
3	Update—add Trident interface—October 1983
4	Add Errata Sheets, Change 1 and 2—January 1984
5	Update manual, add Errata Change 1—March 1984
6	Minor Changes—May 1984
7	Add Appendices B thru E—September 1984

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the technical manuals, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of 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.

This product met the FCC Class A requirements when tested using shielded cables, for both the Radial and Bus cables, which were grounded at the point of entry into the disk drive and also at the system/controller end of both cables.

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

ILLUSTRATIONS

ILLUSTRATIONS (Continued)

TABLES

SECTION 1
INTRODUCTION

DESCRIPTION

The AMS 315 Disk Drive family (see Figure 1-1) is a high performance modular disk storage unit uniquely suited to the OEM requirements. The AMS 315 Disk Drive may be supplied with various different interfaces. This manual will describe both the Trident and the SMD (Storage Module Device) interface installation.

Note also that this manual contains information pertaining to both the AMS 315 and AMS 315-1 Disk Drive Units. The primary difference between these two disk drives is that the AMS 315-1 unit is designed with an electronic carriage lock, while the AMS 315 contains a mechanical carriage lock. Refer to Section 3 for a detailed discussion of the carriage lock device.

During operation the read/write heads of the AMS 315 Disk Drive fly above the recording surface, thereby eliminating wear of both heads and media surface. Data integrity is superior to that found in past large disk systems because the WINCHESTER style read/write heads fly much closer to the media surface.

The AMS 315 Disk Drive consists of WINCHESTER type media, spindle with associated induction AC drive motor, linear motor positioner, read/write heads and servo head, recirculating air filtration system, signal processing circuits, logic control circuits, read/write circuits, servo control circuits and power supply.

The AMS 315 Disk Drive was designed for reliability and does not require any scheduled preventive maintenance.

MANUAL ORGANIZATION

The contents of this manual are divided into seven sections and Appendix A through E.

Section 1 — Introduction
Section 2 — Unpacking and Inspection
Section 3 — Installation Checkout
Section 4 — Operational Checkout
Section 5 — Sector Switches
Section 6 — System Interface Cabling
Section 7 — Accessories
Appendix A — System Grounding
Appendix B — DIP Switch Setting for SMD Dual Access PWB P/N 26310-001 and 27300-001
Appendix C — DIP Switch Setting for SMD Single Access PWB's, P/N 26902-001, 27348-001 and 27546-001
Appendix D — DIP Switch Setting for Trident Dual Access PWB P/N 25991-001
Appendix E — DIP Switch Setting for SMD Dual Access PWB P/N 27015-001 and 27076-001

Section 1 describes the AMS 315 Disk Drive in general, unit differences, technical characteristics and special tools. Section 2 contains unpacking and disk drive inspection before installation. Section 3 details unlocking the head carriage and system cabling. Section 4 describes the operational checkout after power is applied using a disk drive exerciser. Section 5 contains information on setting the sector switches. Section 6 shows interface cabling and Section 7 lists all the disk drive accessories.

RELATED DOCUMENTS

Companion documents for the AMS 315 include:
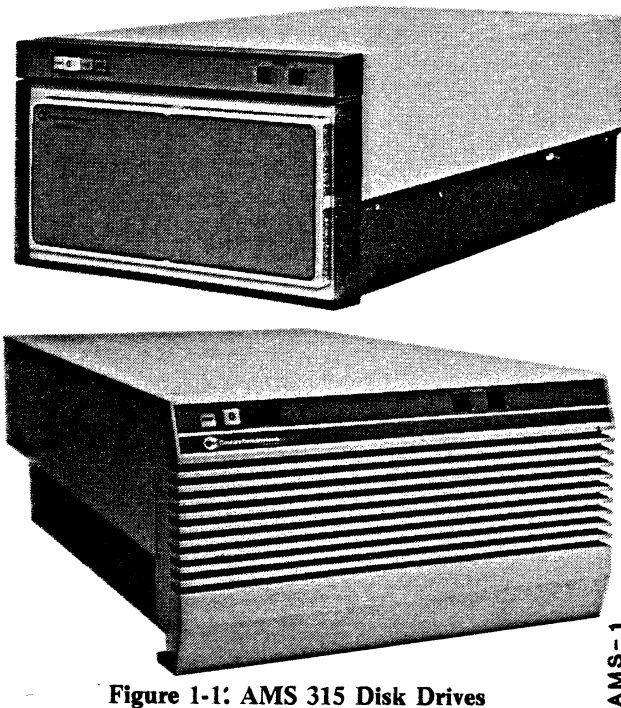
Figure 1-1: AMS 315 Disk Drives

AMS-1

1-1

SPECIAL TOOLS AND TEST EQUIPMENT

Special tools are those necessary to maintain the equipment but not normally found in a standard tool kit. The AMS 315 Disk Drive requires no special tools.

Test equipment is considered as devices that attach to the AMS 315 Disk Drive and are used to perform the necessary tests to determine the operational status of the disk drive. Test equipment is necessary only if the system is not to be used to perform any necessary testing of the disk drive.

CDS has two devices that are capable of testing the disk drive. The Model T2003 Exerciser (referred to as an intelligent exerciser) is capable of being attached to the system cable connectors (in place of the system cables) and perform all operations the system performs including disk formatting, writing and reading with verification. The T2003 can also be attached to the exerciser connector, without disconnecting the system cables, and perform limited testing of the disk drive.

The Model T2005 Maintenance Test Controller can only be attached to the exerciser connector and is capable of limited testing only.

Table 1-1 provides the test equipment part numbers.

TABLE 1-1. TEST EQUIPMENT PART NUMBERS

Name	Part Number
Model T2003 Exerciser (TRIDENT)	21462-001
Model T2003 Exerciser (SMD)	21462-002
Model T2005 MTC	23015-001

UNIT DIFFERENCE

Century Data Systems (CDS) assigns an eight digit part number to all parts, subassemblies, assemblies and products used or built by the company. Each part number is divided into a five digit basic number followed by a three digit dash number. The dash number is used to define any differences in the basic part.

The part number for the AMS 315 Disk Drive is 25682-XXX and for the AMS 315-1 Disk Drive it is 26723-XXX. The dash number is used to define the input AC power, enclosure type and interface for a particular unit. Tables 1-2 and 1-3 shows the definitions for the dash numbers. To determine the exact AC power and other characteristics of your unit, check the nameplate on the disk drive.

TABLE 1-2. AMS 315 UNIT CONFIGURATIONS

CONFIGURATOR M315 (H/V)		
25682-XXX (HORIZONTAL/VERTICAL)		
	VOLTAGE/ FREQUENCY	XX1—220/240V 50 HZ
		XX2—200/220V 50 Hz
		XX3—
		XX4—100/115V 60 HZ
		XX5—
		XX6—
		XX7—100V 50 HZ
	ENCLOSURE/ INPUT COMBINATION	X0X— NO ENCLOSURE OR POWER SUPPLY
		X1X—
		X2X—
		X3X— AMS CABINET
		X4X— DESK/RACK/SLIDE MOUNT
		X5X—
		X6X—
	MEMORY CAPACITY/ INTERFACE	0XX—SPECIAL
		1XX—SMD(S)
		2XX—SMD(D)
		3XX—
		4XX—
		5XX—
		6XX—
		7XX—
		8XX—
		9XX— TRIDENT(D)
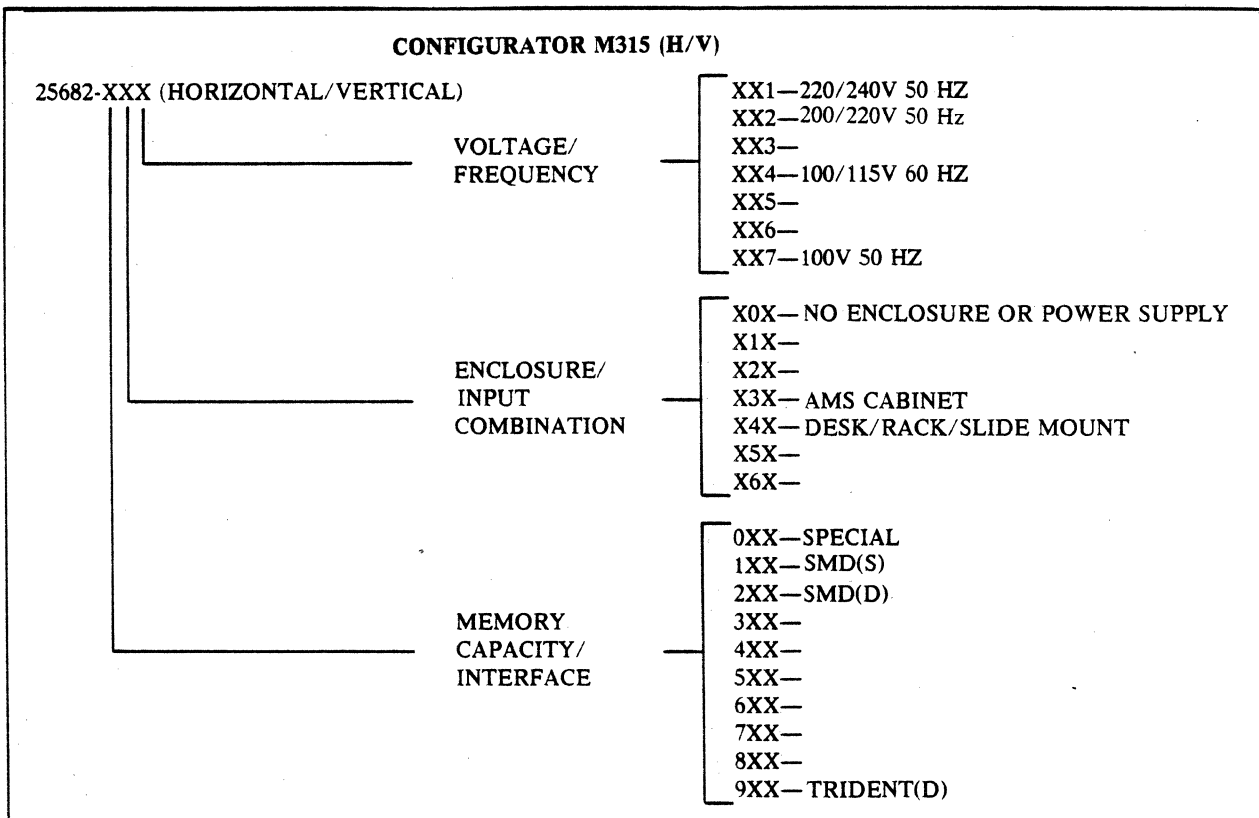
TABLE 1-3. AMS 315-1 UNIT CONFIGURATIONS

```
                           CONFIGURATOR M315-1

26723-XXX                          ┌ XX1—220/240V 50 HZ W/LINEAR SUPPLY
                                   │ XX2—200/220V 50 Hz W/LINEAR SUPPLY
                                   │ XX3—
           VOLTAGE/               ─┤ XX4—100/115V 60 HZ W/LINEAR SUPPLY
           FREQUENCY               │ XX5—
                                   │ XX6—
                                   │ XX7—100V 50 HZ W/LINEAR SUPPLY
                                   │ XX8—100/115V 60 HZ W/SWITCHER SUPPLY
                                   └ XX9—100/200/220/240V 50 HZ W/SWITCHER SUPPLY

                                   ┌ X0X— NO ENCLOSURE OR POWER SUPPLY
                                   │ X1X—
           ENCLOSURE/              │ X2X—
           INPUT                  ─┤ X3X—AMS CABINET
           COMBINATION             │ X4X—DESK/RACK/SLIDE MOUNT-A.C. INPUT
                                   │ X5X—
                                   └ X6X—

                                   ┌ 0XX—SPECIAL
                                   │ 1XX—SMD(S)
                                   │ 2XX—SMD(D)
                                   │ 3XX—
           MEMORY                  │ 4XX—
           CAPACITY/              ─┤ 5XX—
           INTERFACE               │ 6XX—
                                   │ 7XX—
                                   │ 8XX—
                                   └ 9XX—315MB-TRIDENT (D)
```

Each unit carries an identification (ID) tag showing the part number with the appropriate dash number as well as the unit's serial number. There are two ID tags for each unit. One is located on the right side of the sealed disk compartment and the second one is located on the back of the disk drive enclosure above the AC input assembly.

TECHNICAL CHARACTERISTICS

Table 1-4 lists the operating technical characteristics for the AMS 315 Disk Drive.

TABLE 1-4. DISK DRIVE CHARACTERISTICS

Bytes per Track	20,160
Tracks per Cylinder	19
Bytes per Cylinder	383,040
Number of Cylinders	823/845
Bytes per Unit	315.2MB/323.7MB
Single Track Positioning Time	5ms (Max)
Average Positioning Time	25 ms (Avg)
Maximum Positioning Time	50 ms
Rotational Speed	3600 RPM
Average Latency Time	8.3 ms

Recording Density	6363 BPI
Track Density	712 TPI
I/O Transfer Rate	1209 KBytes/sec
Recording Code	MFM Bit Serial
Interface Code (data)	NRZ Serial
Positioning Method	Linear Motor
Start Time	25 Sec.
Stop Time	30 Sec.

AC Input Power (Single Phase)

$$100V \ (+10\% \ -15\%) \ 60 \ Hz$$
$$115V \ (+10\% \ -15\%) \ 60 \ Hz$$
$$100V \ (+10\% \ -15\%) \ 50 \ Hz$$
$$200V \ (+10\% \ -15\%) \ 50 \ Hz$$
$$220V \ (+10\% \ -15\%) \ 50 \ Hz$$
$$240V \ (+10\% \ -15\%) \ 50 \ Hz$$

Starting Current (200V-240V)	11 amperes
(100V, 115V)	16 amperes
Running Current (200V-240V)	4 amperes
(100V, 115V)	6 amperes
DC Power	$\pm 24V \ (\pm 7\%)$
	$\pm 12V \ (\pm 3\%)$
	$+5V \ (+2\%)$

Mounting Configurations

1. Mounting attitudes for the basic drive without enclosure:
   Horizontal .... spindle pulley down
   Vertical .... unit on side, motor on top

2. Mounting attitudes for the drive with enclosure:
   Horizontal and Vertical mount

3. Enclosure
   The enclosure, Figure 1-2, for use with the AMS 315 Disk Drive can be configured in any one of the following:

   a. Desk top enclosure
   b. Rack mounted (fixed)
   c. Slide mounted
   d. Two drawer cabinet
   e. Three drawer cabinet

The enclosure provides mounting for the sealed mechanical assembly, drive control boards, interface board and power supply. The AC distribution for the power supply is located on the back panel of the enclosure and an operator control panel is located on the front. The enclosure also provides all necessary cooling required for a free standing drive. Care should be taken to provide adequate ventilation for drives mounted in racks or cabinets.

4. Rack Mount Slides
   The AMS 315 Disk Drive enclosure can be ordered with a set of slides that mount between the enclosure and a standard RETMA rack and provides forward travel of the drive to extend clear of the rack for ease of maintenance and installation. The enclosure fits in a standard 19" × 30" rack.
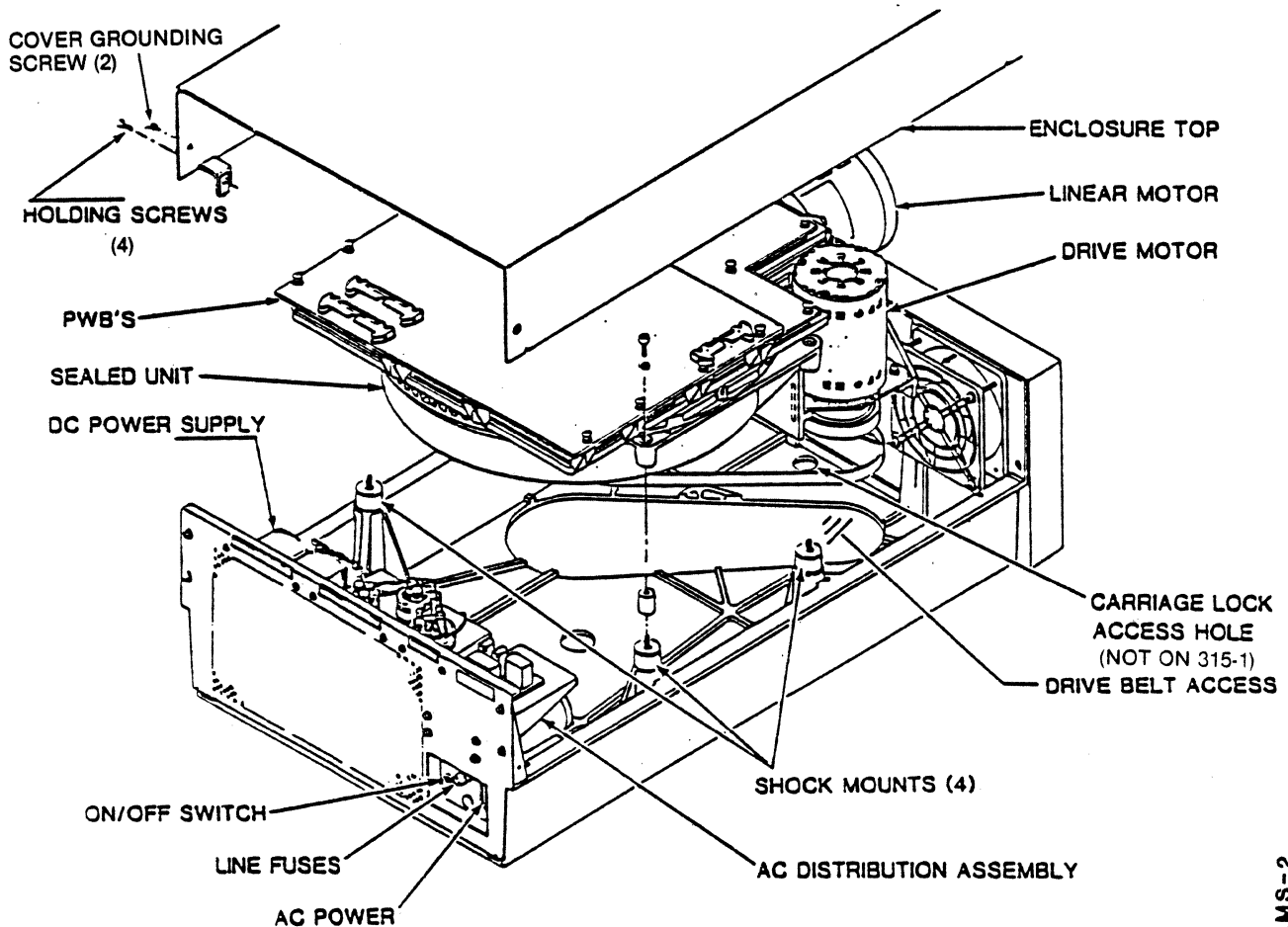
Figure 1-2. Enclosure with Disk Drive

SECTION 2
UNPACKING AND INSPECTION

GENERAL

The AMS 315 Disk Drives are packaged for shipment in a double walled corrugated container reinforced with ethafoam. For overseas shipment, the corrugated container is placed inside a padded plywood box.

For drives without enclosures, the drives are placed in a preformed styrofoam container and then placed in the corrugated shipping container.

This section contains instructions for unpacking the disk drive, in preparation for installation. Instructions for inspecting the disk drive, during unpacking, are included, in case there is evidence of mishandling during shipment.

UNPACKING

The disk drive shipping container is shown in Figure 2-1. The preformed styrofoam container for drives without enclosures is not shown.

If the exterior condition of the shipping container indicates mishandling or abuse, with the likelihood of possible interior damage to the unit, unpacking should be carried out in the presence of the carrier or his agent, where possible. In any case, units should be unpacked and checked for shipping damage as soon as received.

The following procedure is based upon current packing methods. After inspecting the exterior of the corrugated container for obvious shipping damage, proceed as follows:

CAUTION
Two people should be used to move the shipping container prior to unpacking. The shipping weight of the enclosure, drive and power supply is approximately 135 pounds (61.3 kg).

1. Move the shipping container to a suitable work area. Cut and remove the strapping around the corrugated container.

2. The outer sleeve of the shipping container has flaps that open, see Figure 2-1. Open the flaps, remove
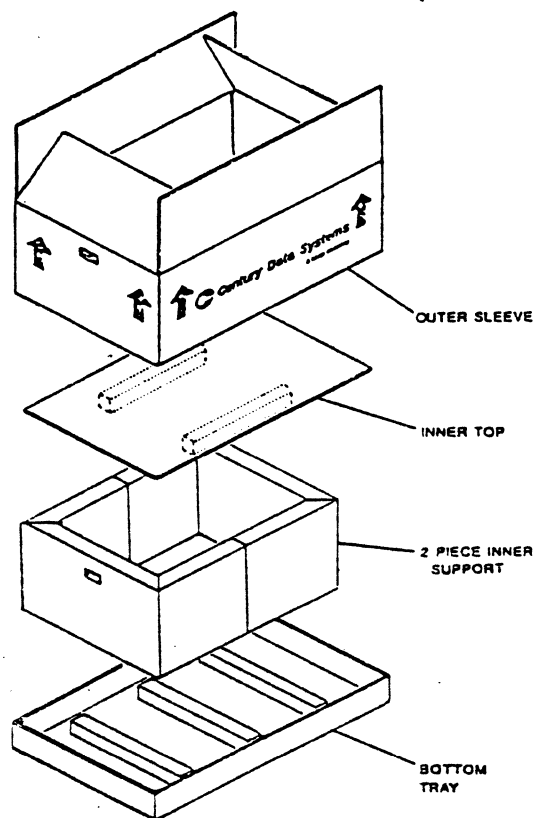
Figure 2-1. Shipping Container

and retain any loose items and/or documentation from the top of the inner container.

Note
Each drive is shipped with a flaw map listing all correctable and uncorrectable media flaws. This list should be kept with the disk drive.

3. Remove the outer sleeve, inner top, and inner supports, by lifting up and off.

4. Carefully lift the enclosure up (two people should be used) and slide the shipping container bottom tray out from under. Set the enclosure down.

5. Remove the enclosure top by removing the six phillips-head screws (two at the front corners and two on each side [front and back]) see Figure 2-2. Lift top up and off.

COVER GROUNDING
SCREW (2)

HOLDING SCREWS
(4)

PWB'S

SEALED UNIT

DC POWER SUPPLY

ENCLOSURE TOP

LINEAR MOTOR

DRIVE MOTOR

CARRIAGE LOCK
ACCESS HOLE
(NOT ON 315-1)

DRIVE BELT ACCESS

SHOCK MOUNTS (4)

ON/OFF SWITCH

LINE FUSES

AC POWER

AC DISTRIBUTION ASSEMBLY
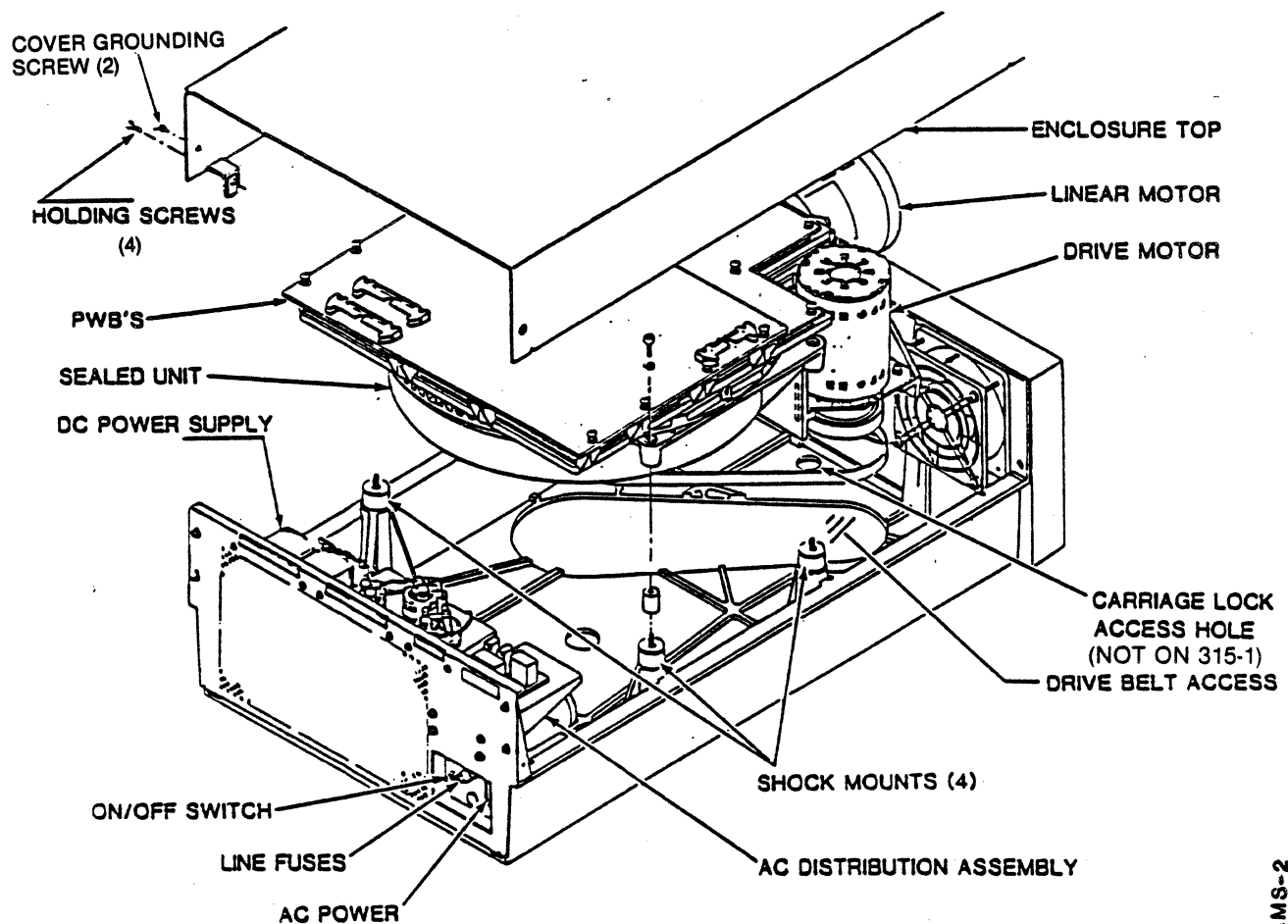
AMS-2

Figure 2-2. Disk Drive with Enclosure

6. Remove the two pieces of cardboard located on each side of the unit.

7. With all shipping material removed, inspect the enclosure for dents or cracks that might indicate internal damage.

If equipment inspection is considered necessary, proceed with the equipment inspection procedure in this section. If equipment inspection is not considered necessary, proceed to Section 3, Installation Checkout.

EQUIPMENT INSPECTION

If equipment shipping damage is suspected, proceed as follows:

1. Inspect for the following:

    a. Deformed frame members.

    b. Cracks or breaks in casting.

    c. Cracked printed circuit boards, particularly around the mounting holes.

    d. Loose or broken cable connectors.

    e. Remove the printed wiring boards (PWB's) and look for cracks or breaks in top of sealed unit.

2. Place enclosure on its side, drive motor down. Remove bottom inspection plate and inspect for the following:

    a. Loose or damaged drive motor pulley.

    b. Damaged spindle pulley.

    c. Drive belt loose or off pulley
    If belt is loose or off, proceed as follows:

    (1) Loosen, do not remove, the drive motor mounting bolts.

    (2) Place belt in place and push drive motor away from spindle, so belt tightens.

    (3) While applying pressure to motor (tightening belt), tighten the motor mounting bolts.

3. Replace belt inspection plate and set enclosure down.

If any shipping damage is discovered, contact the carrier or his agent for disposition of the disk drive.

2-2

SECTION 3
INSTALLATION CHECKOUT

GENERAL

This section contains the recommended procedures for unit installation checkout prior to online use of the disk drive.

Problems found during unit inspection must be corrected before proceeding further.

INSTALLATION

Note
The AMS 315 Disk Drive is available without an enclosure for vertical mounting. The customer is responsible for maintaining 150 CFM air flow over the Sealed Unit.

CAUTION
The disk drive, power supply, and enclosure weighs approximately 135 pounds (61.3 kg). Use care when moving.

1. Install enclosure (with unit) in the desired location and position.

Note
During shipment, the disk drive R/W heads and associated head carriage assembly must be held stationary to prevent damage to the heads or the disks. After the disk drive has been moved to its operating position, the head carriage assembly must be unlocked allowing the heads to move. This is accomplished by one of two methods:

a. Some units contain a mechanical carriage lock that is released by turning a bolt inside of the sealed unit (see Figure 3-1).

b. The 315-1 units have an electronic carriage lock which is automatically activated.

Note
Units with the mechanical lock may be identified by inspecting the nameplate on the disk drive. If they are labeled with part number 25682-XXX they contain the mech-

anical carriage lock and the following two steps must be performed after the unit is positioned into its operating position. (Units numbered 26723-XXX contain the electronic carriage lock and thus the next two steps may be omitted.)

2. The "CARRIAGE LOCK" bolt can be reached with a 6-inch long screwdriver via an access hole in the bottom of the enclosure. See Figure 3-1. Lift the enclosure about 8 inches, from the front end, to gain access to the hole.

CAUTION
Do not, under any circumstances, turn the "CARRIAGE LOCK" bolt past the detent position when releasing the carriage for operation.

3. Release (unlock) "CARRIAGE LOCK" by turning the bolt, very carefully, in the direction (counterclockwise) indicated by the label on the bottom of the enclosure (or sealed unit), until the nose of the "carriage lock" is stopped against the rib of the bowl (sealed unit).

CAUTION
The carriage should always be locked when the disk drive is moved. The "CARRIAGE LOCK" bolt should be turned in the "LOCK" direction (clockwise).

4. Units with the electronic carriage lock will automatically lock the carriage when power is removed. Without dc power applied to the disk drive, a solenoid plunger, inside the sealed unit, engages a notch in the head carriage, preventing it from moving out of the "landing zone" position. This is the normal condition whenever the disk drive is moved. Applying dc power actuates the internal solenoid and separates the plunger from the head carriage notch, allowing it to respond to commands from the head positioning servo system. Actually, solenoid operation is logically associated with the BRAKE/ signal (i.e., Not-Braking status), so the solenoid will also be deenergized, locking the head carriage, while the spindle is being braked to a stop. Spindle brak-
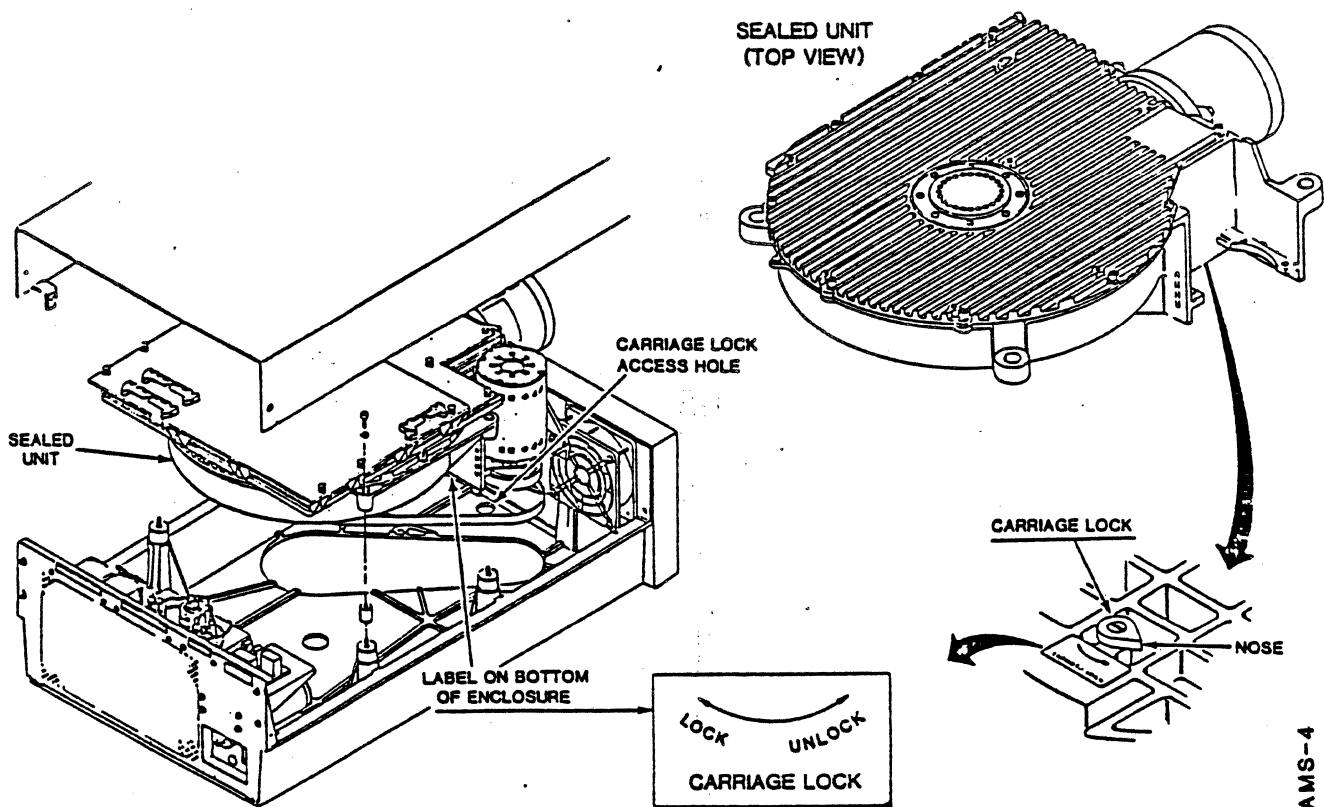
Figure 3-1. Mechanical Carriage Lock

ing normally happens only after the heads have been relocated over the "landing zone."

Note

On units with the electronic carriage lock, the access hole in the bottom of the enclosure has been plugged. No attempt should be made to remove the plug, since access is no longer required.

5. Ensure all cables are seated firmly in their connectors.

6. Connect the system cables as shown in Figures 3-2 or 3-3. The interconnecting cable connectors for the dual access SMD and Trident I/O and Control PWB's are shown in Figures 3-4 through 3-6. Interconnecting I//O and Control Cabling for Single Access is shown in Figure 3-7. When interfacing the disk drive to the system, it is necessary to terminate the BUS cable at the last drive on the line (see Figures 3-2 and 3-3). The terminator part numbers are shown in Table 3-1.

Note

The system grounding point of each disk drive is referred to as E1 on Figures 3-2 and 3-3. Refer to Appendix A for appropriate system grounding methods.

TABLE 3-1. SYSTEM INTERFACE TERMINATORS

CDS Part Number	Used With Interface
25790-001	SMD Interface Unit
26205-001	Trident Interface Unit

7. Install the terminator(s) in the appropriate jack(s) as follows:

   a. The edge of the terminator PWB opposite the connector goes down.

   b. The ground wire on the terminator plugs to the spade terminal on the left (from rear, facing forward).

8. Metal cover safety ground is assured by a screw and lockwasher on each side at the rear of the machine. If the cover is removed during installation, these screws and lockwashers must be reinstalled along with the cover, prior to operation.

9. Install the AC power cord into the connector at the rear of the unit. Refer to Figure 4-4. Note also that there are two AC input fuses here as well as the power on switch.
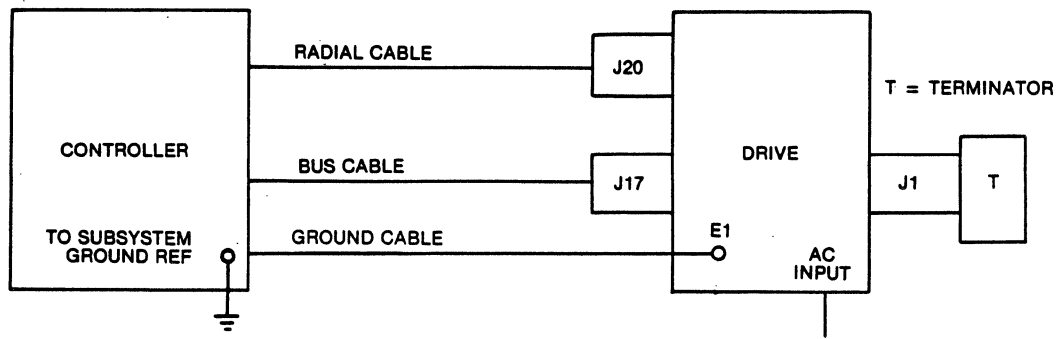
(A) SINGLE ACCESS/SINGLE DRIVE
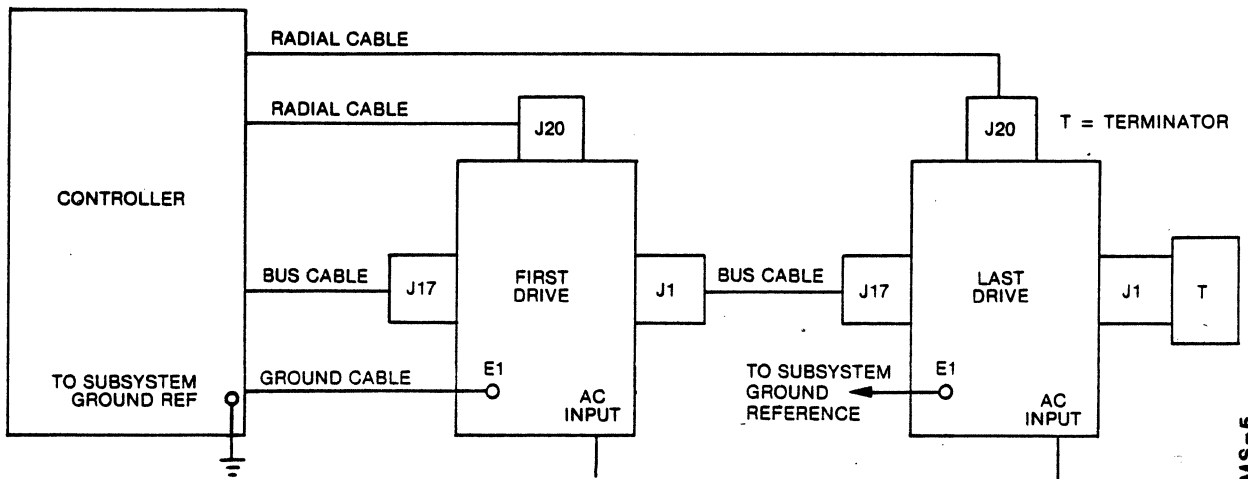
(B) SINGLE ACCESS/MULTIPLE DRIVES

Figure 3-2. System Cable Diagram (Single Access)

Note

See Figures 3-4, 3-5, 3-6 and 3-7 for internal cabling of both 315 and 315-1 disk drives. Note the locations of plugs on power supply (315-1) or AC Distribution PWB (315) for different AC input voltage configurations.

10. The I/O and Control PWB contains a number of rocker (dip) switches that must be set to match the operating system parameters. Locate the I/O and Control PWB part number of your PWB and then refer to the appropriate Appendix for switch settings.

SMD Dual Access PWB's—Appendix B
SMD Single Access PWB's—Appendix C
Trident PWB's—Appendix D
Custom OEM PWB's—Appendix E

Figure 3-3. System Cable Diagram (Dual Access)

Figure 3-4. Model 315 System Cabling

	P2	P7/8	WIRE IN P7/8	PWB
100V 60HZ	J8	J7	PIN 6	25800
115V 60HZ	J2	J7	PIN 6	25800
100V 50HZ	J7	J8	PIN 5	25800
200V 50HZ	J7	J8	PIN 5	25803
220V 50HZ	J8	J7	PIN 6	25803
240V 50HZ	J2	J7	PIN 6	25803

* CONNECTIONS FOR P2 & P7/8

FRONT PANEL

J/PO1 — 25795 — J/PO2

J/PO3

315-1 CABLING

W/LINEAR P.S.

AC IN — FL1 — **AC DIST. ASSY** 25987

FANS

A BUS IN — J17

B BUS IN — J18

A BUS OUT — J1

B BUS OUT — J2

A RADIAL — J20

B RADIAL — J22

EXERCISER — J21

SMD DUAL ACCESS PWB 26310 AND 27300

or

TRIDENT DUAL ACCESS PWB 25991

J/PO4 — 24394 — J/PO6

J/PO5

J06 / PO3 — 24386

24393

R/W PWB 25773

J/PO9

J/PO8

J/PO7 — 24391 — J/P21

SERVO CONTROL PWB 26362

J/P14

J/P11

J/P13

J/P10

25818

J/P22

MOTOR START ASSY 26720

J/PO3 — P7/8 / J7

AC DIST. PWB 25800 OR 25803

J/PO1

J/PO2

J/PO6 — J08 *

J/PO5

24390

25794 — J/PO9 — **HEAD/DISK ASSY (HDA)**

J/PO7

P/J25 J/P25

LINEAR MOTOR

TACHOMETER

J/P20 — XFMR

POWER SUPPLY 25837

SPIN MOTOR

BRAKE

*CONNECTIONS FOR P2 & P7/8

	P2	P7/8	WIRE IN P7/8	PWB
100V 60HZ	J8	J7	PIN 6	25800
115V 60HZ	J2	J7	PIN 6	25800
100V 50HZ	J7	J8	PIN 5	25800
200V 50HZ	J7	J8	PIN 5	25803
220V 50HZ	J8	J7	PIN 6	25803
240V 50HZ	J2	J7	PIN 6	25803

Figure 3-5. Model 315-1 System Cabling (Linear P.S.)

FRONT PANEL

J/P01 — 25795 — J/P02

J/P03

A BUS IN — J17

B BUS IN — J18

A BUS OUT — J1

B BUS OUT — J2

A RADIAL — J20

B RADIAL — J22

EXERCISER — J21

SMD
DUAL
ACCESS
PWB
26310 AND
27300
or
TRIDENT
DUAL
ACCESS
PWB
25991

315-1 CABLING
W/SWITCHER P.S.

AC IN

FL1   AC DIST. ASSY
26709

FANS

J/P07 — 24391 — J/P21

J/P22

R/W PWB
25773

SERVO
CONTROL
PWB
26362

J/P101   POWER SUPPLY   J201
                26491   J202
J/P20   J203
                             J204   *
                             J205   P201

J/P04 — 24394 — J/P06

J/P04   J/P01

J/P05   MOTOR START ASSY
              26644
J/P06

J/P03

J/P05

J06 P03   24393
          24386

J/P09

J/P11

J/P14

J/P13

J/P08

J/P10

25818

25794   J/P08   HEAD/DISK ASSY
                    (HDA)

J/P07

LINEAR MOTOR

TACHOMETER

SPIN MOTOR

BRAKE

24390

*** P201 IS INSERTED INTO
ONE OF THE FOLLOWING:**

J201 for 240V
J202 for 220V
J203 for 200V
J204 for 115V
J205 for 100V

Figure 3-6. Model 315-1 System Cabling (Switcher P.S.)

315/513
315-1/513-1 SINGLE ACCESS CABLING

	P2	P7/8	WIRE IN P7/8	PWB
100V 60HZ	J8	J7	PIN 6	25800
115V 60HZ	J2	J7	PIN 6	25800
100V 50HZ	J7	J8	PIN 5	25800
200V 50HZ	J7	J8	PIN 5	25803
220V 50HZ	J8	J7	PIN 6	25803
240V 50HZ	J2	J7	PIN 6	25803

☆ CONNECTIONS FOR P2 & P7/8

* CONNECTOR PIN STRIP 27594-040
** CONNECTOR PIN STRIP 27594-050
*** EARLY UNITS MAY BE LABELED PO3.
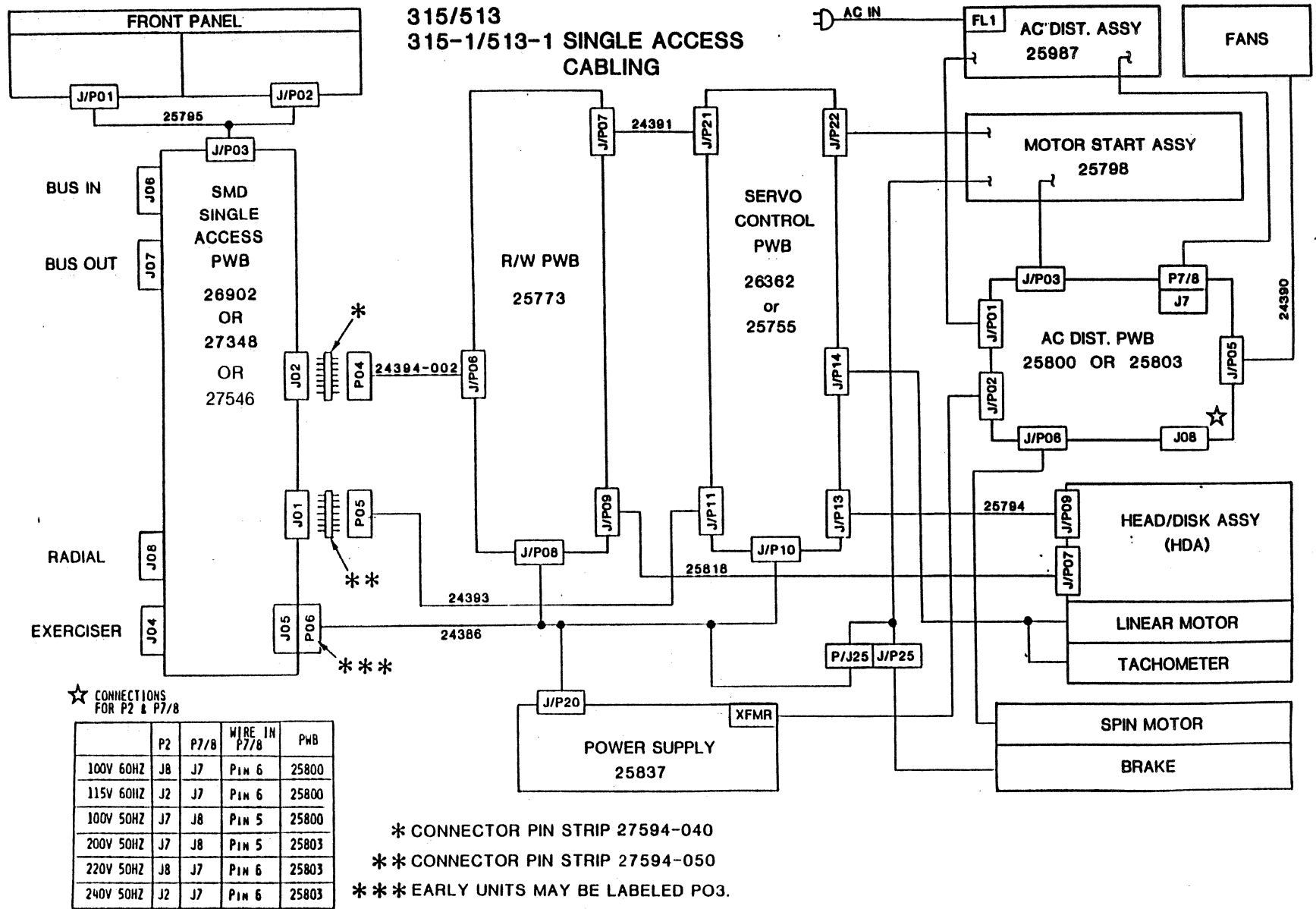
Figure 3-7. Models 315 and 315-1 System Cabling (Linear P.S.)

Access A and B Switches (Front Panel)

Figure 3-8 shows a view of the Front Panel and Table 3-2
describes their functions.
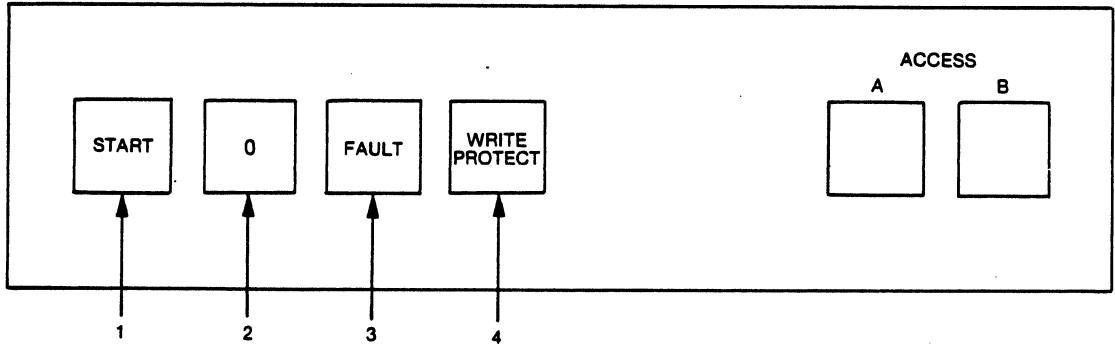
Figure 3-8. Front Panel Controls & Indicators

TABLE 3-2. CONTROLS AND INDICATORS

Control/Indicator	Description/Function
1 START Switch/Indicator	IN position turns on the drive motor and positions the heads over the data tracks. OUT position moves the heads to the landing zone area, turns off the drive motor, and activates the brake to stop the disks.
2 Ready Indicator/ Logical Address Plug (White) (SMD)	Indicates that the drive is powered up and the logical address of the drive (SMD only) is stamped on the indicator lens. Flashes during the power up until the drive is ready and during power down until the disks have stopped.
3 FAULT Pushbutton Switch/Indicator (Red)	Indicates that an unsafe operating condition has been detected and that corrective action is required. Pressing the switch will clear any fault condition that no longer exists.
4 WRITE PROTECT Switch/Indicator	WRITE PROTECT (ON) position disables the write logic for read-only disk protection. OFF position enables all data operations. Note: An electrical interlock prevents switch actuation from disrupting a write operation in progress.

SECTION 4
OPERATIONAL CHECKOUT

GENERAL

This section contains disk drive offline and online testing information and procedures. The procedures in this section must not be performed until Section 3 procedures have been accomplished. Before proceeding check the following:

    a. System cabling complete

    b. DC grounding to common point at controller

    c. Switches are set as described in Appendices B through E.

    d. Mechanical carriage lock is released (if used)

    e. AC power cord installed

    f. Disk drive cover removed as described in Section 2

Note
The disk drive user may elect to perform an online operational checkout using available diagnostic routines and system benchmark programs if desired or if disk drive exercisers are not available.

OPERATIONAL CHECKOUT

Extensive testing of the AMS 315 Disk Drive was performed prior to shipment, ensuring each unit shipped meets or exceeds the published specifications.

The following list of test functions and procedures are to be used, if an operational checkout of the disk drive is desired, prior to making it operational with the operating system.

Not all the functions listed need be performed nor is the list the only test functions that could be performed.

    a. Power On

    b. Sequence-Up

    c. Drive Motor RPM's

    d. Rezero

    e. Forward Sequential Seeks

    f. Reverse Sequential Seeks

    g. Forward Seek Timing

    h. Reverse Seek Timing

    i. Count Sectors

    j. Format the Disks (Write)

    k. Random Seek/Read

    l. Sequence-Down

CDS Exercisers

Performing the operational checkout can be accomplished using either an exerciser or the operating system. Century Data Systems manufacturers two exercisers that can be used to test the AMS 315 Disk Drive.

    a. T2003 Smart Exerciser (w/SMD Interface) CDS P/N 21462-002

    b. T2003 Smart Exerciser (w/Trident Interface) CDS P/N 21462-001

    c. T2005 Maintenance Test Controller CDS P/N 23015-001

The T2003 Smart Exerciser can perform all operational checks necessary to completely test the unit. Testing is performed in the "ONLINE" mode by connecting the exerciser to the drive via the system cable connectors. The T2003 cannot exercise the dual access feature of the disk drive. It must be connected to either Access A or Access B and the appropriate front panel access switch must be enabled. See Figure 4-1. The T2003 Smart Exerciser Technical Manual part number is 76271-20X.

The T2005 Maintenance Test Controller (MTC) is a hand-held exerciser that utilizes the disk drive microprocessor and firmware to perform limited testing of the drive. Testing with the MTC is performed in the "OFF-LINE" mode by connecting it to J21, on the I/O & Control PWB. The drive must be DEGATED (both front panel access switches disabled or the DEGATE switches on the PWB in the DEGATE position). Use of the T2005 MTC is described in the T2005 MTC Installation and Operation Manual, part number 76223-20X.

TO
AMS DRIVES

BUS CABLE

(60) DRIVE: J17

RADIAL CABLE

(26) DRIVE: J20

DARK — — —▶
STRIPE
LINES UP WITH
PIN 1

RED STRIPE
LINES UP WITH
PIN 1

21564-015

21565-015

(40)   (40)   (60)   (26)

J1   ▲   J2   ▲ J3   ▲ J4
PIN 1   PIN 1   PIN 1

(40)

J7   ▲
PIN 1

T2003 SMD INTERFACE
BOARD

P2   P3   +5V   GND   J6   (4 PINS
                      ○   ○   CONNECTOR)
(40)   (40)

TO CONTROL AND
POWER SUPPLY OF
T2003

DIFFERENTIAL I/F
ASSY: 22164

AMS—16
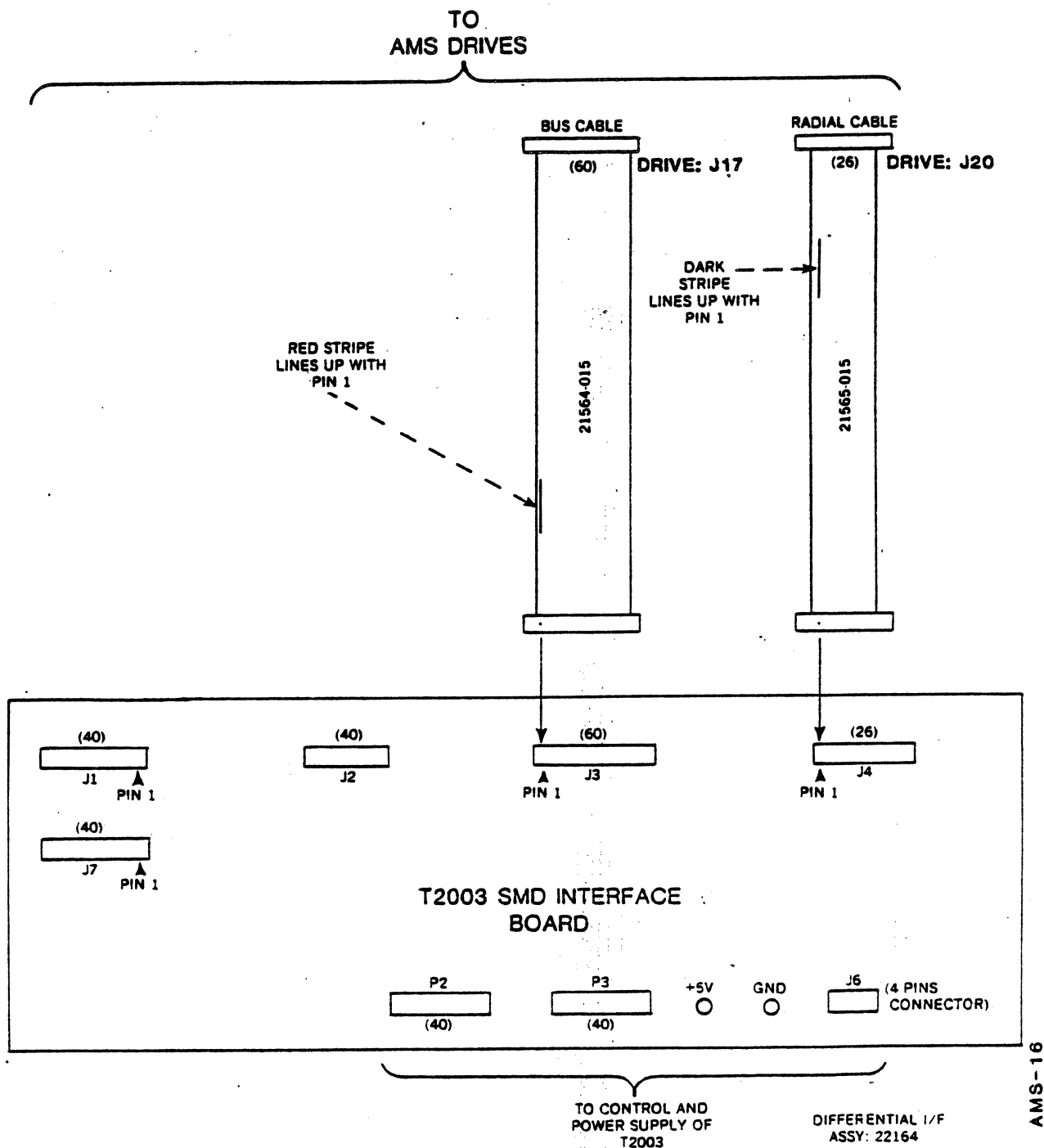
Figure 4-1. T2003 Smart Exerciser Cabling

Procedure

1. Insure all power is removed from drive.

2. Cable the disk drive (depending on method to be used for testing) as follows:

   a. Operating System to be used to test the drive. Refer to Section 3 and connect system cables as shown in Figures 3-2 and 3-3.

   b. T2003 Smart Exerciser to be used to test the drive. Connect exerciser cables as shown in Figure 4-1.

   c. T2005 MTC to be used to test the drive. Connect the MTC cable to J21, on I/O & Control PWB.

3. Set the front panel Access switches or the PWB Degate switches to allow for ONLINE or OFFLINE mode of testing.

4. Turn power on to the unit and verify that the DC power LED's on the Servo Control Printed Wire Board (PWB) are illuminated. See Figure 4-2.

Note

If any DC power LED is not illuminated, stop and troubleshoot the disk drive.

+24V
+12V
+5V
-12V
-24V

VELOCITY
(R305)

AMS-17
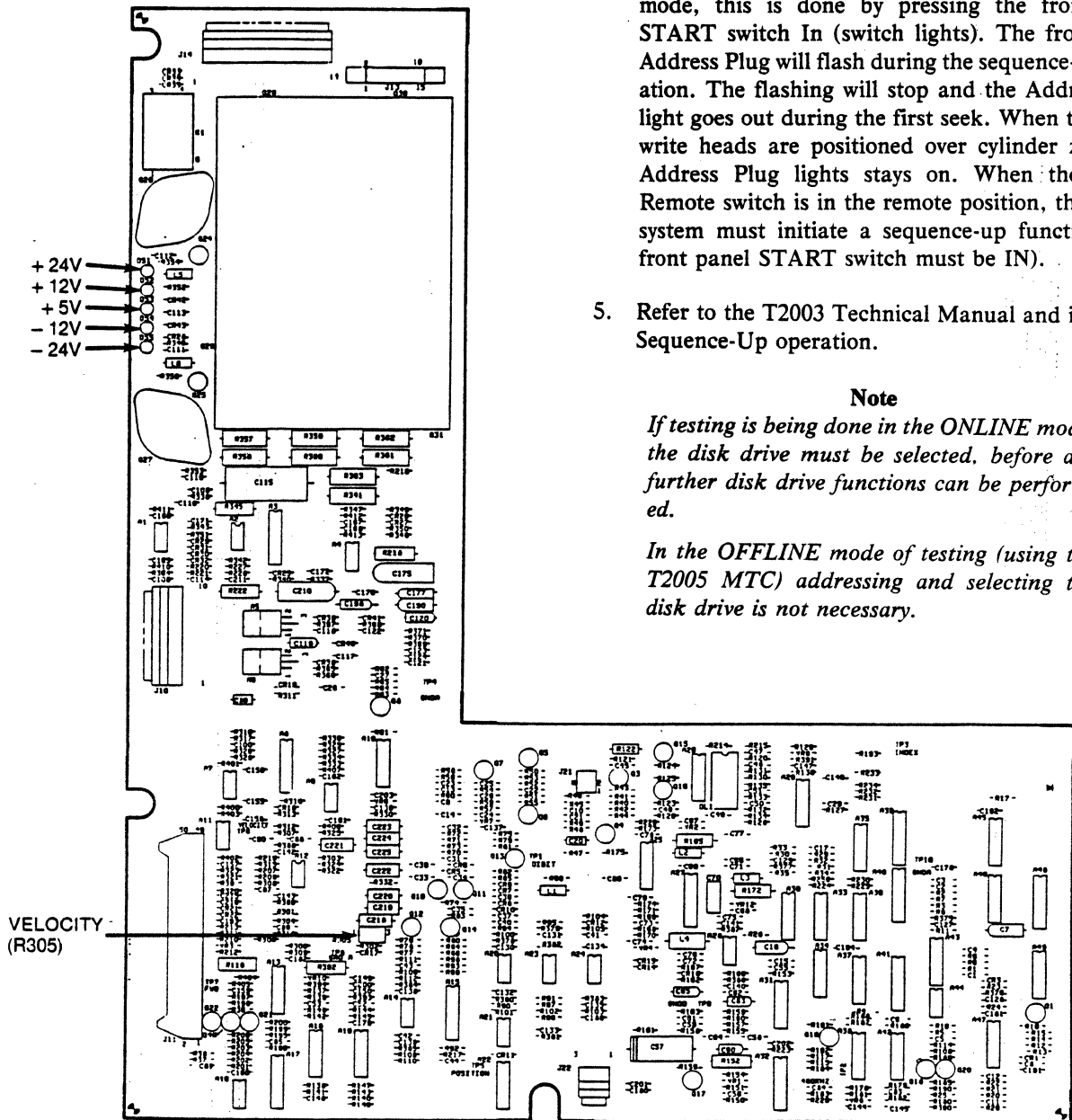
The +5 and -12 volt sections of some versions of the power supply are adjustable. Refer to the Disk Drive Characteristics Table 1-4 for tolerances and to Figure 4-3 for locations. There are also two fuses on the ±24V supply on the power supply chassis inside the drive enclosure. Two additional fuses are located on the rear of the unit. These are AC line fuses and should be checked in case of difficulty in powering up the disk drive. See Figure 4-4.

After the DC power has been checked, a disk drive sequence-up function should be performed both in the local and remote mode (SMD only). The PWB Local/Remote switch controls the mode. In the local mode, this is done by pressing the front panel START switch In (switch lights). The front panel Address Plug will flash during the sequence-up operation. The flashing will stop and the Address Plug light goes out during the first seek. When the read/write heads are positioned over cylinder zero, the Address Plug lights stays on. When the Local/Remote switch is in the remote position, the testing system must initiate a sequence-up function, (the front panel START switch must be IN).

5. Refer to the T2003 Technical Manual and initiate a Sequence-Up operation.

Note

If testing is being done in the ONLINE mode, the disk drive must be selected, before any further disk drive functions can be performed.

In the OFFLINE mode of testing (using the T2005 MTC) addressing and selecting the disk drive is not necessary.

Figure 4-2. DC Power LED's

+5V
ADJUST

GND

-12V
ADJUST

-24V
FUSE

+24V
FUSE

AMS-18

FRONT
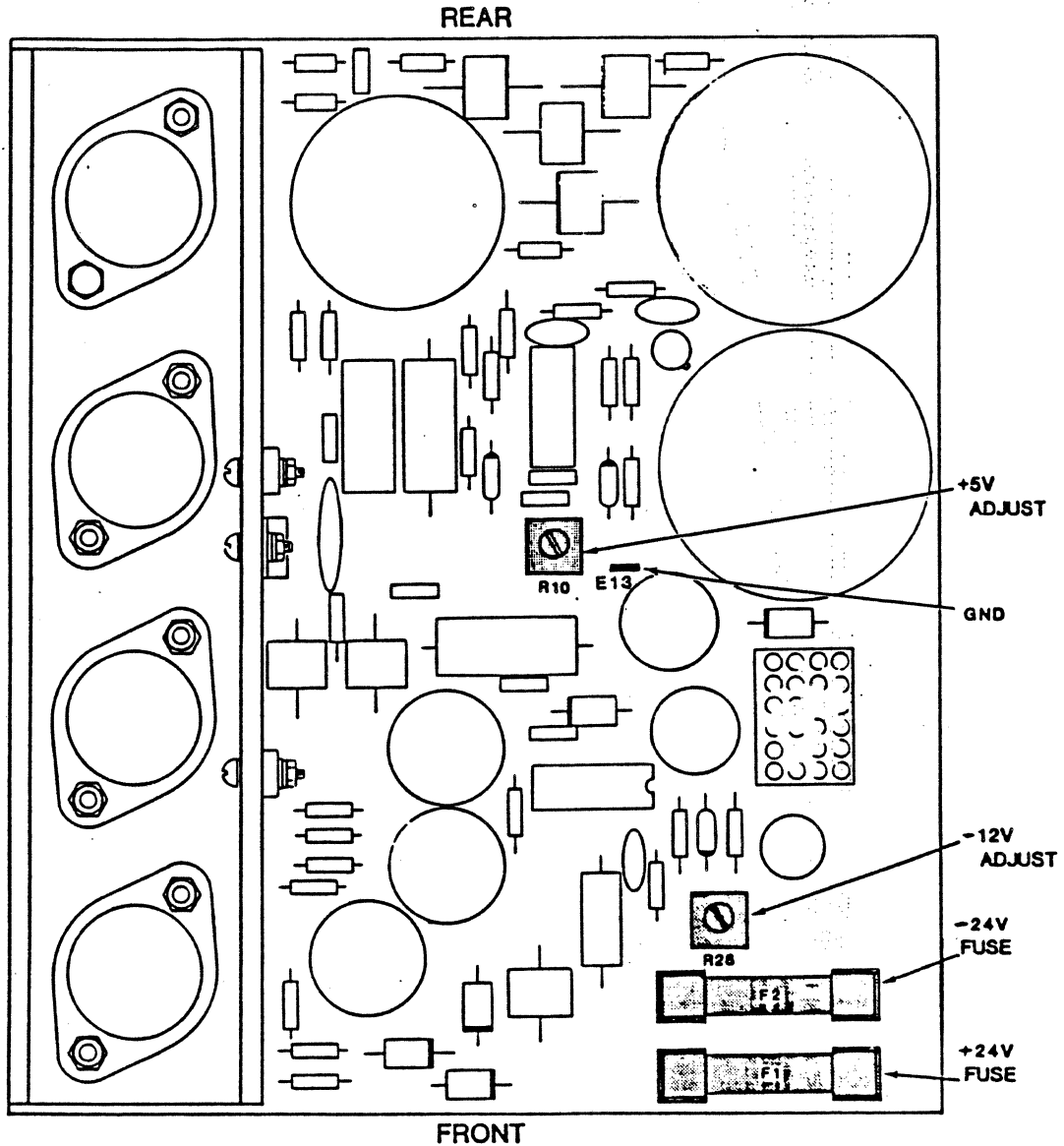
Figure 4-3. Power Supply Adjustments (2046)

6. Check drive motor speed

Once the disk drive has been sequenced up and selected, the speed of the drive motor can be checked, by checking the time between INDEX pulses. The disks should be rotating at 3600 ±4% rpm, causing the INDEX pulse interval to be approximately 16.8 milliseconds. This can be verified by an oscilloscope, or the CDS exercisers can perform the function automatically. Index pulse may be found on the SMD I/O PWB on J1 or J17, Pin 36, or IC J6, Pin 10 or 11. On the Trident I/O PWB, Index may be found on J1 or J17, Pin 6, or IC H5, Pin 4.

7. Perform a REZERO operation.

A REZERO disk drive function causes the read/write heads to be moved from the cylinder where they are currently positioned to cylinder zero and head zero is selected for the next read/write operation.

8. Sequential seeks

One of the main functions of the disk drive is the ability to move the read/write heads to specific locations for data storage and then return to those locations to retrieve the data at some later time. These are called SEEK functions and should be tested.

AC ON/OFF   AC LINE FUSES   AC LINE
SWITCH   CORD INPUT
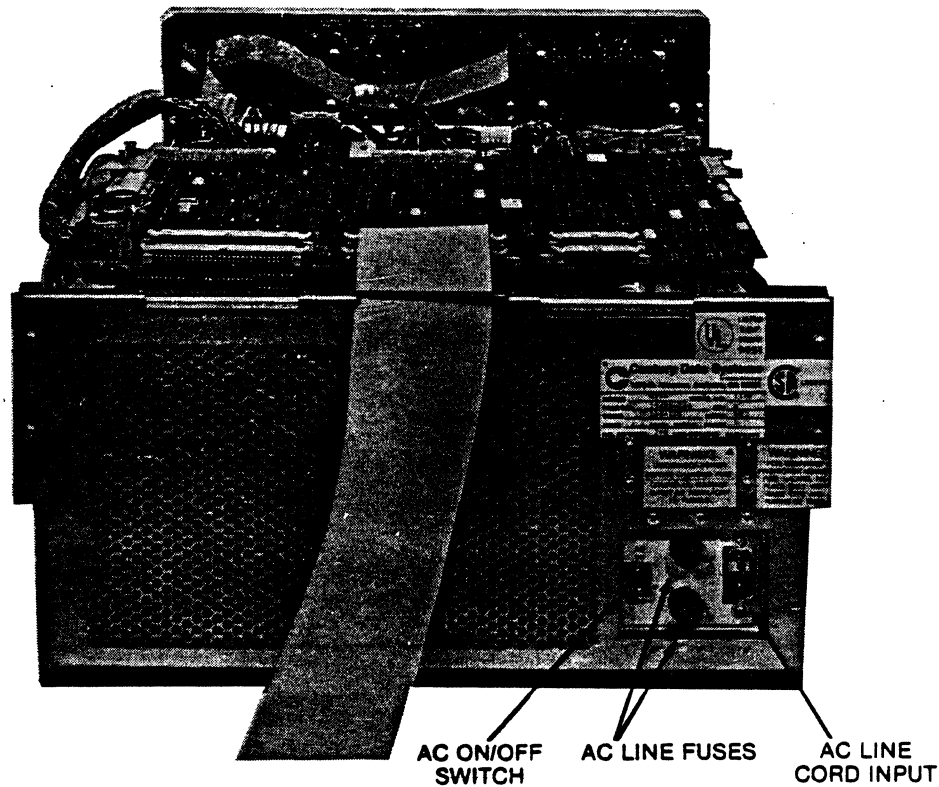
AMS-19

Figure 4-4. AC Input Assembly

a. Perform sequential seeks, forward from cylinder zero to cylinder 844. (Check setting of MAX. CYL. switch.)

b. Perform sequential seeks, reverse from cylinder 844 to cylinder zero.
The disk drive should take a maximum of 49 ±1 milliseconds to move the read/write heads in a full-stroke seek (cylinder zero to cylinder 844). This time should be checked and adjusted, if necessary. The seek timing test, using the CDS exercisers, provides a read-out in milliseconds. If timing is being checked with an oscilloscope, use interface signal ONCYLINDER.

9. Perform continuous alternate full-stroke seek operations and check seek timing as follows:

a. Pull up on the plunger-latches to release the I/O & Control PWB, lift and place PWB in the maintenance position. See Figure 4-5.

CAUTION
When placing I/O and Control PWB into the slot on the PWB holder, be sure to use the rearmost slot. As the PWB leans toward the rear, it may rest on the heat sink for A46 on the R/W PWB. A piece of insulating material must be placed between the prongs on the

heat sink and the I/O and Control PWB in order to prevent a short.

b. Synchronize the oscilloscope on seek forward (FWD at IC A15 Pin 3 on the I/O & Control-SMD PWB) and scope signal ONCYLINDER (IC D16, Pin 9). On the Trident I/O PWB, FWD is on IC C11, Pin 12 and ONCYLINDER is on IC F11, Pin 9.

c. Initiate the seek operations.

d. If ONCYLINDER does not stay in active for 49 ±1 millisecond then adjust potentiometer, R305, on the Servo Control PWB. See Figures 4-2 and 4-5.

WARNING
Any write operation will destroy any data that had previously been written on the disks.

Note
The T2005 MTC does not have read or write commands. The remaining steps of the checkout assumes other methods are being used to test the disk drive.

10. Verify the SECTOR switches are correctly set for system operation (refer to Section 5).

11. Initiate the operation to format the disk drive.

4-5

I/O CONTROL PWB

VELOCITY ADJUSTMENT POTENTIOMETER R305

SERVO CONTROL PWB
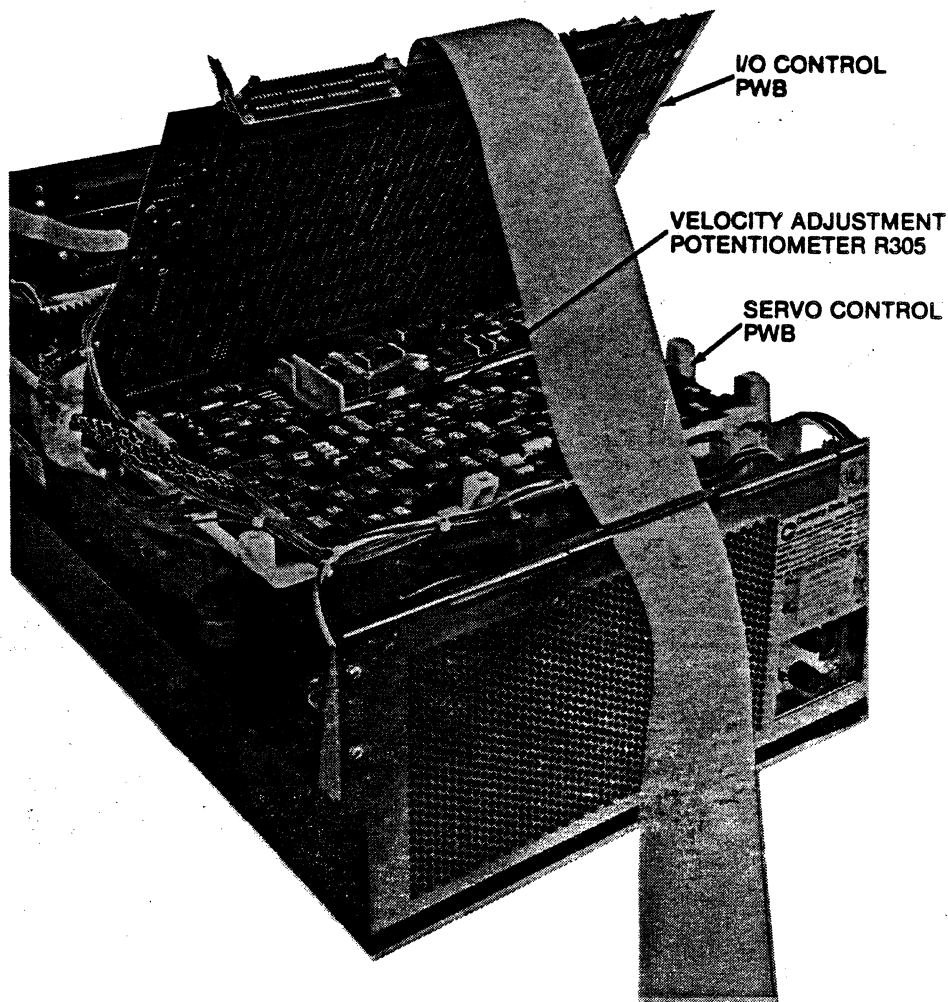
AMS-20

Figure 4-5. I/O PWB in Maintenance Position

12. Initiate continuous Random Seeks and Read operation for at least 5 minutes. Unit should run error-free (except for mapped errors).

13. Stop Random Seeks and Read operation and initiate the REZERO operation.

14. Initiate a Sequence-Down operation. After the drive motor has stopped, turn off all power to the drive.

15. Disconnect the exerciser and connect system cables, if applicable.

16. Check and verify that all switches are set for online system operation.

Note

When AMS series drives are cabled in a multiple drive configuration it is recommended that all drives are sequenced down and the AC power turned off before any bus cables are disconnected. Do not turn the power on until all bus cables are in place.

Failure to do this will not cause any hardware damage, however, it can confuse the MPU when the lines float in an undefined state as the cables are unplugged.

If it is not possible to follow this procedure at least degate all AMS drives on the bus before disconnecting the bus cables.

17. Refer to Section 2 and reinstall enclosure cover.

OPERATION

The AMS 315 Disk Drive is designed to operate online under control of the operating system with minimum interaction with an operator. Operator action is required for the following:

a. Sequencing the drive up or down, independent of the system, by using the front panel START switch.

b. Protecting the data stored on the drive by setting the front panel WRITE PROTECT switch ON.

c. Clearing a drive fault by pressing the front panel FAULT switch.

d. Degating or activating Access A or B by turning the ACCESS A or B switches OFF or ON.

ADDRESS PLUGS (SMD INTERFACE)

On the SMD interface front panel the white light, or ready light, actually contains a group of address switches that are activated when the address plug is inserted. The AMS 315 Disk Drive, when initially shipped, includes a small plastic bag containing address plugs 0, 1, 2 and 3. Address plugs 4 through 15 however are also available in kits as follows:

Plugs 0-3	CDS P/N 19566-001
Plugs 4-7	CDS P/N 19567-001
Plugs 8-15	CDS P/N 19568-001

SECTION 5
SECTOR SWITCHES

GENERAL

The sector switches are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. The actual setting of the switches, because of hardware implementation, is two bytes less than the total byte capacity.

The switches should be set using the following formula:

$$\text{Sector Switches} = \frac{\text{Track Byte Capacity } (20,160) - 2}{\text{Number of Sectors}}$$

Table 5-1 shows total byte count, switch byte count and switch settings for from 5 to 128 sectors.

TABLE 5-1. SECTOR SWITCHES SETTINGS

0 = SWITCH CLOSED   1 = SWITCH OPEN

NUMBER OF SECTORS/TRACK	TOTAL NUMBER OF BYTES/SECTOR	BYTE COUNT SET IN SWITCHES	2048 (S2-1)	1024 (S2-2)	0512 (S2-3)	0256 (S2-4)	0128 (S2-5)	0064 (S2-6)	0032 (S2-7)	0016 (S2-8)	0008 (S3-1)	0004 (S3-2)	0002 (S3-3)	0001 (S3-4)
005	4032	4030	1	1	1	1	1	0	1	1	1	1	1	0
006	3360	3358	1	1	0	1	0	0	0	1	1	1	1	0
007	2880	2878	1	0	1	1	0	0	1	1	1	1	1	0
008	2520	2518	1	0	0	1	1	1	0	1	0	1	1	0
009	2240	2238	1	0	0	0	1	0	1	1	1	1	1	0
010	2016	2014	0	1	1	1	1	1	0	1	1	1	1	0
011	1832	1830	0	1	1	1	0	0	1	0	0	1	1	0
012	1680	1678	0	1	1	0	1	0	0	0	1	1	1	0
013	1550	1548	0	1	1	0	0	0	0	0	1	1	0	0
014	1440	1438	0	1	0	1	1	0	0	1	1	1	1	0
015	1344	1342	0	1	0	1	0	0	1	1	1	1	1	0
016	1260	1258	0	1	0	0	1	1	1	0	1	0	1	0
017	1185	1183	0	1	0	0	1	0	0	1	1	1	1	1
018	1120	1118	0	1	0	0	0	1	0	1	1	1	1	0
019	1061	1059	0	1	0	0	0	0	1	0	0	0	1	1
020	1008	1006	0	0	1	1	1	1	1	0	1	1	1	0
021	0960	0958	0	0	1	1	1	0	1	1	1	1	1	0
022	0916	0914	0	0	1	1	1	0	0	1	0	0	1	0
023	0876	0874	0	0	1	1	0	1	1	0	1	0	1	0
024	0840	0838	0	0	1	1	0	1	0	0	0	1	1	0
025	0806	0804	0	0	1	1	0	0	1	0	0	1	0	0
026	0775	0773	0	0	1	1	0	0	0	0	0	1	0	1
027	0746	0744	0	0	1	0	1	1	1	0	1	0	0	0

IFS (annotation pointing to row 009)

TABLE 5-1. SECTOR SWITCHES SETTINGS (Continued)

0 = SWITCH CLOSED   **1 = SWITCH OPEN**

NUMBER OF SECTORS/TRACK	TOTAL NUMBER OF BYTES/SECTOR	BYTE COUNT SET IN SWITCHES	SECTOR SWITCHES BINARY WEIGHTS											
			2048 (S2-1)	1024 (S2-2)	0512 (S2-3)	0256 (S2-4)	0128 (S2-5)	0064 (S2-6)	0032 (S2-7)	0016 (S2-8)	0008 (S3-1)	0004 (S3-2)	0002 (S3-3)	0001 (S3-4)
028	0720	0718	0	0	1	0	1	1	0	0	1	1	1	0
029	0695	0693	0	0	1	0	1	0	1	1	0	1	0	1
030	0672	0670	0	0	1	0	1	0	0	1	1	1	1	0
031	0650	0648	0	0	1	0	1	0	0	0	1	0	0	0
032	0630	0628	0	0	1	0	0	1	1	1	0	1	0	0
033	0610	0608	0	0	1	0	0	1	1	0	0	0	0	0
034	0592	0590	0	0	1	0	0	1	0	0	1	1	1	0
035	0576	0574	0	0	1	0	0	0	1	1	1	1	1	0
036	0560	0558	0	0	1	0	0	0	1	0	1	1	1	0
037	0544	0542	0	0	1	0	0	0	0	1	1	1	1	0
038	0530	0528	0	0	1	0	0	0	0	1	0	0	0	0
039	0516	0514	0	0	1	0	0	0	0	0	0	0	1	0
040	0504	0502	0	0	0	1	1	1	1	1	0	1	1	0
041	0491	0489	0	0	0	1	1	1	1	0	1	0	0	1
042	0480	0478	0	0	0	1	1	1	0	1	1	1	1	0
043	0468	0466	0	0	0	1	1	1	0	1	0	0	1	0
044	0458	0456	0	0	0	1	1	1	0	0	1	0	0	0
045	0448	0446	0	0	0	1	1	0	1	1	1	1	1	0
046	0438	0436	0	0	0	1	1	0	1	1	0	1	0	0
047	0428	0426	0	0	0	1	1	0	1	0	1	0	1	0
048	0420	0418	0	0	0	1	1	0	1	0	0	0	1	0
049	0411	0409	0	0	0	1	1	0	0	1	1	0	0	1
050	0403	0401	0	0	0	1	1	0	0	1	0	0	0	1
051	0395	0393	0	0	0	1	1	0	0	0	1	0	0	1
052	0387	0385	0	0	0	1	1	0	0	0	0	0	0	1
053	0380	0378	0	0	0	1	0	1	1	1	1	0	1	0
054	0373	0371	0	0	0	1	0	1	1	1	0	0	1	1
055	0366	0364	0	0	0	1	0	1	1	0	1	1	0	0
056	0360	0358	0	0	0	1	0	1	1	0	0	1	1	0
057	0353	0351	0	0	0	1	0	1	0	1	1	1	1	1
058	0347	0345	0	0	0	1	0	1	0	1	1	0	0	1
059	0341	0339	0	0	0	1	0	1	0	1	0	0	1	1
060	0336	0334	0	0	0	1	0	1	0	0	1	1	1	0
061	0330	0328	0	0	0	1	0	1	0	0	1	0	0	0
062	0325	0323	0	0	0	1	0	1	0	0	0	0	1	1
063	0320	0318	0	0	0	1	0	0	1	1	1	1	1	0
064	0315	0313	0	0	0	1	0	0	1	1	1	0	0	1
065	0310	0308	0	0	0	1	0	0	1	1	0	1	0	0
066	0305	0303	0	0	0	1	0	0	1	0	1	1	1	1
067	0300	0298	0	0	0	1	0	0	1	0	1	0	1	0
068	0296	0294	0	0	0	1	0	0	1	0	0	1	1	0
069	0292	0290	0	0	0	1	0	0	1	0	0	0	1	0

TABLE 5-1. SECTOR SWITCHES SETTINGS (Continued)

0 = SWITCH CLOSED   1 = SWITCH OPEN

SECTOR SWITCHES BINARY WEIGHTS

NUMBER OF SECTORS/TRACK	TOTAL NUMBER OF BYTES/SECTOR	BYTE COUNT SET IN SWITCHES	2048 (S2-1)	1024 (S2-2)	0512 (S2-3)	0256 (S2-4)	0128 (S2-5)	0064 (S2-6)	0032 (S2-7)	0016 (S2-8)	0008 (S3-1)	0004 (S3-2)	0002 (S3-3)	0001 (S3-4)
070	0288	0286	0	0	0	1	0	0	0	1	1	1	1	0
071	0283	0281	0	0	0	1	0	0	0	1	1	0	0	1
072	0280	0278	0	0	0	1	0	0	0	1	0	1	1	0
073	0276	0274	0	0	0	1	0	0	0	1	0	0	1	0
074	0272	0270	0	0	0	1	0	0	0	0	1	1	1	0
075	0268	0266	0	0	0	1	0	0	0	0	1	0	1	0
076	0265	0263	0	0	0	1	0	0	0	0	0	1	1	1
077	0261	0259	0	0	0	1	0	0	0	0	0	0	1	1
078	0258	0256	0	0	0	1	0	0	0	0	0	0	0	0
079	0255	0253	0	0	0	0	1	1	1	1	1	1	0	1
080	0252	0250	0	0	0	0	1	1	1	1	1	0	1	0
081	0248	0246	0	0	0	0	1	1	1	1	0	1	1	0
082	0245	0243	0	0	0	0	1	1	1	1	0	0	1	1
083	0242	0240	0	0	0	0	1	1	1	1	0	0	0	0
084	0240	0238	0	0	0	0	1	1	1	0	1	1	1	0
084	0237	0235	0	0	0	0	1	1	1	0	1	0	1	1
086	0234	0232	0	0	0	0	1	1	1	0	1	0	0	0
087	0231	0229	0	0	0	0	1	1	1	0	0	1	0	1
088	0229	0227	0	0	0	0	1	1	1	0	0	0	1	1
089	0226	0224	0	0	0	0	1	1	1	0	0	0	0	0
090	0224	0222	0	0	0	0	1	1	0	1	1	1	1	0
091	0221	0219	0	0	0	0	1	1	0	1	1	0	1	1
092	0219	0217	0	0	0	0	1	1	0	1	1	0	0	1
093	0216	0214	0	0	0	0	1	1	0	1	0	1	1	0
094	0214	0212	0	0	0	0	1	1	0	1	0	1	0	0
095	0212	0210	0	0	0	0	1	1	0	1	0	0	1	0
096	0210	0208	0	0	0	0	1	1	0	1	0	0	0	0
097	0207	0205	0	0	0	0	1	1	0	0	1	1	0	1
098	0205	0203	0	0	0	0	1	1	0	0	1	0	1	1
099	0203	0201	0	0	0	0	1	1	0	0	1	0	0	1
100	0201	0199	0	0	0	0	1	1	0	0	0	1	1	1
101	0199	0197	0	0	0	0	1	1	0	0	0	1	0	1
102	0197	0195	0	0	0	0	1	1	0	0	0	0	1	1
103	0195	0193	0	0	0	0	1	1	0	0	0	0	0	1
104	0193	0191	0	0	0	0	1	0	1	1	1	1	1	1
105	0192	0190	0	0	0	0	1	0	1	1	1	1	1	0
106	0190	0188	0	0	0	0	1	0	1	1	1	1	0	0
107	0188	0186	0	0	0	0	1	0	1	1	1	0	1	0
108	0186	0184	0	0	0	0	1	0	1	1	1	0	0	0
109	0184	0182	0	0	0	0	1	0	1	1	0	1	1	0
110	0183	0181	0	0	0	0	1	0	1	1	0	1	0	1
111	0181	0179	0	0	0	0	1	0	1	1	0	0	1	1

TABLE 5-1. SECTOR SWITCHES SETTINGS (Continued)

			0 = SWITCH CLOSED				1 = SWITCH OPEN							
NUMBER OF SECTORS/TRACK	TOTAL NUMBER OF BYTES/SECTOR	BYTE COUNT SET IN SWITCHES	SECTOR SWITCHES BINARY WEIGHTS											
			2048 (S2-1)	1024 (S2-2)	0512 (S2-3)	0256 (S2-4)	0128 (S2-5)	0064 (S2-6)	0032 (S2-7)	0016 (S2-8)	0008 (S3-1)	0004 (S3-2)	0002 (S3-3)	0001 (S3-4)
112	0180	0178	0	0	0	0	1	0	1	1	0	0	1	0
113	0178	0176	0	0	0	0	1	0	1	1	0	0	0	0
114	0176	0174	0	0	0	0	1	0	1	0	1	1	1	0
115	0175	0173	0	0	0	0	1	0	1	0	1	1	0	1
116	0173	0171	0	0	0	0	1	0	1	0	1	0	1	1
117	0172	0170	0	0	0	0	1	0	1	0	1	0	1	0
118	0170	0168	0	0	0	0	1	0	1	0	1	0	0	0
119	0169	0167	0	0	0	0	1	0	1	0	0	1	1	1
120	0168	0166	0	0	0	0	1	0	1	0	0	1	1	0
121	0166	0164	0	0	0	0	1	0	1	0	0	1	0	0
122	0165	0163	0	0	0	0	1	0	1	0	0	0	1	1
123	0163	0161	0	0	0	0	1	0	1	0	0	0	0	1
124	0162	0160	0	0	0	0	1	0	1	0	0	0	0	0
125	0161	0159	0	0	0	0	1	0	0	1	1	1	1	1
126	0160	0158	0	0	0	0	1	0	0	1	1	1	1	0
127	0158	0156	0	0	0	0	1	0	0	1	1	1	0	0
128	0157	0155	0	0	0	0	1	0	0	1	1	0	1	1

SECTION 6
SYSTEM INTERFACE CABLES

GENERAL

This section contains the recommended cable requirements for both Trident and SMD interface systems.

Problems, if any, found during unit receiving inspection must be corrected before proceeding further. If any adjustments or parts replacements are required to put the disk drive online, refer to the AMS Disk Drive Technical Manual for maintenance procedures.

WARNING
This product may not be in compliance with the FCC Class A computing device requirements if operated without the use of properly shielded Radial and Bus cables.

CABLES AND CONNECTORS

Bus and radial cables of the required number and lengths to interconnect the disk drive controller and the associated AMS 315 Disk Drives are frequently fabricated on site to match the physical arrangement of the system. Actual cable requirements and fabrication instructions are given in the following paragraphs.

WARNING
Care must be used when fabricating the interface cables because the method of numbering the connector pins is different for CDS connectors and the standard ANSI SMD connectors.

The pin number designators for the ANSI SMD interface follow the designation shown below.

1	31		1	14
2	32		2	15
3	33		3	16
o	o		o	o
o	o		o	o
o	o		o	o
o	o		o	o
o	o		o	o
29	59		12	25
30	60		13	26

60 Pin Connector   *26 Pin Connector*

The Century Data Systems pin number designators follow the designation shown below.

1	2		1	2.
3	4		3	4
o	o		o	o
o	o		o	o
o	o		o	o
o	o		o	o
o	o		o	o
o	o		o	o
57	58		23	24
59	60		25	26

60 Pin Connector   *26 Pin Connector*

The AMS 315 Disk Drive with the SMD interface uses a balanced differential interface for both bused and radial line cables. The bused signal cable lines must be terminated at the last drive in the drive bank; the radial cable lines are terminated internally in the drive itself.

Bused Signal Cables (Standard)

Bused signal cables are needed to reach from the controller Busout connector to the Busin connector of Drive A, from the Busout connector of Drive A to the Busin connector of Drive B, etc. The number of bused signal cables required is the same as the number of disk drives in the system. The combined (total) length of these cables must not exceed 100 feet.

Each SMD signal cable is fabricated from 30 pairs of 100-ohm (nominal), twisted pair, flat cable. Wire side should be 28 AWG seven-strand, rated at 300v rms. The Trident Bus cable is essentially the same except only 20 pairs are required.

Standard signal cables using the twisted-pair flat cables provide mass termination without stripping the cable. It should be noted that this type cable must be jacketed for above-floor installations in order to comply with UL requirements. A UL approved radial cable that does not require jacketing is available.

The twisted pair lines are connected point to point between two terminal end connectors. All terminal end

connectors for bused signal cables (except the one that mates with the Controller Busout connector) should be Connector Block P/N 95363-XXX (XXX equals number of pins). See Tables 6-1 and 6-2 for pin number assignments. The last drive in the drive bank must also be terminated with Signal Cable Terminator. (Refer to Table 3-1.)

Termination for all lines except the Open Cable Detector and Power Sequence (SMD only) lines must be provided at the controller end of the signal cable.

Radial Data Cables (Standard)

Radial Data Cables make direct, two-way contact between each disk drive and the controller. The number of radial data cables required is the same as the number of disk drives in the system. The length of any one radial data cable must not exceed 50 feet.

Each SMD radial cable is fabricated from 13 pairs of 130-ohm (nominal), flat ribbon cable that incorporates a ground plane and drain wire. (Trident interface uses 20 pairs.) Wire size should be 28 AWG seven-strand, rated at 300v rms. For above-floor cabling, AMP Part No. 1-86479-0 cable or Ansley Part No. 174-26 cable should be used to meet UL requirements.

Proper termination for all lines in the radial cable has been provided for within the disk drive. On the controller end of the cable, correct termination must be supplied by the user. The mating cable connector at the drive end of the cable should be CDS Connector Block 95363-XXX or equivalent.

TABLE 6-1. BUS CABLE CONNECTOR AND PINS—SMD INTERFACE (A CABLE)

CDS Pin Assignment		ANSI Pin Assignment			
Active Low	Active High	Active Low	Active High	Signal Name	Source
43	44	22	52	UNIT SELECT TAG	CONTROLLER
1	2	1	31	TAG 1 (SET CYLINDER)	CONTROLLER
3	4	2	32	TAG 2 (SETHDTAG)	CONTROLLER
5	6	3	33	TAG 3 (CONTROL TAG)	CONTROLLER
7	8	4	34	BUS BIT 0	CONTROLLER
9	10	5	35	BUS BIT 1	CONTROLLER
11	12	6	36	BUS BIT 2	CONTROLLER
13	14	7	37	BUS BIT 3	CONTROLLER
15	16	8	38	BUS BIT 4	CONTROLLER
17	18	9	39	BUS BIT 5	CONTROLLER
19	20	10	40	BUS BIT 6	CONTROLLER
21	22	11	41	BUS BIT 7	CONTROLLER
23	24	12	42	BUS BIT 8	CONTROLLER
25	26	13	43	BUS BIT 9	CONTROLLER
45	46	23	53	UNIT SELECT 1	CONTROLLER
47	48	24	54	UNIT SELECT 2	CONTROLLER
51	52	26	56	UNIT SELECT 4	CONTROLLER
53	54	27	57	UNIT SELECT 8	CONTROLLER
35	36	18	48	INDEX	DRIVE
49	50	25	55	SECTOR	DRIVE
29	30	15	45	FAULT	DRIVE
31	32	16	46	SEEK ERROR	DRIVE
33	34	17	47	ON CYLINDER	DRIVE
27	28	14	44	OPEN CABLE DETECTOR	CONTROLLER
37	38	19	49	UNIT READY	DRIVE
39	40	20	50	ADDRESS MARK FOUND	DRIVE
55	56	28	58	WRITE PROTECTED	DRIVE
	57		29	POWER SEQUENCE PICK	CONTROLLER
	58		59	POWER SEQUENCE HOLD	CONTROLLER
59	60	30	60	GROUND	
41	42	21	51	BUSY	DRIVE

TABLE 6-2. BUS CABLE CONNECTOR PIN ASSIGNMENTS—TRIDENT INTERFACE

Pin	Signal Name
1	Sector
2	End of Cylinder
3	Address Mark Detected
4	Offset
*5	Terminator +5V
6	Index
*7	Terminator +5V
8	Ready
9	Ground
10	Read Only
11	Ground
12	Device Check
13	Ground
14	On Line
15	Ground
16	Seek Incomplete
17	Ground
18	—Not Used—
19	Ground
20	Bus 0
21	Ground

Pin	Signal Name
22	Bus 1
23	Ground
24	Bus 2
25	Ground
26	Bus 3
27	Ground
28	Bus 4
29	Ground
30	Bus 5
31	Ground
32	Bus 6
33	Ground
34	Bus 7
35	Terminator IN
36	Bus 8
37	Control Tag
38	Bus 9
39	Set Cylinder Tag
40	Set Head Tag
*Signal OUT connector only	

Refer to Tables 6-3 and 6-4 for radial cable connector pin assignments.

CABLE PART NUMBERS

Table 6-5 shows the cable part numbers that are manufactured by CDS.

TABLE 6-3. RADIAL CABLE CONNECTOR AND PINS—SMD INTERFACE (B CABLE)

CDS Pin Number		ANSI Pin Assignment			
Active Low	Active High	Active Low	Active High	Signal Name	Source
15	14	8	20	WRITE DATA	CONTROLLER
3	2	2	14	SERVO CLOCK	DRIVE
5	6	3	16	READ DATA	DRIVE
9	8	5	17	READ CLOCK	DRIVE
11	12	6	19	WRITE CLOCK	CONTROLLER
19	20	10	23	SEEK END	DRIVE
18	17	22	9	UNIT SELECTED	DRIVE
23	22	12	24	INDEX	DRIVE
25	26	13	26	SECTOR	DRIVE
	1		7	GROUND	
	4		18	GROUND	
	7		1	GROUND	
	10		15	GROUND	
	13		4	GROUND	
	16		21	GROUND	
	21		11	GROUND	
	24		25	GROUND	

6-3

TABLE 6-4. RADIAL CABLE PIN NUMBERS— TRIDENT INTERFACE

Signal Pin	Signal Function
01	Ground
02	Ground
03	Ground
04	Request
05	Ground
06	Request (From other C.U.)
07	Ground
08	—Not Used—
09	Ground
10	—Not Used—
11	Ground
12	—Not Used—
13	Ground
14	—Not Used—
15	Ground
16	—Not Used—
17	Ground
18	—Not Used—
19	Not Available
20	Not Available
21	Terminator +5V
22	Terminator +5V
23	Ground
24	Composite Sector/Index
25	Ground
26	Attention
27	Ground
28	Module Selected
29	Ground
30	Sequence
31	Ground
32	Module Select
33	Ground
34	Read/Write Data (P)
35	Ground
36	Read/Write Data (M)
37	Ground
38	Read/Write Clock (P)
39	Ground
40	Read/Write Clock (M)

TABLE 6-5. CDS CABLE PART NUMBERS

Interface	Bus Cable	Radial Cable
Trident Interface	19839-XXX	19840-XXX
	19841-XXX Drive to Drive	
SMD Interface	26522-XXX	21565-XXX
XXX = Length of cable in feet		

TRIDENT INTERFACE CONNECTOR ADAPTERS

When attempting to insert some (older) Trident cables into the Trident I/O PWB (25991) connectors, the paddle board may not fit through the openings. Therefore, an adapter is required to plug in these bus and radial cables. This adapter (26877-001 and -002) should be supplied when the drive is shipped. This adapter is required because of physical interference from the paddle board on the end of the Trident cables. Most newer Trident cables will fit without these adapters.

SECTION 7
ACCESSORIES

GENERAL

This section contains a complete listing of the AMS Disk Drive accessories available from CDS.

KITS

Some of the accessories are sold only as kits that are packaged disassembld and must be assembled at the user's site.

Kits presently available are:

Slide Kit, 2 High/3 High Cabinet	P/N (TBS)
Cabinet Mounting, Slide (TRU-GUIDE)	P/N 24631-003
Cabinet Mounting, Rack	P/N 24631-004
Cabinet Mounting, Slide (ACCURIDE) with J-Bar	P/N 27370-001
Cabinet Mounting, slide (ACCURIDE) without J-Bar	P/N 27370-003
Cabinet Mounting, J-Bar	P/N 27370-002
Lens Cap Kit, 0-3	P/N 19566-001
Lens Cap Kit, 4-7	P/N 19567-002
Lens Cap Kit, 8-15	P/N 19568-003

CABLES

Cable assemblies available from CDS are:

Cable Assy, Buss, Controller to Disk Drive	P/N 26522-XXX
Cable Assy, Radial, Drive	P/N 21565-XXX
Cable Assy, Ground	P/N 20960-XXX

XXX = length in feet (-015 = 15 feet long)

TERMINATOR

Board Assy, Terminator-SMD Interface	P/N 25790-001

ORDERING INFORMATION

Delivery time for special accessories (such as cabinets) should be arranged through your contracts adminis-trator. Normal delivery on most disk drive accessories is 60-90 days after receipt of purchase order. Contact your contracts administrator for current delivery times and prices.

Order Procedure

Before ordering: check the part number and description as shown in this section to be sure you have copied them correctly. Disk drive special tools and exercisers are not listed in this section but are offered for sale. Contact CDS for prices and availability.

CABINET MOUNTING

There are two styles of slide kits available suitable for mounting an AMS Disk Drive in a RETMA cabinet. Use the installation procedure for the slide kit you received.

Slide Mount Kit (TRUE-GUIDE) Installation

To assemble the slide mount kit and install a AMS Disk Drive in a cabinet, proceed as follows:

1. Lay out kit parts and check against Table 7-1.

TABLE 7-1. TRU-GUIDE SLIDE KIT

Item	Qty	Part Number	Description
1	1	24628-001	SLIDE, L.H.
2	1	24628-002	SLIDE, R.H.
3	2	24632-052	TRIM ASSY, RETMA
4	4	24628-003	NUT BAR
5	2	90484-031	SCREW, 6-32 FT. HD. 82 C'SINK
6	2	90488-004	WASHER, FLAT, ROUND
7	2	90489-003	WASHER, SPLIT, LOCK
8	2	90487-004	NUT, PLAIN, HEX
9	8	24661-408	SCREW, 10-32 × ½ IN
10	8	10489-005	LOCK WASHER
11	1	24911-001	LABEL, CAUTION

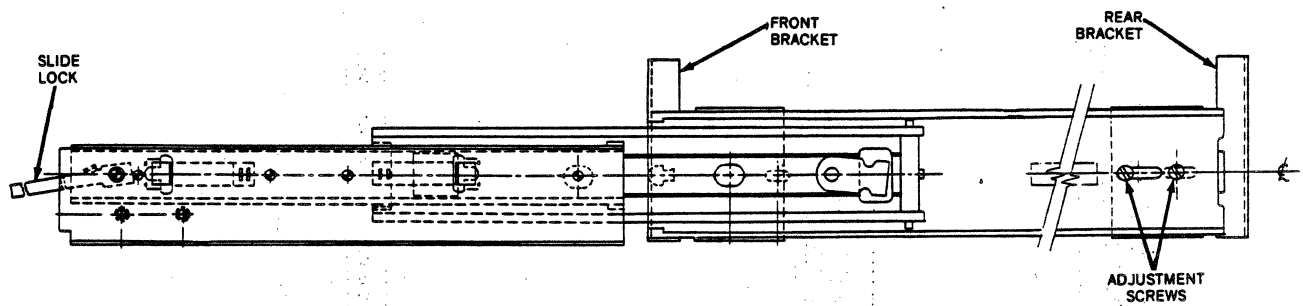2. Loosen the two adjustment screws holding the back mounting bracket to each slide. See Figure 7-1.

SLIDE LOCK

FRONT BRACKET

REAR BRACKET

ADJUSTMENT SCREWS

Figure 7-1. TRU-GUIDE Slide, P/N 24628-001

3. Loosely mount the left front NUT BAR (4) at the desired height. See Figure 7-2.

29.50 REF

RETMA RAIL REF

4 NUT BAR

8.75 x 19.00 OPENING
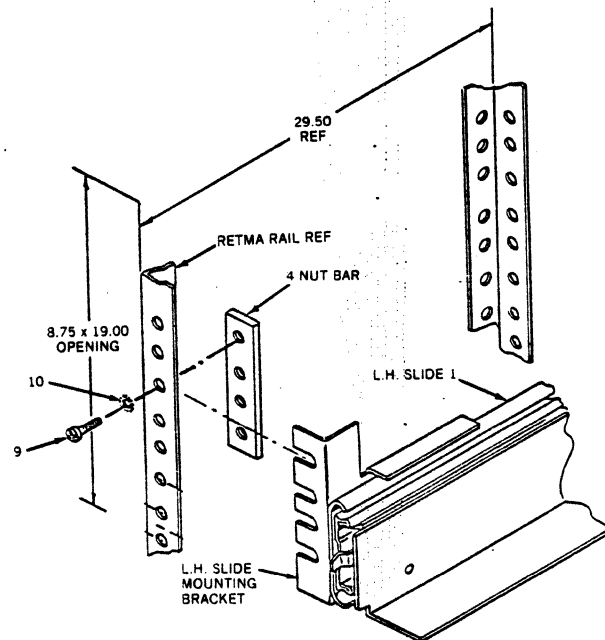
10

9

L.H. SLIDE 1

L.H. SLIDE MOUNTING BRACKET

Figure 7-2. TRU-GUIDE Slide and Nut Bar Mounting

4. Place left slide (1) front mounting bracket between the RETMA Rail and the NUT BAR (4).

5. Tighten mounting screws (9) (use two).

6. Push rear mounting bracket up against rear RETMA Rail and secure using screws (9) and NUT BAR (4).

7. Tighten the two adjustment screws on the slide.

8. Mount the right slide (2) in the same manner, insuring that both slides are at the same height.

9. With both slides mounted in cabinet, extend slides.

10. Remove disk drive enclosure top.

11. Set disk drive enclosure (with disk drive) onto extended slides.

12. Push disk drive enclosure and slides halfway into cabinet so enclosure is supported firmly.

13. Screw enclosure (both front corners) to slides. See Figure 7-3.

5

L.H. SLIDE

DISK DRIVE REF

6
7
8
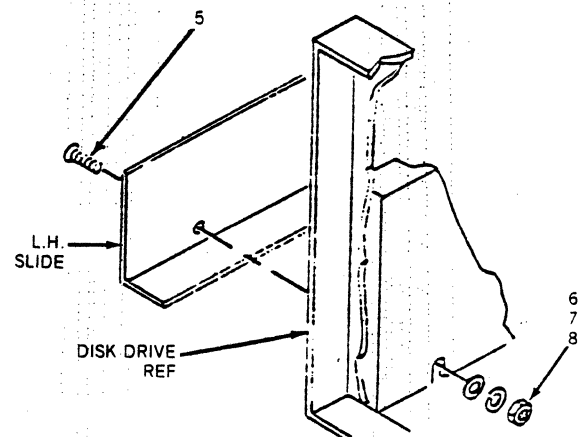
Figure 7-3. Enclosure Mounting

14. Mount Trip Strip (3) and CAUTION label (11) as shown in Figure 7-4.

Rack Mount Kit Installation

To assemble the rack mount kit and install a AMS Disk Drive in a cabinet, proceed as follows:

1. Lay out parts and check against Table 7-2.

2. Mount rear adapter, L.H. (3) to back RETMA Rail (left side) at the desired height. See Figure 7-5.

3. Mount Rear Adapter, R.H. (4) to back RETMA Rail (right side) at the same height as the left adapter.
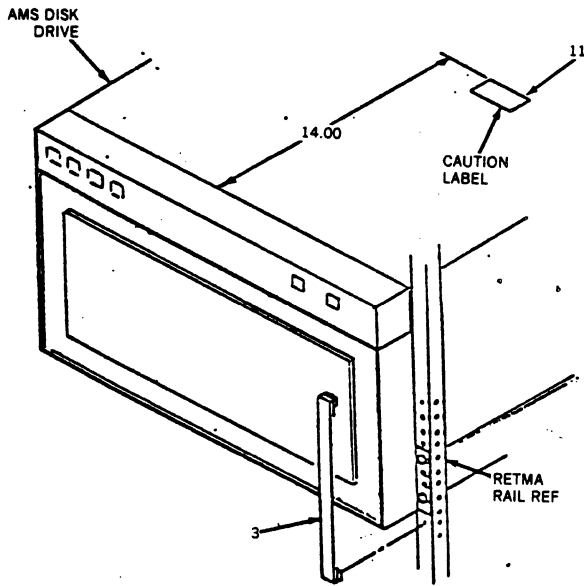
Figure 7-4. Trim Strip and CAUTION Label Installation

TABLE 7-2. CABINET MOUNTING KIT, RACK

Item	Qty	Part Number	Description
1	2	24632-052	TRIM ASSY, RETMA
2	2	25072-001	PLATE, MOUNTING
3	1	25073-001	ADAPTER, REAR L.H.
4	1	25073-002	ADAPTER, REAR R.H.
5	1	25071-001	RAIL, ENCLOSURE SUPPORT, L.H.
6	1	25071-002	RAIL, ENCLOSURE SUPPORT, R.H.
7	12	24661-408	SCREW, MACH, PHILLIPS HD. 10-32
8	8	90487-006	NUT, PLAIN, HEX
9	20	90488-006	WASHER, FLAT, ROUND
10	12	90489-005	WASHER, SPLIT, LOCK
11	8	24661-308	SCREW, MACH, PHILLIPS HEAD
12	12	90488-005	WASHER, FLAT, ROUND
13	8	90489-004	WASHER, SPLIT, LOCK
14	4	90487-005	NUT, PLAIN, HEX
15	1	24911-001	LABEL, CAUTION

4. Loosely attach left Support Rail (5) to Rear Adapter (3). Refer to Figure 7-5.

5. Attach front of Support Rail to RETMA Rail insuring the Support Rail is level.

6. Tighten all screws.

7. Mount the right Support Rail (6) in the same manner.

Figure 7-5. Rear Adapter Installation

8. Attach mounting plates (2) to each side of the disk drive enclosure (front) as shown in Figure 7-6.
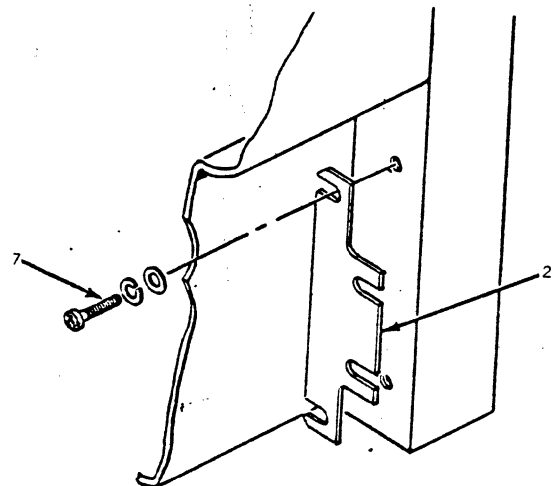
Figure 7-6. Mounting Plate Installation

9. Carefully slide disk drive enclosure into cabinet (on support rails) and attach Mounting Plates (2) to front RETMA Rails. See Figure 7-7.

10. Attach magnetized Trim Strip and CAUTION label (15).

J-Bar Kit Installation

The J-Bar Kit should be used whenever a AMS Disk Drive is to be cabinet mounted using the ACCURIDE slides. To install the J-Bars, proceed as follows:

1. Lay out parts and check against Table 7-3.

Figure 7-7. Disk Drive Enclosure Installation

TABLE 7-3. J-BAR KIT

Item	Qty	Part Number	Description
1	1	27208-001	J-BAR L.H.
2	1	27208-002	J-BAR R.H.
3	2	27210-001	NUT BAR
4	2	27211-001	SPACER
5	2	27209-001	LOCK, SLIDE
6	2	27236-001	PLATE, MTG
7	2	27236-002	PLATE, MTG
8	2	90487-005	NUT, PLAIN, HEX 8-32
9	4	90489-004	WASHER, LOCK, SPLIT #8
10	2	90799-009	SET SCREW, SOCKET, HEX TYPE 4-40 × 1/2 LG
11	2	24661-408	SCREW, MACH, PHILLIPS PAN HD 10-32 × 1/2 LG
12	2	14907-010	WASHER, LOCK, EXT TOOTH
13	2	90488-006	WASHER, FLAT, ROUND
14	2	24661-306	SCREW, MACH, PHILLIPS PAN HD 8-32 × 3/8 LG
15	4	90488-005	WASHER, FLAT, ROUND #8
16	2	96619-314	SCREW, MACH, FLT; 100% CSNK PHILLIPS #6

2. Mount a Slide Lock (5) on each J-Bar (1), as shown in Figure 7-8. Note—Slide Lock may already be mounted.

3. Place screw (16) and spacer (4) on left J-Bar (1) as shown in Figure 7-8.
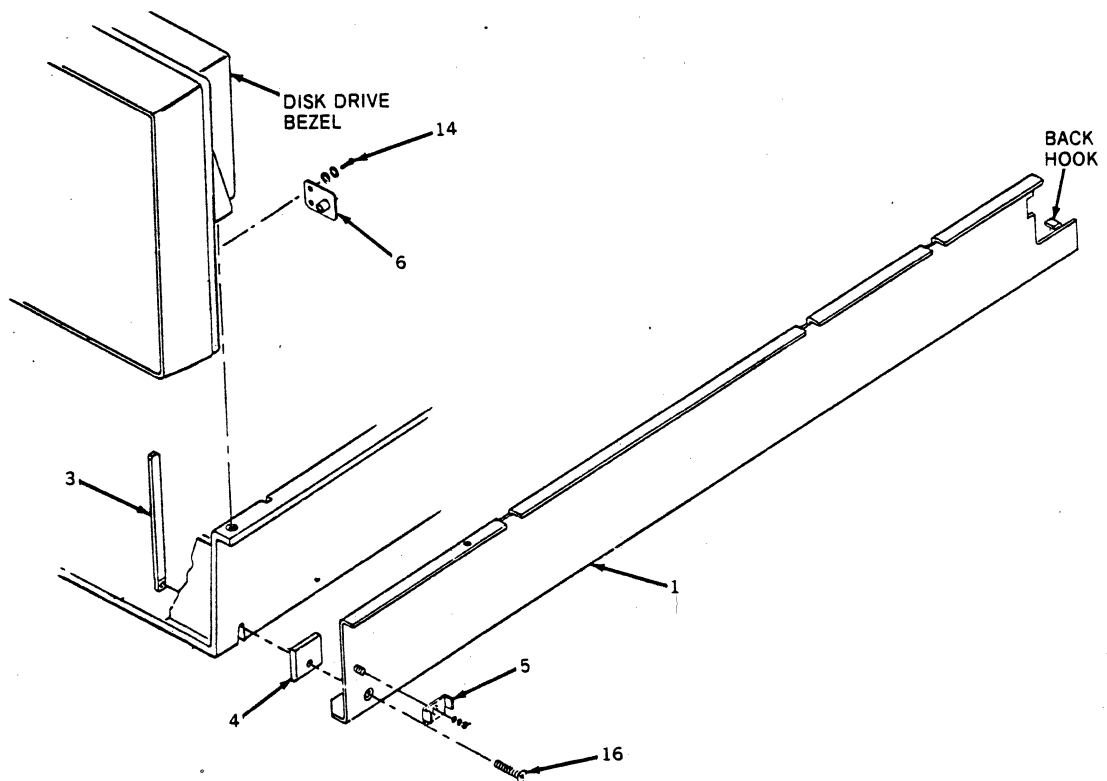
Figure 7-8. Slide Lock/J-Bar Assembly

4. Place Back Hook of left J-Bar (refer to Figure 7-8) in slot on back of disk drive enclosure. See Figure 7-9.
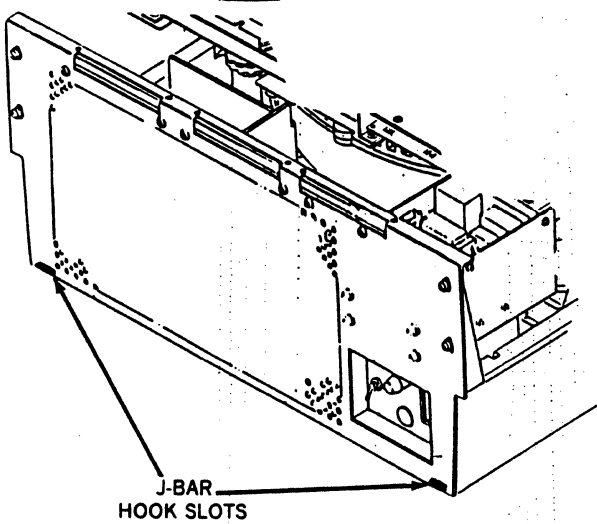
Figure 7-9. Disk Drive Back Hook Slots

5. Screw (16) (with spacer) goes through hole in front corner of disk drive enclosure and screws into a Nut Bar (3). Refer to Figure 7-8.

6. Install mounting plates (6), (7) as shown in Figure 7-8 if required to lock disk drive in place.

7. Mount the right J-Bar (2) in the same manner.

Slide Mount Kit (ACCURIDE) Installation

To assemble the slide mount kit and install a AMS Disk Drive in a cabinet, proceed as follows:

1. Lay out parts and check against Table 7-4.

2. Loosen the two adjustment screws holding the back mounting bracket to each slide. See Figure 7-10.

3. Loosely mount the left front NUT BAR (3) at the desired height. See Figure 7-11.

4. Place left slide front mounting bracket between the RETMA Rail and the NUT BAR (3).

TABLE 7-4. ACCURIDE SLIDE KIT

Item	Qty	Part Number	Description
1	1	27310-001	SLIDE, DOUBLE BAR (LEFT)
2	1	27310-002	SLIDE, DOUBLE BAR (RIGHT)
3	4	27310-003	NUT BAR
4	8	24661-408	SCREW, MACH, PHILLIPS PAN HD 10-32 × 1/2 LG
5	8	14907-010	WASHER, LOCK, EXT TOOTH
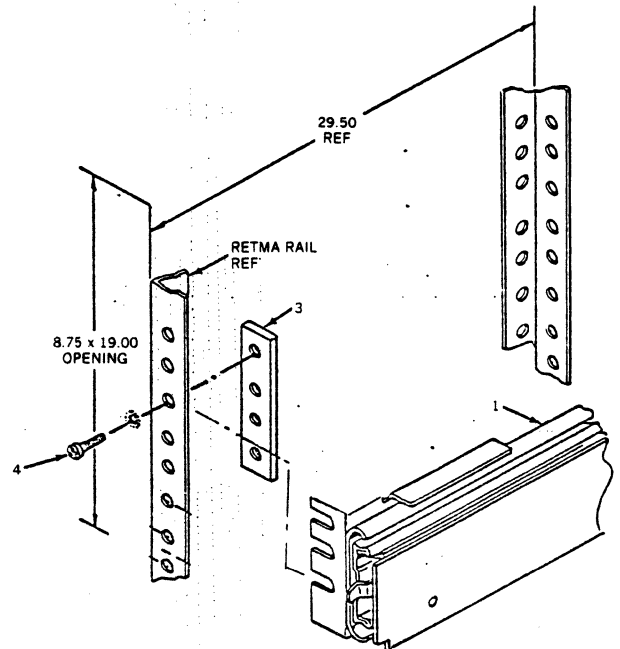
Figure 7-11. ACCURIDE Slide Mounting

5. Tighten mounting bolts (4) (use two).

6. Push rear mounting bracket up against rear RETMA Rail and secure using another NUT BAR (3).

7. Tighten the two adjustment screws on the slide.

Figure 7-10. ACCURIDE Slide

8. Mount the right slide in the same manner, insuring that both slides are at the same height.

9. With both slides mounted in cabinet, fully extend slides.

10. Loosen the Slide Lock on each J-Bar.

11. Keeping the front of the disk drive enclosure slightly higher than the back, slide enclosure onto the slides and push back until the J-Bars are under the J-Bar Hold-Down bar. Lower front of enclosure.

12. Push each J-Bar Slide Lock up against the slide and tighten the nut.

AMS DISK DRIVE CABINETS (see Figure 7-12)

Century Data Systems provides two cabinets for the AMS Disk Drive, a two-high cabinet, CDS part number 26367-002 and a three-high cabinet, CDS part number 26367-001. The two-high cabinet for the AMS Disk Drive allows 1180.4 megabytes of storage capacity and the three-high cabinet permits 1770.6 megabytes storage capacity.

The cabinets are designed for shipment to customers with disk drives installed, however, customers may order either cabinet without disk drives. If less than a full number of disk drives will be present in a cabinet, blank front panels (CDS P/N 26553-051) are available to main-tain the aesthetic appearance of the cabinet. Counter balances are provided in the bottom rear of the cabinet so that a disk drive may be installed in any cabinet drawer. Cabinets without disk drives are shipped completely assembled with slide mounts and cabling as specified by the customer. Installed disk drives may be extended fully to the front of the cabinet to enable easy access to the disk drive for maintenance. The cabinets contain interlocks that allow only one disk drive drawer at a time to be extended. Each cabinet has four casters for ease of installation. The two-high cabinet is 25.6 inches high (Figure 7-13) allowing it to fit under most standard desks. The three-high cabinet is 36.2 inches high. Cabinet colors are CDS standard clean blue and grey. Optional colors for cabinet enclosures are available. Contact your contracts administrator at Century Data Systems.

Operating Requirements

Power Requirements: Power is supplied to each disk drive in the cabinet using the drives' standard power cords (15 feet long) which pass through the rear of the cabinet to the AC outlet. Check that AC outlets are located near the machine and are easily accessible.

Cabling: The enclosure includes all necessary cabling to properly interconnect its contained complement of drives. Accessory cables are available for drives not present.
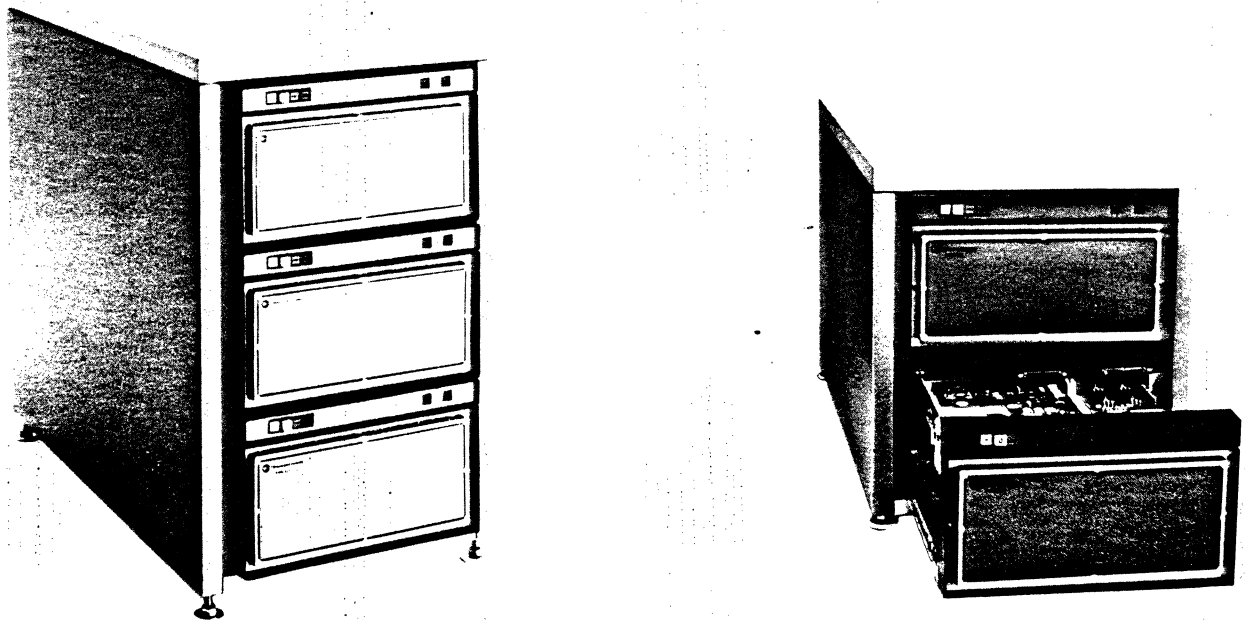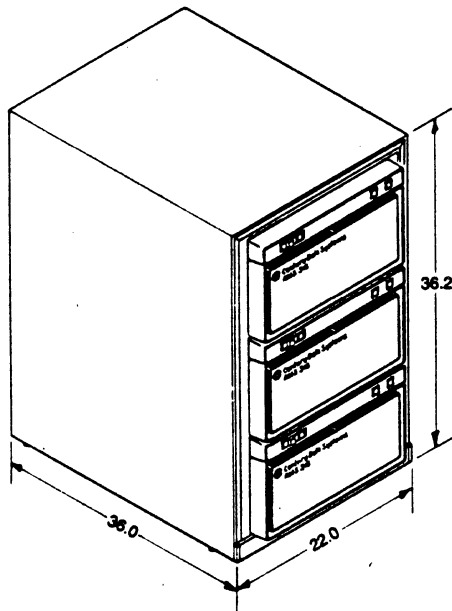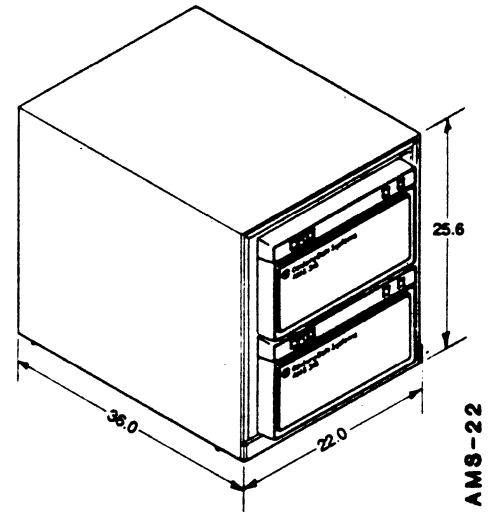

Figure 7-12. Two-High and Three-High Cabinets

THREE-HIGH

Height	36.2 inches (91.9cm)
Width	22.0 inches (55.9cm)
Depth	36.0 inches (91.4cm)
Weight	393 pounds (without Disk Drives)
	Add 115 pounds for each Disk Drive installed.

TWO-HIGH

Height	26.5 inches (65.0cm)
Width	22.0 inches (55.9cm)
Depth	36.0 inches (91.4cm)
Weight	275 pounds

Figure 7-13. Cabinet Physical Dimensions

Signal cables terminate on the back plane of the enclosure with connectors, and allow the OEM to connect either round or flat cable interfaces. Both cabinets include standard SMD interface connections.

Table 7-5 shows a list of cables required for the cabinets. Cables must be ordered in accordance with user disk drive requirements.

Cabinet Disk Drive Installation

The following instructions are included for users who purchase cabinets without disk drives installed by CDS and must install the disk drives at the user site.

Unpacking (see Figure 7-14)

The AMS Disk Drive cabinet (two-high and three-high) are packaged for shipment in a plywood shipping container attached to a wood pallet.

If the exterior condition of the shipping container indicates the likelihood of interior damage to the cabinet, unpacking should be carried out in the presence of the carrier or his agent, where possible. In any case, cabinets should be unpacked and checked for shipping damage as soon as received.

TABLE 7-5. CABINET CABLES

Part Number	Description	Interface	Qty
20960-XXX	Cable Assy, Ground	Both	*
26540-XXX	Cable Assy, I/O Buss	SMD	*
26371-XXX	Cable Assy, I/O Buss (Round Cable)	SMD	*
26533-XXX	Cable Assy, I/O Radial	Both	*
26372-XXX	Cable Assy, I/O Radial (Round Cable)	SMD	*
26373-XXX	Cable Assy, Buss Interconnect	SMD	*
27003-XXX	Cable Assy, I/O Buss (40 Pin)	Trident	*
27005-XXX	Cable Assy, Buss Interconnect (40 Pin)	Trident	*

*Cable quantity is determined by number of disk drives installed.
XXX = Cable length—Interface must be specified.

The following procedure is based upon current packing methods. After inspecting the exterior of the shipping container for obvious shipping damage, proceed as follows:
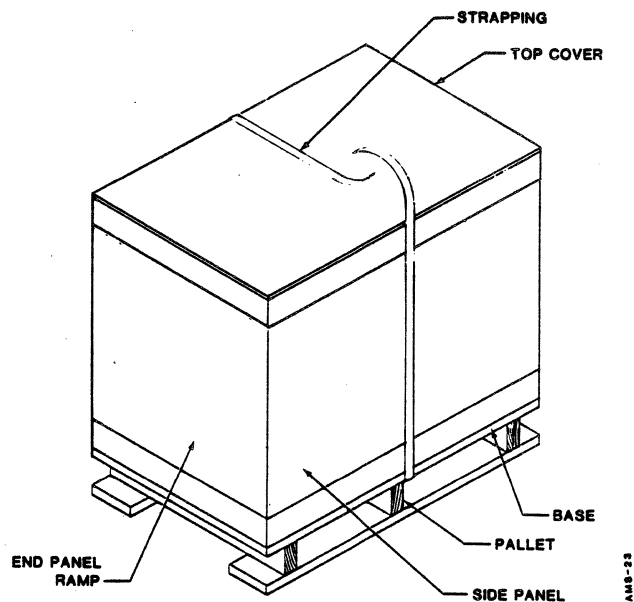
7-7

Figure 7-14. Cabinet Shipping Container

Figure 7-15. Cabinet Shipping Container with Ramp in Unloading Position

CAUTION

The shipping weight of the cabinet without disk drives installed is approximately 393 pounds. If disk drives are shipped with the cabinet, add 115 pounds for each disk drive.

1. Move the shipping container to a suitable work area. Cut and remove the strapping around the container.

2. Remove the top cover of the shipping container by lifting straight up.

Note

The top cover, base and all side panels are tongue and grooved to install together. If the shipping container is to be saved for possible reshipment, use care not to damage the container edges.

3. Refer to Figure 7-15 and use one end panel as a ramp to remove the cabinet from the container base and pallet. The ramp wedges and spacer board are stored under the cabinet assembly.

4. Raise the cabinet leveling jacks to seat cabinet casters on base of the container.

5. Remove all foam pads and with help (two persons) remove the cabinet from shipping container by rolling down ramp.
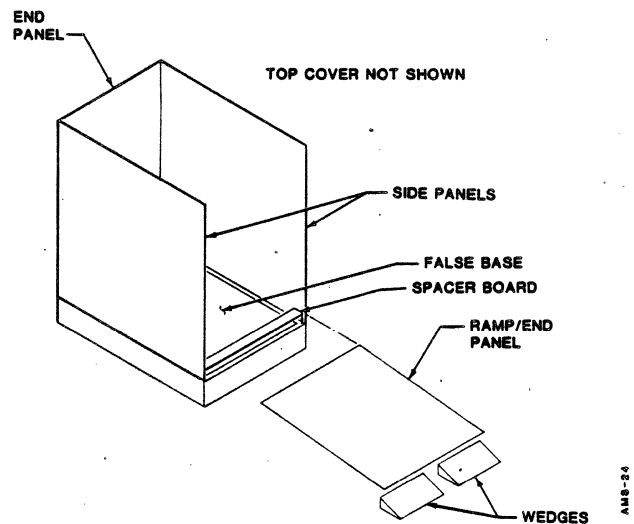
6. Inspect the cabinet to insure that no shipping damage has occurred and that all sides are present in each drawer.

Note

Some cabinets are shipped with all cabling installed if so ordered by customer, also the cabinet may contain false panels if ordered. Check that your cabinet order is correct and complete.

7. Roll the cabinet to the area where the disk drives will be installed in the cabinet.

8. Remove the cabinet rear panel. Check the shipping lock slider. The slider should be in the down position, locking all drawers in the closed position.

9. Remove the slider locking screw (about midway) from the lower threaded hole, raise the locking slider and install the locking screw in the upper threaded hole, freeing all drawers to slide forward one at a time.

10. If cables are not installed in the cabinet, but were purchased separately, route the cables onto the cabinet support tray as shown in Figure 7-16 or Figure 7-17. Install cable clamps as shown.

Note

Fold cables as shown in Figures 7-16 or 7-17 to provide a neat cable configuration between the cable support tray, clamps and connector panels.
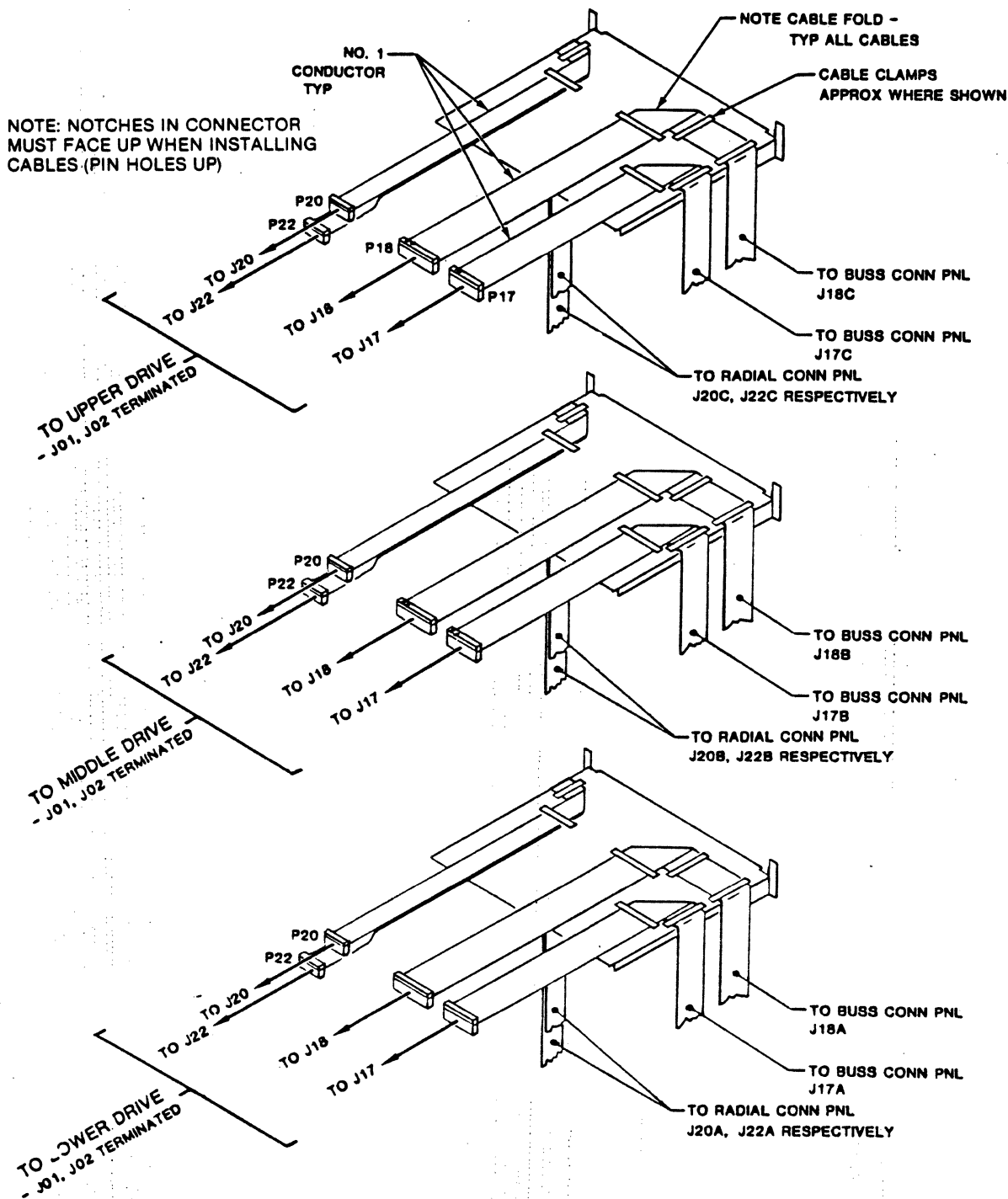
Figure 7-16. Star Cable System

NOTE: NOTCHES IN CONNECTOR MUST FACE UP WHEN INSTALLING CABLES (PIN HOLES UP)
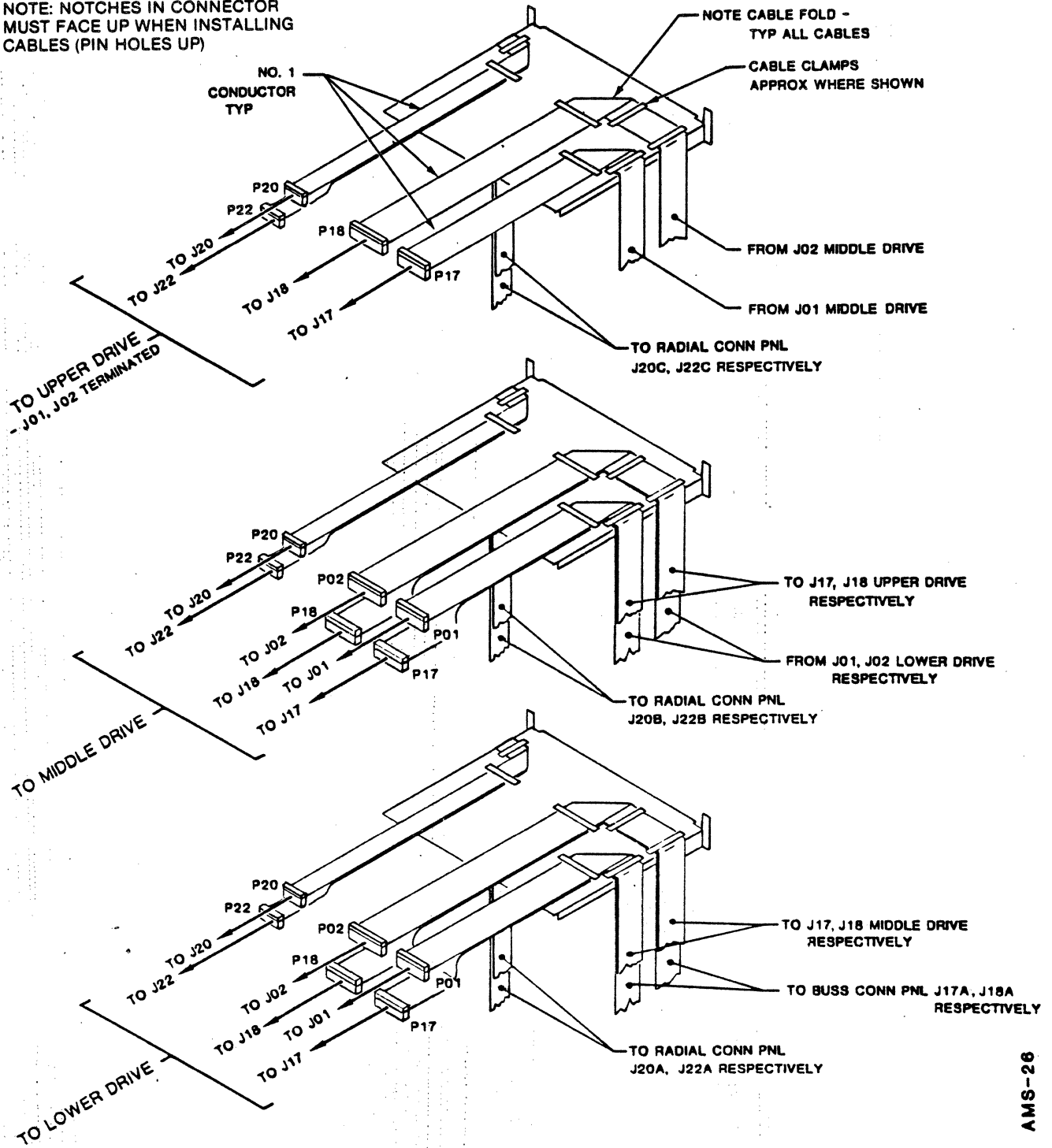
NO. 1 CONDUCTOR TYP

NOTE CABLE FOLD – TYP ALL CABLES

CABLE CLAMPS APPROX WHERE SHOWN

FROM J02 MIDDLE DRIVE

FROM J01 MIDDLE DRIVE

TO RADIAL CONN PNL J20C, J22C RESPECTIVELY

TO J17, J18 UPPER DRIVE RESPECTIVELY

FROM J01, J02 LOWER DRIVE RESPECTIVELY

TO RADIAL CONN PNL J20B, J22B RESPECTIVELY

TO J17, J18 MIDDLE DRIVE RESPECTIVELY

TO BUSS CONN PNL J17A, J18A RESPECTIVELY

TO RADIAL CONN PNL J20A, J22A RESPECTIVELY

P20 P22 P18 P17

TO J20 TO J22 TO J18 TO J17

TO UPPER DRIVE J01, J02 TERMINATED

TO MIDDLE DRIVE

TO LOWER DRIVE

P20 P22 P02 P18 P01 P17

TO J20 TO J22 TO J02 TO J18 TO J01 TO J17

AMS-26

Figure 7-17. Daisy Chain Cable System

7-10

DISK DRIVE INSTALLATION

1. Refer to Section 2 and remove disk drive cover (6 screws), also remove rubber feet from bottom of disk drive (if installed). Retain cover hardware to install new stepped cover.

2. Extend the bottom drawer slides to the first locking position (see Figure 7-18) and then with two persons, insert the disk drive as deep into the cabinet as possible.
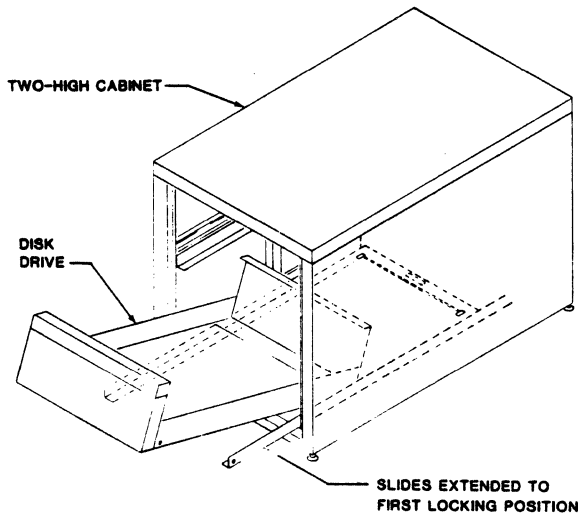

Figure 7-18. Disk Drive to Cabinet Installation

3. Push the disk drive and slides into the cabinet until the slides reach their "STOP" and are fully retracted. Continue to push the disk drive into the cabinet until the rear of the disk drive is flush against the hold-down bracket and hold-down bracket tangs (Figure 7-19) protrude into lower rear of disk drive (under power supply).
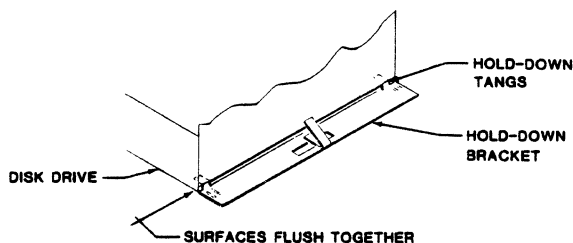
Figure 7-19. Cabinet Hold-Down Bracket and Hold-Down Tangs

4. Re-extend disk drive with slides to first locking position. Install a (6-32 × ½ inch) flat head screw, lock washer and hex nut through the slide and into the front of each slide of the disk drive (see Figure 7-20) to hold the disk drive and slides together.
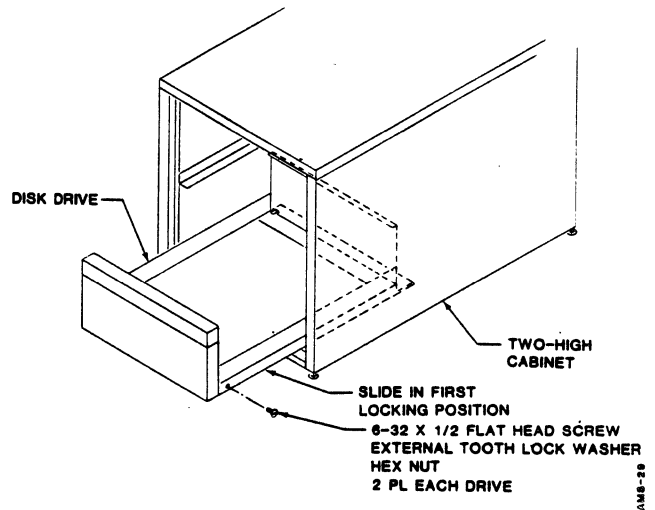

Figure 7-20. Installation of Locking Slide and Disk Drive Hardware

Note
Some disk drive units contain a captive nut in this position, therefore eliminating the need for the hex nuts.

5. Pull disk drive out of cabinet to its fully extended position. Install cables through power supply slots (see Figure 7-21) and onto printed wiring board (PWB). Allow cables to sag ½ to 1 inch when routing cables to PWB. Install controller ground cable to E1 on disk drive.
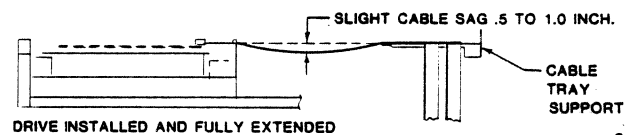

Figure 7-21. Cabinet Cable Routing to PWB

6. During installation of the flat cable interface connector (J17) to the cabinet connector panel at rear, use the spacers provided to raise J18 connector off of the cabinet connector panel and allow the J17 cable to pass underneath, (see Figure 7-22).

7. Attach the disk drive AC cord to the disk drive at the top right corner of the power supply as shown in Figure 7-23. Use the existing screw to attach the cable clamp. Attach the other end of the AC cord to the cable support tray mounting screw. Allow enough service loop to fully extend the disk drive on its slides. Check that socket outlets are located near the cabinet and are easily accessible.
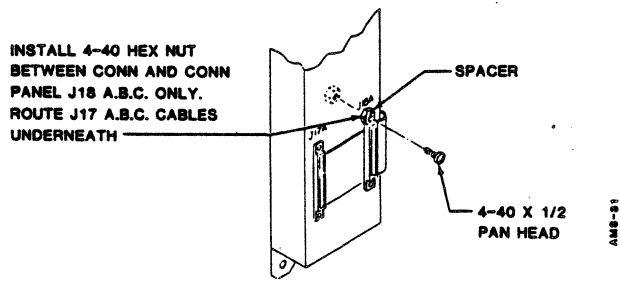
INSTALL 4-40 HEX NUT
BETWEEN CONN AND CONN
PANEL J18 A.B.C. ONLY.
ROUTE J17 A.B.C. CABLES
UNDERNEATH

SPACER

4-40 X 1/2
PAN HEAD

**Figure 7-22. Flat Cable Interface Routing to
Connector Mounting Panel**

8. Install "plated" stepped cover to top of disk drive
(see Figure 7-23).

9. Repeat steps 1 through 8 above for each disk drive
installed in cabinet.
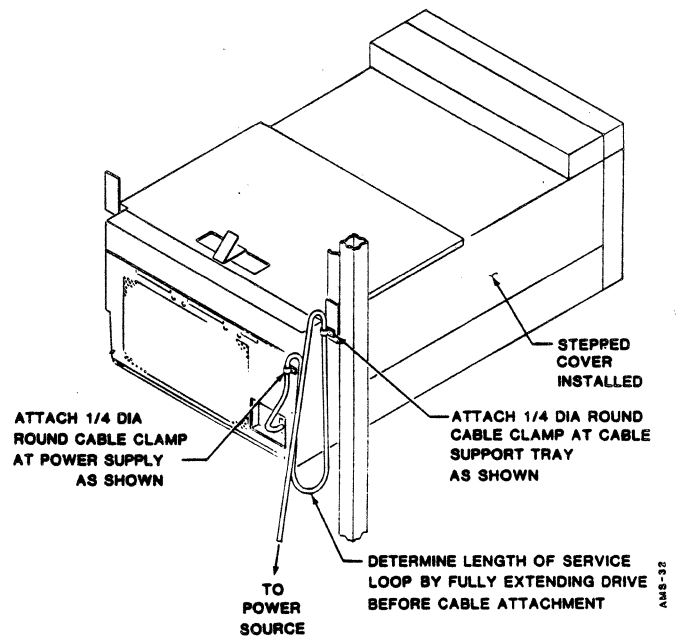
10. Install the rear cabinet panel.

STEPPED
COVER
INSTALLED

ATTACH 1/4 DIA
ROUND CABLE CLAMP
AT POWER SUPPLY
AS SHOWN

ATTACH 1/4 DIA ROUND
CABLE CLAMP AT CABLE
SUPPORT TRAY
AS SHOWN

TO
POWER
SOURCE

DETERMINE LENGTH OF SERVICE
LOOP BY FULLY EXTENDING DRIVE
BEFORE CABLE ATTACHMENT

Figure 7-23. AC Power Cord Installation Diagram

APPENDIX A
SYSTEM GROUNDING

When installing the AMS 315 Disk Systems, care should be taken to insure proper connection of the logic (DC) ground and the frame/chasis (AC) ground.

Several different methods may be used depending on the entire system configuration and recommendations of the CPU and disk controller manufacturer. Four different configurations are shown here, with Century Data Systems suggesting use of the first one, if possible.

Grounding of the AMS Disk Drives back through the computer/disk controller is required when the drives are configured in a daisy-chain fashion, or cable lengths are greater than ten feet. When the disk drive grounds are configured in a daisy-chain fashion the number of drives in the chain should be limited to four with the total ground cable length not longer than 30 feet.

When the disk drives are shipped from Century Data Systems, both logic (DC) ground and frame/chassis (AC) ground are connected together at the chassis stud located near the power supply at the rear of the disk drive. Whenever possible, it is also recommended that the computer, disk controller and all AMS Disk Drives share a common AC voltage input branch and the ground path be brought back to the disk controller system.

The terms E1 and E2 in the four figures following refer to the logic ground studs located on the SMD Input/Output PWB (or Trident I/O PWB) alongside of the controller (J1) for the bus cable.

Note
Other terminals on other PWB's are also labeled E1 but should not be used for external ground cables.

CONFIGURATION 1: (Recommended)

Figure A-1 shows the computer, disk controller and AMS Disk Drives with logic ground and chassis grounds common through a star cable configuration. Flat braided ground cable is recommended with insulation if possible.

CONFIGURATION 2:

Figure A-2 separates the AMS Disk Drive logic and chassis grounds by removing the green/yellow wire from the chassis ground stud (bottom, left, rear corner) that connects to E13 on linear power supply PWB, see Figure A-5. On AMS models with a switcher power supply the grounds may be isolated by moving the jumper wire from terminal E21 to E20 (right, rear corner of drive), see Figure A-6. The system grounds should then be connected in a star configuration as shown. Ground cables should be flat braided and insulation is required to isolate the logic and chassis grounds.

CONFIGURATION 3:

Figure A-3 shows the computer, disk controller and AMS Disk Drives with logic and chassis grounds common through a daisy-chain configuration. The ground cable should be flat braided and, if possible, insulated. This configuration should be implemented only where total ground cable length can be held to less than 30 feet. A maximum of four drives may be configured in this manner.

CONFIGURATION 4:

Figure A-4 isolates the disk drive logic and chassis ground in the same manner as described in Configuration 2. This is also a daisy-chain ground configuration and the restrictions mentioned under Configuration 3 also apply.
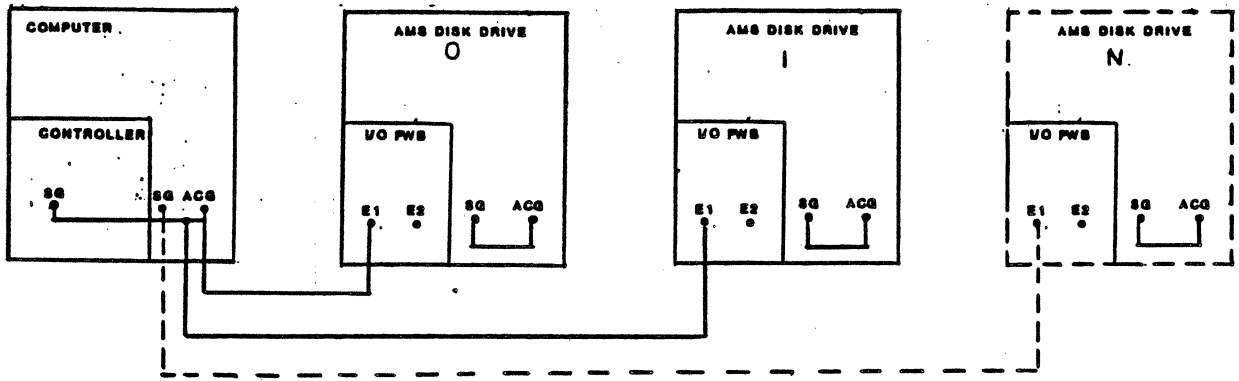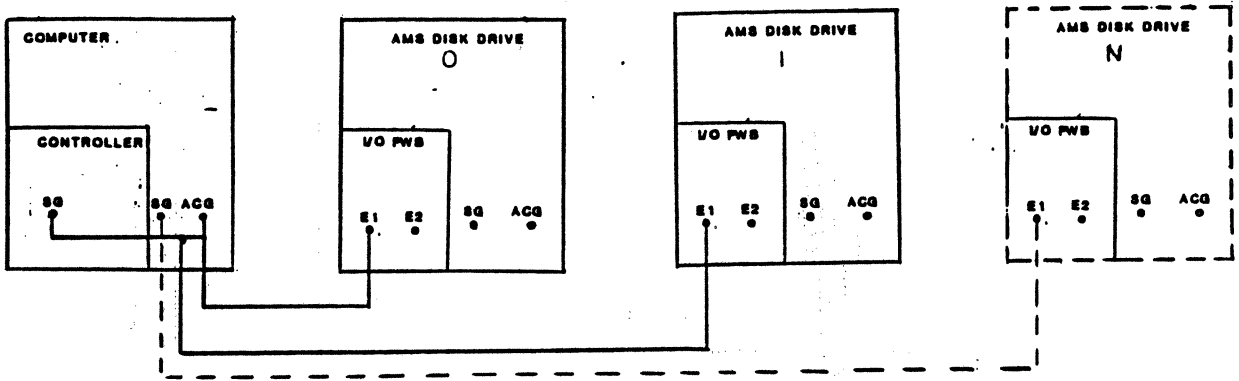
Figure A-1.

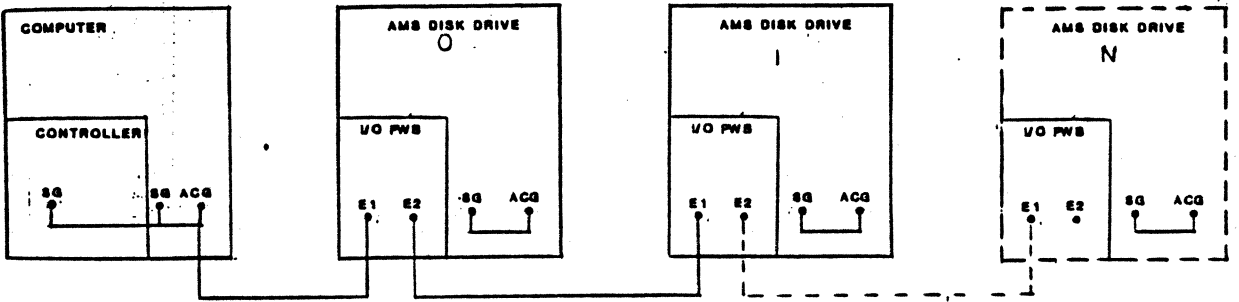Figure A-2.
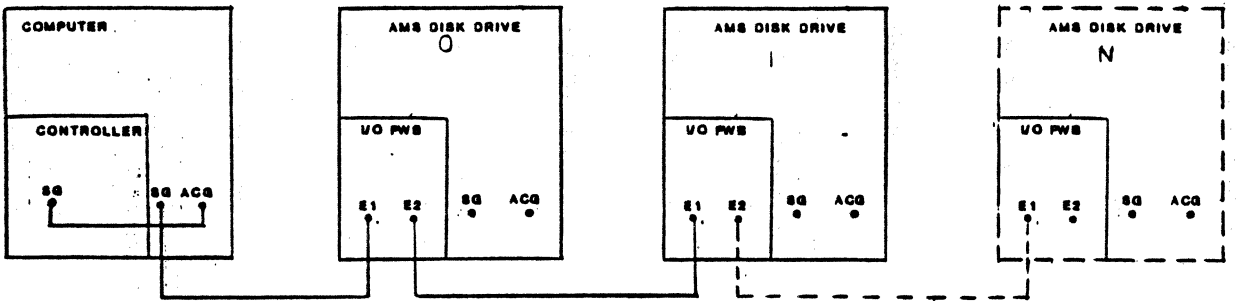

Figure A-3.

Figure A-4.

NOTE
SG = LOGIC GROUND
ACG = AC OR CHASSIS GROUND

NOTE   SG = E13 ON LINEAR POWER SUPPLY
        SG = E21 ON SWITCHER POWER SUPPLY
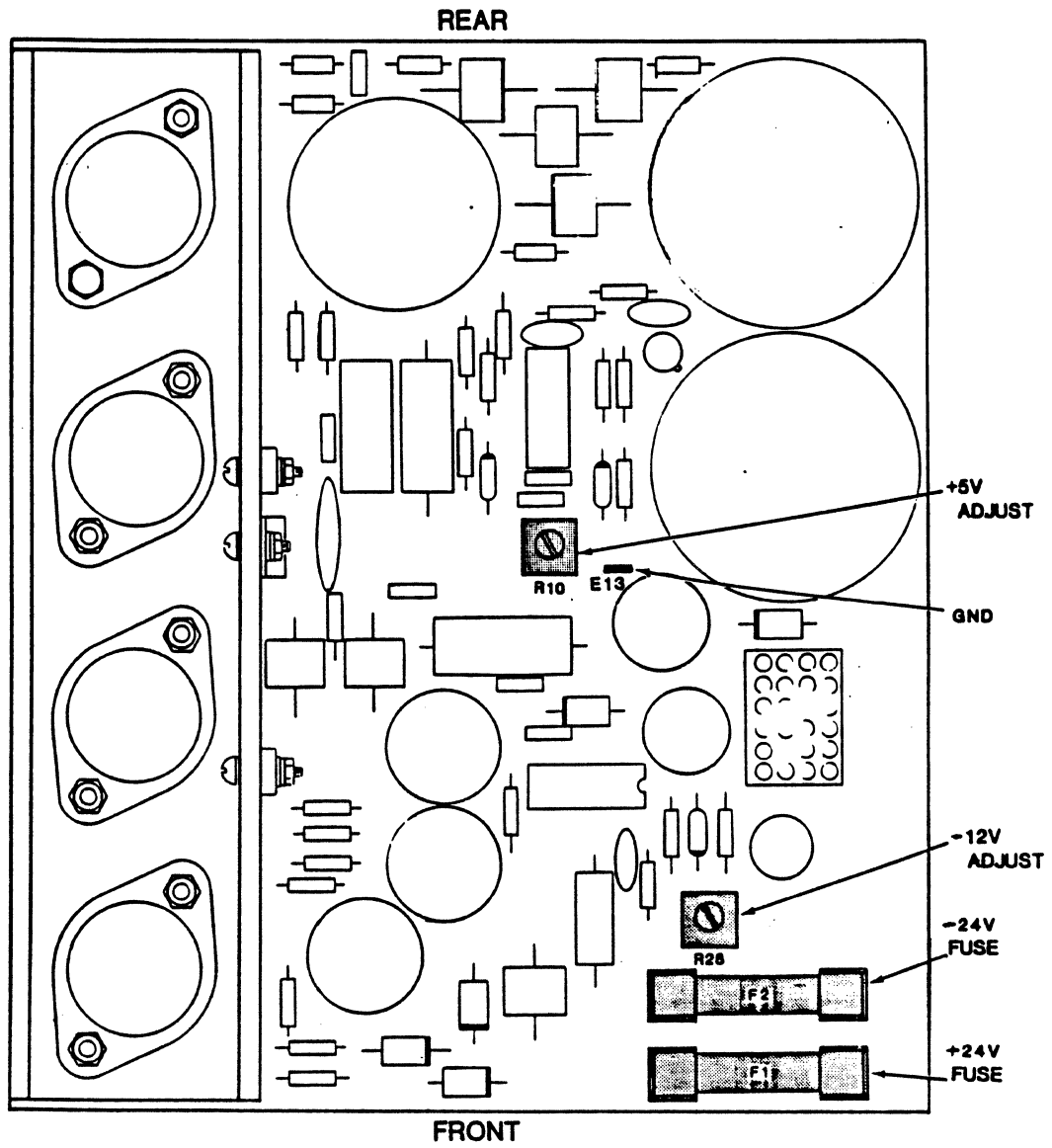   ACG IN DISK DRIVE IS GND STUD ON CHASSIS.

A-2

REAR

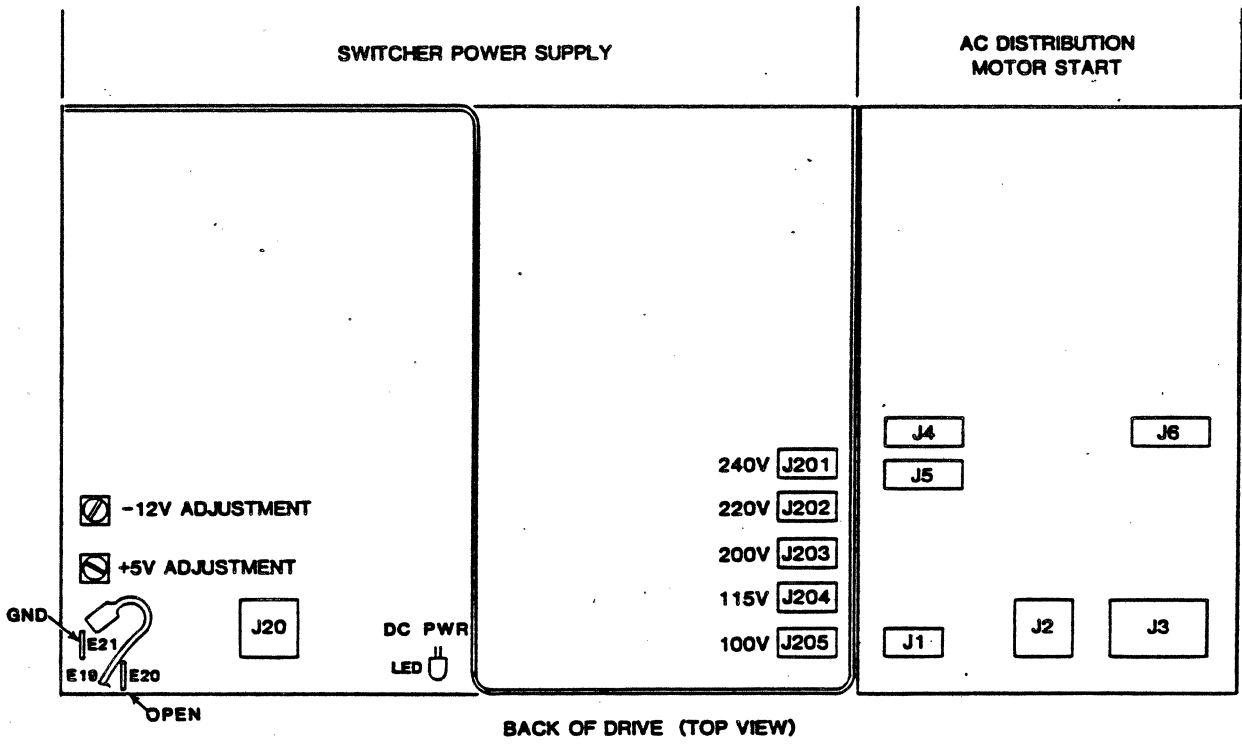
Figure A-5. Linear Power Supply

Figure A-6. Switcher Power Supply

APPENDIX B
DIP SWITCH SETTING FOR SMD DUAL ACCESS PWB P/N 26310-001
AND 27300-001

1. Verify the part number of the SMD Dual Access PWB before starting.

2. Figures B-1 and B-2 show the three switch blocks located on the P/N 26310-001 SMD Dual Access I/O PWB. Figures B-4 and B-5 show the three switch blocks on the P/N 27300-001 SMD Dual Access I/O PWB.

3. Each SMD Dual Access PWB also contains 14 Fault (Maintenance) and Access indicators (LED's that are shown in Figures B-1 and B-4. Refer to Table B-1 for P/N 26310-001 and P/N 27300-001 fault indicator condition and description.

Maximum Cylinder Switch (See Figure B-2)

The setting of this switch (S3-8) is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S3-8) on Dual Access PWB is closed, the maximum legal cylinder address is address 844. With the switch in the open position, the maximum legal cylinder address is 822. Set the switch according to the maximum cylinder address recognized by the system.
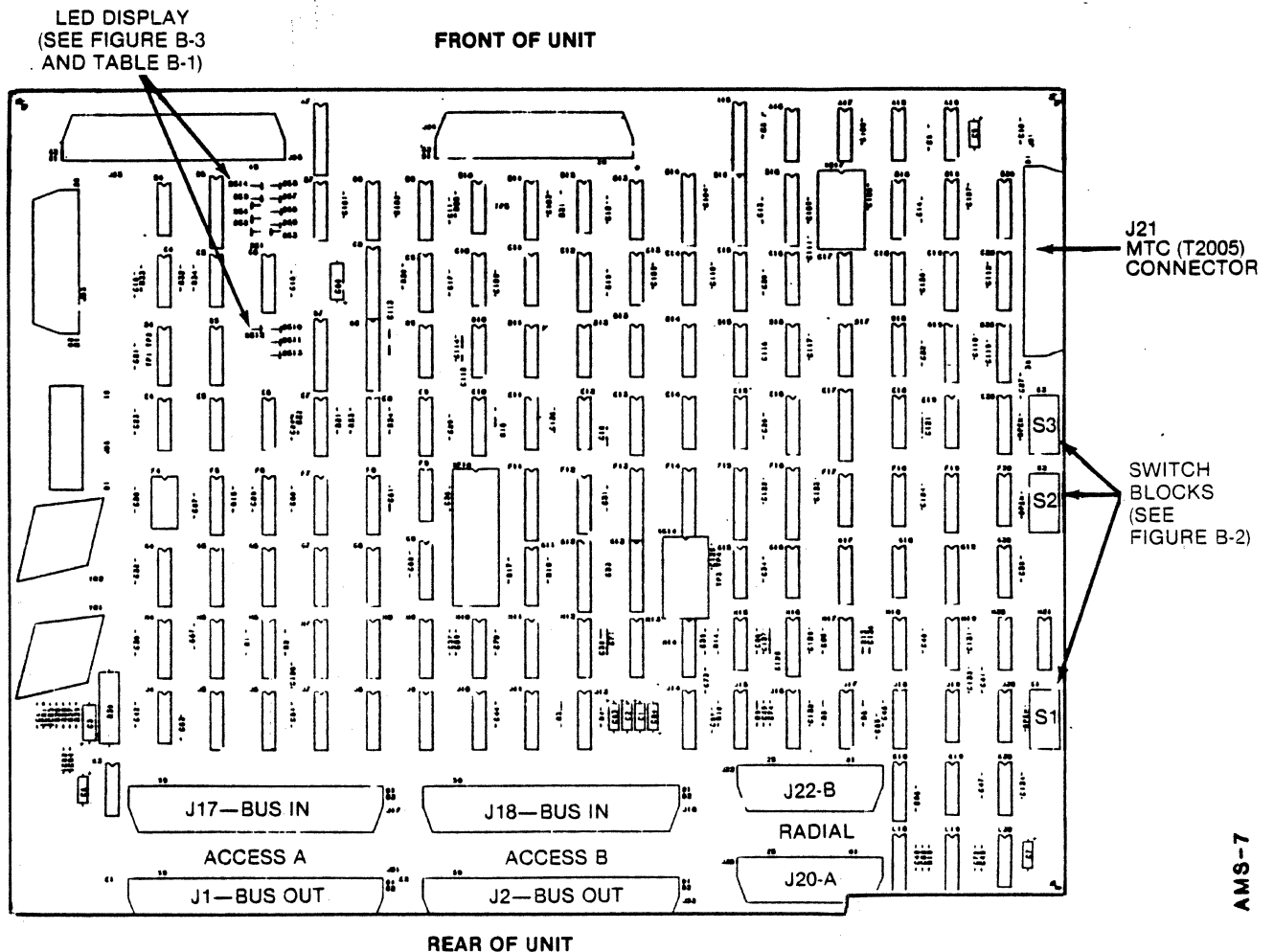

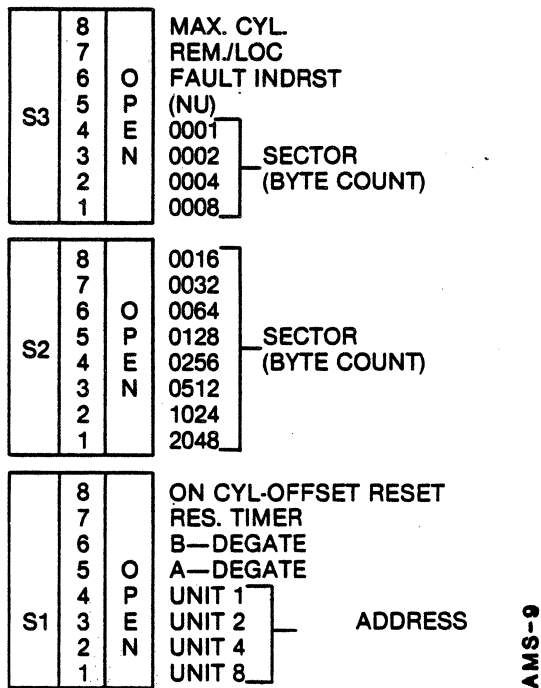Figure B-1. SMD Dual Access I/O PWB (P/N 26310-001)

```
     ┌──┬─┬─┐  MAX. CYL.
     │8 │ │ │  REM./LOC
     │7 │ │O│  FAULT INDRST
     │6 │ │P│  (NU)
  S3 │5 │ │E│  0001 ┐
     │4 │ │N│  0002 │ SECTOR
     │3 │ │ │  0004 │ (BYTE COUNT)
     │2 │ │ │  0008 ┘
     │1 │ │ │
     └──┴─┴─┘

     ┌──┬─┬─┐  0016 ┐
     │8 │ │ │  0032 │
     │7 │ │O│  0064 │
     │6 │ │P│  0128 │ SECTOR
  S2 │5 │ │E│  0256 │ (BYTE COUNT)
     │4 │ │N│  0512 │
     │3 │ │ │  1024 │
     │2 │ │ │  2048 ┘
     │1 │ │ │
     └──┴─┴─┘

     ┌──┬─┬─┐  ON CYL-OFFSET RESET
     │8 │ │ │  RES. TIMER
     │7 │ │ │  B—DEGATE
     │6 │ │O│  A—DEGATE
     │5 │ │P│  UNIT 1 ┐
  S1 │4 │ │E│  UNIT 2 │   ADDRESS
     │3 │ │N│  UNIT 4 │
     │2 │ │ │  UNIT 8 ┘
     │1 │ │ │
     └──┴─┴─┘                      AMS-9
```

Figure B-2. Switch Blocks (P/N 26310-001)

Local/Remote Switch (See Figure B-2)

The Local/Remote switch (S3-7) determines whether the disk drive is to be sequenced up and down locally (by the front panel START switch only) or remotely (by the PICK and HOLD signals issued by the system controller). The PICK and HOLD signals are routed from the system controller to each disk drive serially. To initiate a sequence-up function, the PICK and HOLD signals are routed to the first disk drive, starting its sequence-up function. When the first disk drive is up to speed, the signals are routed to the next disk drive and so on down the line until all disk drives are sequenced up.

When the switch (S3-7) is in the LOCAL (closed) position it is not necessary to issue a PICK or HOLD signal and sequencing is done by opening and closing the front panel START switch. When it is in the REMOTE (open) position PICK and HOLD signals must be issued from the system controller (START switch must be closed).

Fault Indicator Reset Switch (See Figure B-2)

Nine different fault conditions are indicated by individual LED's located on the I/O & Control PWB. During maintenance (fault finding) the Fault Indicator Reset switch (S3-6) can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the

TABLE B-1. SMD INTERFACE (DUAL ACCESS) LED'S (26310-001 AND 27300-001)

LED	Condition/Fault
DS1	Overtemperature (Linear Motor)
DS2	DC Unsafe
DS3	Power Amplifier Unsafe
DS4	Read/Write Fault
DS5	Read Error
DS6	Write Error
DS7	Read Only
DS8	Offset Or Not On Cylinder
DS9	Seek Error
DS10	A Priority
DS11	A Reserved
DS12	B Priority
DS13	B Reserved
DS14	Fault

switch was kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table B-1 shows the fault LED's.

Sector Switches (See Figure B-2)

The sector switches (S2-1 thru -8 and S3-1 thru -4) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.

On Cylinder Offset Reset Switch (See Figure B-2)

The On Cylinder Offset Reset switch (S1-8) allows for SMD or CMD compatibility of the interface signal ON-CYLINDER. With the switch closed, signal ON-CYLINDER drops at the beginning and end of an Offset Operation (CMD). With the switch open, signal ON-CYLINDER drops at the beginning of an Offset Operation only (SMD).

Reserve Timer Switch (See Figure B-2)

This switch (S1-7) is the Dual Access Reserve Timer mode switch. When the switch is open, the first access to select the drive, reserves the drive until that access specifically releases the drive by activating Control Tag and Bus Bit 9. When the switch is closed, the reserve status of the drive is automatically released 500 milliseconds after the end of an I/O operation.

The AMS Disk Drive uses a dual access host interface. The dual access feature contains the interface and control electronics that allows the drive to be selectively connected to two control units. The interface electronics

provides separate line receivers and line drivers for inter-facing to each control unit. The control electronics implements a "hardware interlock", via the select signal, allowing one control unit to control the drive at any one time. The logical state of the interlock, controlled either by manual switches or control unit selection, assures that an operation is started and completed with a control unit without interference from the second control unit. Once a control unit has selected the drive through the dual access interface, all disk operations are allowed, as specified for a single access drive. A control unit must first select the drive before any communications with the drive is possible.

The access switches on the enclosure front panel provide separate enable switches for each access. The I/O & Control-SMD PWB has two DEGATE switches (S1-5, 6) (one for each access) that are in parallel with the front panel access switches. When the front panel access switches are to be used, both DEGATE switches must be in the open positon. See Figure B-3.

Note
The DEGATE switches should only be used when the front panel switches are not available and/or when the drive is being operated in the maintenance mode.

Degate Switches (See Figure B-2)

Access A Degate switch (S1-5) and Access B Degate switch (S1-6) are used to place the disk drive online or offline to the system cabled to the associated access. When an access switch is in the open position, the disk drive, through the associated access, is placed ONLINE to the cabled system. When an access switch is in the closed position, the associated access is OFFLINE (DEGATED) to the cabled system. When the disk drive is DEGATED (both degate switches closed), commands can only be issued from an exerciser plugged into J21 on the I/O & Control PWB. The degate switches are in parallel with the front panel ACCESS switches. If the front panel ACCESS switches are to be used to place the disk drive online or offline, then both degate switches must be placed in the open position. See Figure B-3 and Table B-2.

TABLE B-2. DUAL ACCESS SWITCH CONFIGURATIONS

State	Access A	Access B	Configuration
1	ON	ON	Automatic (Hardware Controlled)
2	ON	OFF	Manual (Forced Connection to A)
3	OFF	ON	Manual (Forced Connection to B)
4	OFF	OFF	Degated (Offline)
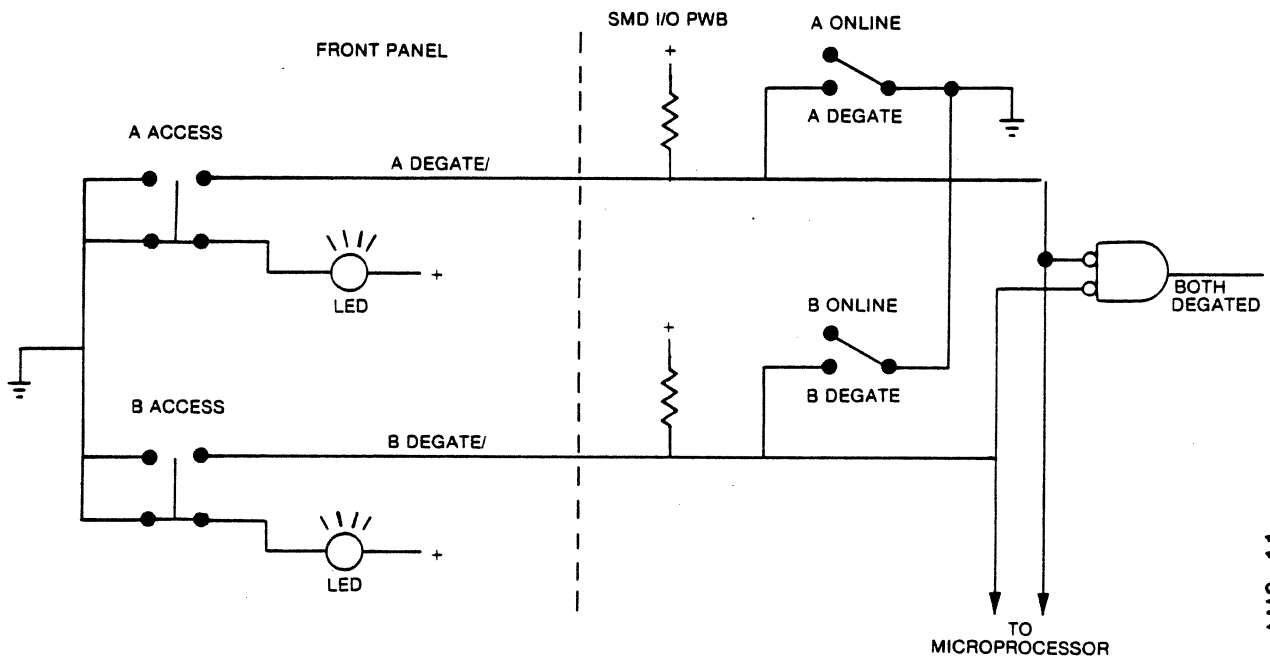
Figure B-3. SMD Dual Access and Degate Switches

B-3

LED DISPLAY
(SEE FIGURE B-6 AND TABLE B-1)

J21
MTC (T2005)
CONNECTOR

SWITCH
BLOCK S4
(SEE
FIGURE B-5)

SWITCH
BLOCKS
(SEE
FIGURE B-5)

SWITCH
BLOCK S1
(SEE
FIGURE B-5)

S4

S3

S2

S1

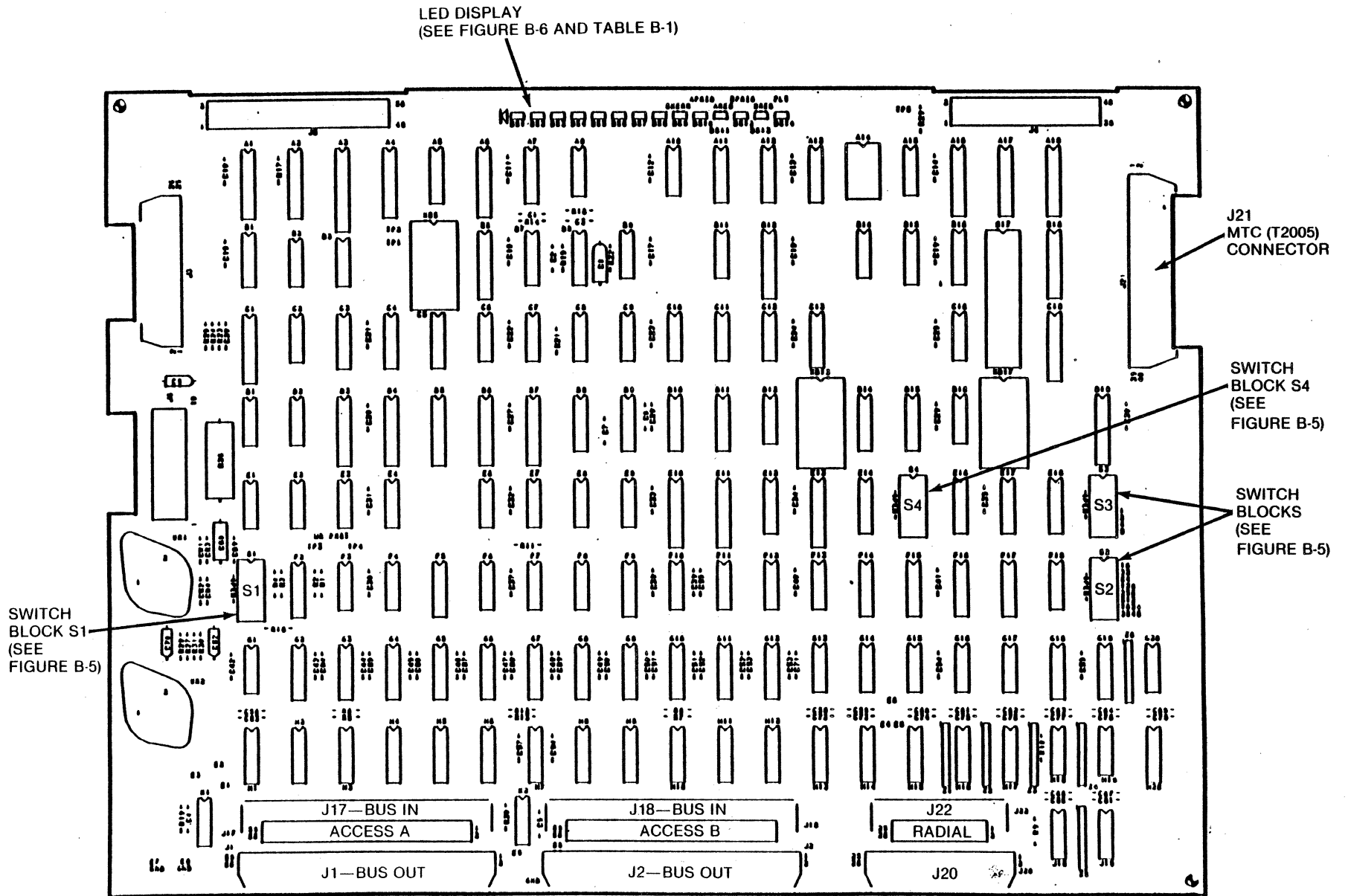| J17—BUS IN | J18—BUS IN | J22 |
| ACCESS A | ACCESS B | RADIAL |
| J1—BUS OUT | J2—BUS OUT | J20 |

Figure B-4. SMD Dual Access PWB (P/N 27300-001)

Unit Address Switches (See Figure B-2)

System software usually determines what unit address the disk drive is to use. In systems with more than one disk drive, each drive will be assigned a different unit address. In systems with only one disk drive the unit address for the drive is usually "zero". The unit address switches (S1-1 thru S1-4) on the Dual Access PWB are in parallel with the unit address plug on the front panel of the enclosure. If the front panel plug is to be used, the switches must be left in the open position to prevent interaction with the front panel address plug. The unit address is set by these switches for drives without a front panel. Each switch is binary weighted and when open equals a binary 'one' in that weighted position.

Fault Indicator Reset Switch (See Figure B-5)

Nine different fault conditions are indicated by individual LED's located on the I/O & Control PWB. During maintenance (fault finding) the Fault Indicator Reset switch (S3-1) can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the
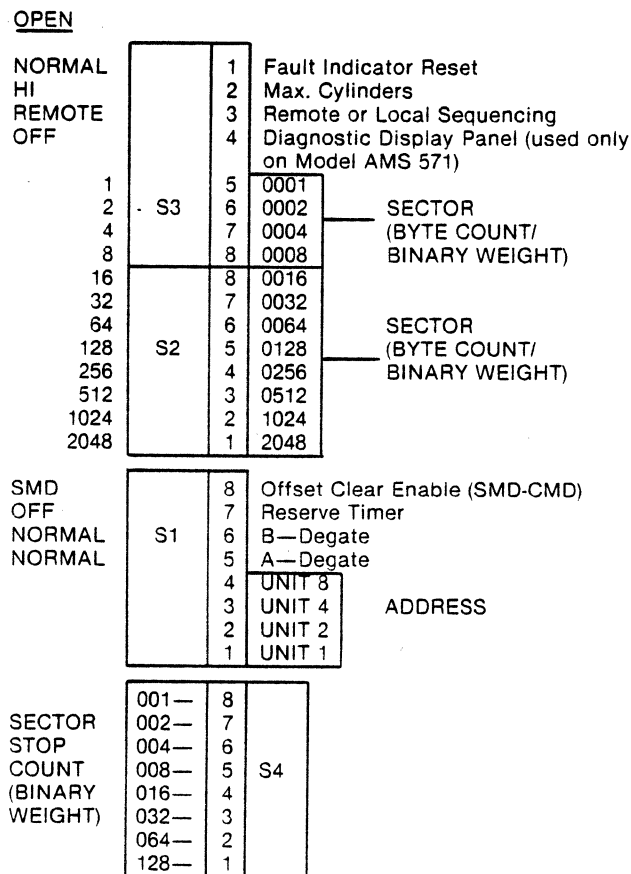
OPEN

Figure B-5. Switch Blocks (P/N 27300-001)

switch was kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table B-1 shows the fault LED's.

Maximum Cylinder Switch (See Figure B-5)

The setting of this switch (S3-2) is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S3-2) on Dual Access PWB is closed, the maximum legal cylinder address is address 844. With the switch in the open position, the maximum legal cylinder address is 822. Set the switch according to the maximum cylinder address recognized by the system.

Local/Remote Switch (See Figure B-5)

The Local/Remote switch (S3-3) determines whether the disk drive is to be sequenced up and down locally (by the front panel START switch only) or remotely (by the PICK and HOLD signals issued by the system controller). The PICK and HOLD signals are routed from the system controller to each disk drive serially. To initiate a sequence-up function, the PICK and HOLD signals are routed to the first disk drive, starting its sequence-up function. When the first disk drive is up to speed, the signals are routed to the next disk drive and so on down the line until all disk drives are sequenced up.

When the switch (S3-3) is in the LOCAL (closed) position it is not necessary to issue a PICK or HOLD signal and sequencing is done by opening and closing the front panel START switch. When it is in the REMOTE (open) position PICK and HOLD signals must be issued from the system controller (START switch must be closed).

Sector Switches (See Figure B-5)

The sector switches (S2-1 thru S2-8 and S3-5 thru S3-8) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.

Note
Because of differences in user controllers, Sector Stop Count switch (S4) must be considered when setting the sector switches. Refer to setting the Sector Stop Count switch (S4) in this appendix.

Offset Clear Enable (SMD-CMD) (See Figure B-5)

The Offset Clear Enable switch (S1-8) on Dual Access PWB allows for SMD or CMD compatibility of the interface signal ON-CYLINDER. With the switch

closed, signal ON-CYLINDER drops at the beginning and end of an Offset Operation (CMD). With the switch open, signal ON-CYLINDER drops at the beginning of an Offset Operation only (SMD).

Reserve Timer Switch (See Figure B-5)

This switch (S1-7) is the Dual Access Reserve Timer mode switch. When the switch is open, the first access to select the drive, reserves the drive until that access specifically releases the drive by activating Control Tag and Bus Bit 9. When the switch is closed, the reserve status of the drive is automatically released 500 milliseconds after the end of an I/O operation.

The AMS Disk Drive uses a dual access host interface. The dual access feature contains the interface and control electronics that allows the drive to be selectively connected to two control units. The interface electronics provides separate line receivers and line drivers for interfacing to each control unit. The control electronics implements a "hardware interlock", via the select signal, allowing one control unit to control the drive at any one time. The logical state of the interlock, controlled either by manual switches or control unit selection, assures that an operation is started and completed with a control unit without interference from the second control unit. Once a control unit has selected the drive through the dual access interface, all disk operations are allowed, as specified for a single access drive. A control unit must first select the drive before any communications with the drive is possible.

The access switches on the enclosure front panel provide separate enable switches for each access. The I/O & Control-SMD PWB has two DEGATE switches (S1-5, 6) (one for each access) that are in parallel with the front panel access switches. When the front panel access switches are to be used, both DEGATE switches must be in the open positon. See Figure B-3.

Note
The DEGATE switches should only be used when the front panel switches are not available and/or when the drive is being operated in the maintenance mode.

Degate Switches (See Figure B-5)

Access A Degate switch (S1-5) and Access B Degate Switch (S1-6) are used to place the disk drive online or offline to the system cabled to the associated access. When an access switch is in the open position, the disk drive, through the associated access, is placed ONLINE to the cabled system. When an access switch is in the closed position, the associated access is OFFLINE (DEGATED) to the cable system. When the disk drive is DEGATED (both degate switches closed), commands can only be issued from an exerciser plugged into J21 on the I/O & Control PWB. The degate switches are in parallel with the front panel ACCESS switches. If the front panel ACCESS switches are to be used to place the disk drive online or offline, then both degate switches must be placed in the open position. See Figure B-3 and Table B-2.

Unit Address Switches (See Figure B-5)

System software usually determines what unit address the disk drive is to use. In systems with more than one disk drive, each drive will be assigned a different unit address. In systems with only one disk drive the unit address for the drive is usually "zero". The unit address switches (S1-1 thru S1-4) on the Dual Access PWB are in parallel with the unit address plug on the front panel of the enclosure. If the front panel plug is to be used, the switches must be left in the open position to prevent interaction with the front panel address plug. The unit address is set by these switches for drives without a front panel. Each switch is binary weighted and when open equals a binary 'one' in that weighted position.

Sector Stop Count Switch (See Figure B-5)

The (S4) switch is used when the bytes per track do not allow sector combinations to come out even. The end sector suppression prevents the generation of a sector pulse after a preset count is reached, effectively lengthening the last sector to include any remaining sector bytes. The end sector suppression switches (S4) are set for the desired count minus one. For example, if you want 48 sectors per track, you would set the (S4) switches for a count of 47. To disable this switch, set all (S4) switches to "open".

APPENDIX C
DIP SWITCH SETTING FOR SMD SINGLE ACCESS PWB'S,
P/N 26902-001, 27348-001 AND 27546-001

1. Verify the part number of the SMD Single Access PWB before starting.

2. Figures C-1, C-2 and C-3 show the switch blocks located on the P/N 26902-001 SMD Single Access I/O PWB and also the switch blocks located on the P/N 27348-001 SMD Single Access I/O PWB. Figures C-4 and C-5 show the switch blocks located on the P/N 27546-001 SMD Single Access I/O PWB.

3. Each SMD Single Access I/O PWB also contains eight Fault (maintenance) indicators (LED's) that are shown in Figures C-1, C-3 and C-4. Refer to Table C-1 for the fault indicator condition and description for all SMD Single Access PWB's.

Maximum Cylinder Switch (See Figures C-1, C-2 and C-3)

The setting of this switch is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S1-1) on Single Access PWB is closed, the maximum legal cylinder address is address 844. With the switch in the open position, the maximum legal cylinder address is 822. Set the switch according to the maximum cylinder address recognized by the system.

Sector Pulse Width Switch (See Figures C-1, C-2 and C-3)

This switch (S1-2) on Single Access PWB) is used to select the width of the SECTOR pulse. With switch open it is 0.83 microseconds wide and with the switch closed it is 1.24 microseconds wide (1½ clock times). This switch setting is dependent on the user controller requirements.

Fault Clear Switch (See Figures C-1, C-2 and C-3)

Nine different fault conditions are indicated by individual LED's located on the I/O & Control PWB. During maintenance (fault finding) the Fault Clear switch (S1-3) can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the switch was kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table C-1 shows the fault LED's.

Sector Switches (See Figures C-1, C-2 and C-3)

The sector switches (S3-1 thru S3-4 and S2-1 thru S2-8) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.

Unit Select Switches (See Figures C-1, C-2 and C-3)

System software usually determines what unit address the disk drive is to use. In systems with more than one disk drive, each drive will be assigned a different unit address. In systems with only one disk drive the unit address for the drive is usually "zero". The unit select switches (S8-1 thru S8-4) on Single Access PWB are in parallel with the unit address plug on the front panel of the enclosure. If the front panel plug is to be used, the switches must be left in the open position to prevent interaction with the front panel address plug. The unit address is set by these switches for drives without a front panel. Each switch is binary weighted and when open equals a binary 'one' in that weighted position.

Offset Clear Switch (See Figures C-1, C-2 and C-3)

The Offset Clear switch (S8-5) on Single Access PWB allows for SMD or CMD compatibility of the interface signal ONCYLINDER. With the switch closed, signal ONCYLINDER drops at the beginning and end of an Offset Operation (CMD). With the switch open, signal ONCYLINDER drops at the beginning of an Offset Operation only (SMD).

Degate Switch (See Figures C-1 and C-3)

Degate switch (S6) is used to place the disk drive online or offline to the system. When the switch is in the ON-LINE position, the disk drive is placed ONLINE to the cable system. When the switch (S6) is in the DEGATE position, the disk drive is OFFLINE (DEGATED) to the cabled system. When the disk drive is DEGATED, commands can only be issued from an exerciser plugged into J21 on the I/O & Control PWB.
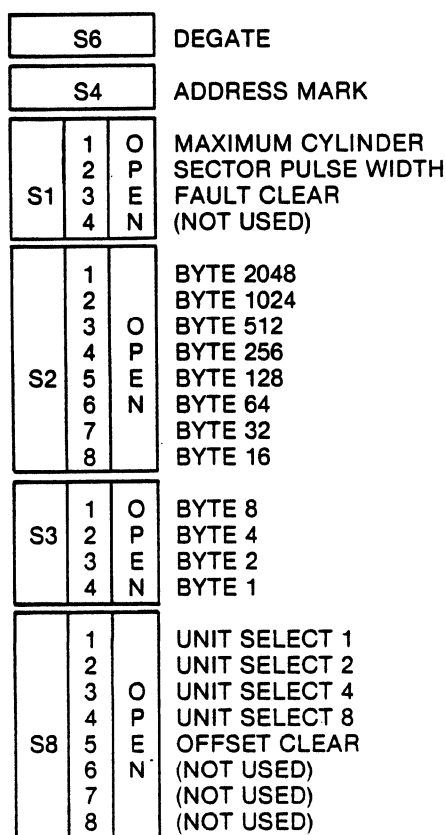
Figure C-1. SMD Single Access I/O PWB (P/N 26902-001) Switches and LED's

S6			DEGATE
S4			ADDRESS MARK
S1	1	O	MAXIMUM CYLINDER
	2	P	SECTOR PULSE WIDTH
	3	E	FAULT CLEAR
	4	N	(NOT USED)
S2	1		BYTE 2048
	2		BYTE 1024
	3	O	BYTE 512
	4	P	BYTE 256
	5	E	BYTE 128
	6	N	BYTE 64
	7		BYTE 32
	8		BYTE 16
S3	1	O	BYTE 8
	2	P	BYTE 4
	3	E	BYTE 2
	4	N	BYTE 1
S8	1		UNIT SELECT 1
	2		UNIT SELECT 2
	3	O	UNIT SELECT 4
	4	P	UNIT SELECT 8
	5	E	OFFSET CLEAR
	6	N	(NOT USED)
	7		(NOT USED)
	8		(NOT USED)

Figure C-2. Switch Blocks P/N 26902 and 27348-001 (SMD Single Access Only)

TABLE C-1. FAULT (MAINTENANCE) INDICATORS

LED INDICATORS										Fault Conditions
1	2	3	4	5	6	7	8	9	14	
1	X	X	X	X	X	X	X	X	1	Linear Motor Overtemp
X	1	X	X	X	X	X	X	X	1	DC Voltage Out Of Spec
X	X	1	X	X	X	X	X	X	1	Pwr Amp Fail During Pwr-Up
X	X	X	1	X	X	X	X	X	1	Fault On R/W PWB
X	X	X	X	1	X	X	X	X	1	Read Not On Cylinder
X	X	X	X	X	1	1	X	X	1	Write In Read Only Mode
X	X	X	X	X	1	X	1	X	1	Write In Offset Or Not On Cyl
X	X	X	X	X	1	0	0	X	1	Write During Upper Threshold
X	X	X	X	X	X	X	X	1	1	Error During Seek Operation

1 = ON; 0 = OFF; X = DON'T CARE

Address Mark Switch (S4) (See Figures C-1 and C-3)

This switch determines which logic controls the write address mark operation. With the switch in the SMD position, the disk drive writes an address mark as long as the system controller keeps the command active. With the switch in the TRIDENT position, the disk drive uses an internal counter to count 24 data bit times (3 bytes) to determine the length of address mark.

Maximum Cylinder Switch (See Figures C-4 and C-5)

The setting of this switch is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S1-1) on Single Access PWB is closed, the maximum legal cylinder address is address 844. With the switch in the open position, the maximum legal cylinder address is 822. Set the switch according to the maximum cylinder address recognized by the system.

Sector Pulse Width Switch (See Figures C-4 and C-5)

This switch (S1-2) on Single Access PWB is used to select the width of the SECTOR pulse. With switch open it is 0.83 microseconds wide and with the switch closed it is 1.24 microseconds wide (1½ clock times). This switch setting is dependent on the user controller requirements.

Fault Clear Switch (See Figures C-4 and C-5)

Nine different fault conditions are indicated by individual LED's located on the I/O & Control PWB. During maintenance (fault finding) the Fault Clear switch (S1-3) can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the switch was kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table C-1 shows the fault LED's.

Sector Switches (See Figures C-4 and C-5)

The sector switches (S3-1 thru S3-4 and S2-1 thru S2-8) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.

Note

Because of differences in user controllers, Sector Stop Count switch (S5) must be considered when setting the sector switches. Refer to setting the Sector Stop Count switch (S5) in this appendix.

Unit Select Switches (See Figures C-4 and C-5)

System software usually determines what unit address the disk drive is to use. In systems with more than one disk drive, each drive will be assigned a different unit
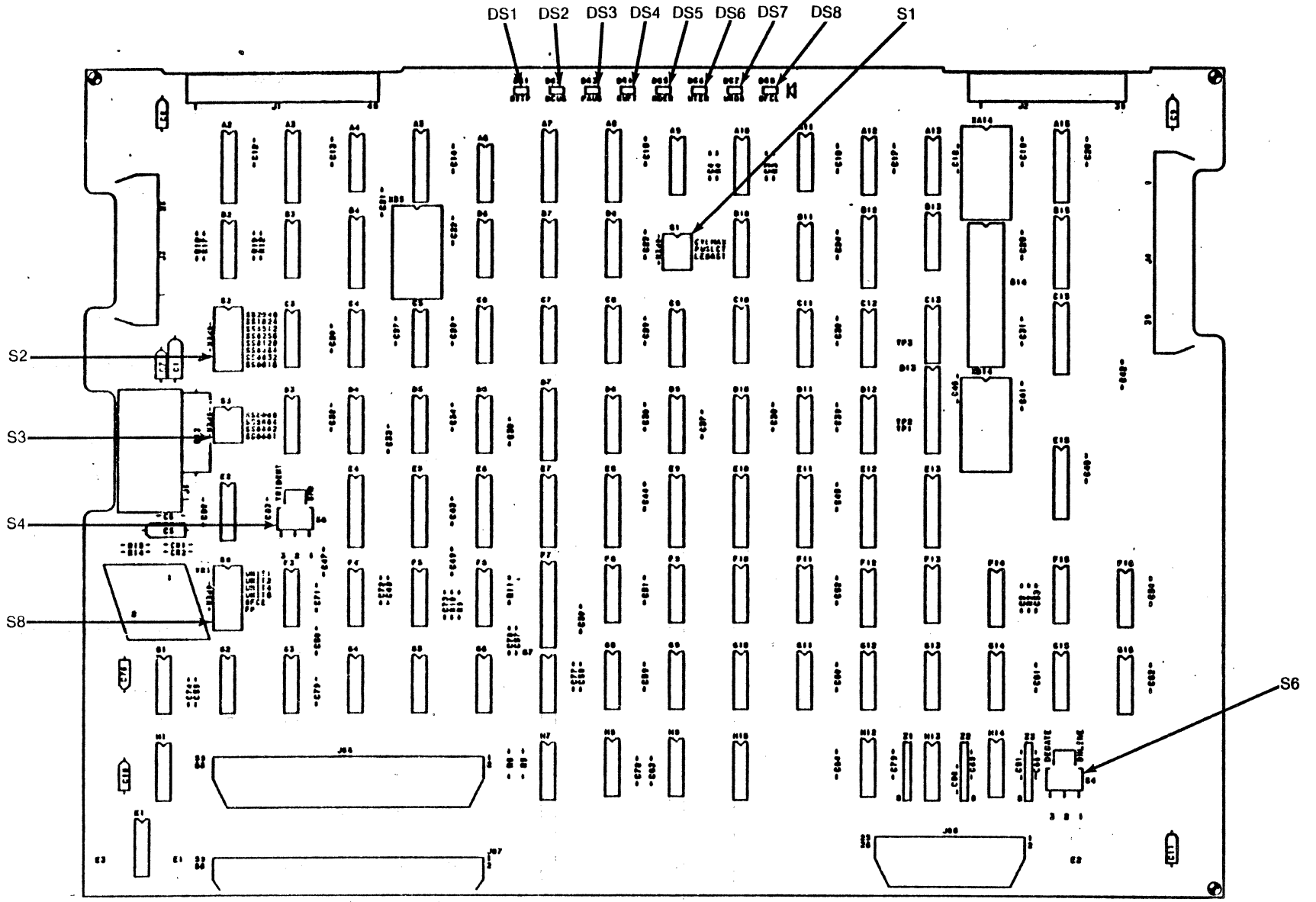
C-4

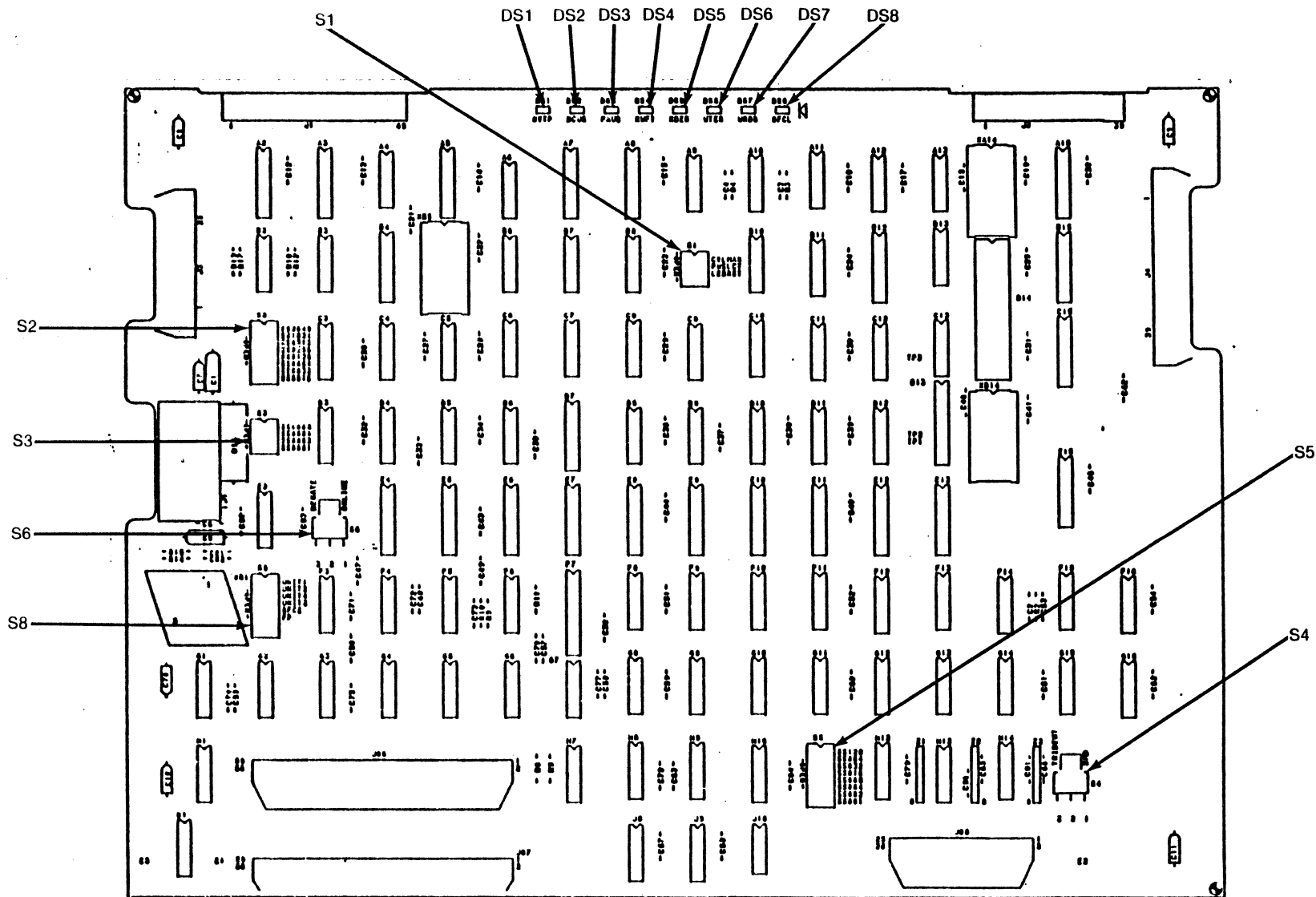Figure C-3. SMD Single Access I/O PWB (P/N 27348-001) Switches and LED's

Figure C-4. SMD Single Access I/O PWB (P/N 27546-001) Switches and LED's

S6			DEGATE

S4			ADDRESS MARK

	1	O	MAXIMUM CYLINDER
	2	P	SECTOR PULSE WIDTH
S1	3	E	FAULT CLEAR
	4	N	(NOT USED)

	1		BYTE 2048
	2		BYTE 1024
	3	O	BYTE 512
	4	P	BYTE 256
S2	5	E	BYTE 128
	6	N	BYTE 64
	7		BYTE 32
	8		BYTE 16

	1	O	BYTE 8
S3	2	P	BYTE 4
	3	E	BYTE 2
	4	N	BYTE 1

	1		UNIT SELECT 1
	2		UNIT SELECT 2
	3	O	UNIT SELECT 4
	4	P	UNIT SELECT 8
S8	5	E	OFFSET CLEAR
	6	N	(NOT USED)
	7		(NOT USED)
	8		(NOT USED)

	8	001	
	7	002	
	6	004	SECTOR STOP
S5	5	008	COUNT
	4	016	(BINARY WEIGHT)
	3	032	
	2	064	
	1	128	

Figure C-5. Switch Blocks (P/N 27546-001) SMD Single Access PWB

address. In systems with only one disk drive the unit address for the drive is usually "zero". The unit select switches (S8-1 thru S8-4) on Single Access PWB are parallel with the unit address plug on the front panel of the enclosure. If the front panel plug is to be used, the switches must be left in the open position to prevent interaction with the front panel address plug. The unit address is set by these switches for drives without a front

panel. Each switch is binary weighted and when open equals a binary 'one' in that weighted position.

Offset Clear Switch (See Figures C-4 and C-5)

The Offset Clear switch (S8-5) on Single Access PWB allows for SMD or CMD compatibility of the interface signal ONCYLINDER. With the switch closed, signal ONCYLINDER drops at the beginning and end of an Offset Operation (CMD). With the switch open, signal ONCYLINDER drops at the beginning of an Offset Operation only (SMD).

Degate Switch (See Figures C-4 and C-5)

Degate switch (S6) is used to place the disk drive online or offline to the system. When the switch is in the ON-LINE position, the disk drive is placed ONLINE to the cabled system. When the switch (S6) is in the DEGATE position, the disk drive is OFFLINE (DEGATED) to the cabled system. When the disk drive is DEGATED, commands can only be issued from an exerciser plugged into J21 on the I/O & Control PWB.

Addres Mark Switch (S4) (See Figures C-4 and C-5)

This switch determines which logic controls the write address mark operation. With the switch in the SMD position, the disk drive writes an address mark as long as the system controller keeps the command active. With the switch in the TRIDENT position, the disk drive uses an internal counter to count 24 data bit times (3 bytes) to determine the length of address mark.

Sector Stop Count Switch (See Figures C-4 and C-5)

The Sector Stop Count switch (S5) is used when the bytes per track do not allow sector combinations to come out even. The end sector suppression prevents the generation of a sector pulse after a preset count is reached, effectively lengthening the last sector to include any remaining sector bytes. The end sector suppression switches (S5) are set for the desired count minus one. For example, if you want 48 sectors per track, you would set the (S5) switches for a count of 47. To disable this switch, set all (S5) switches to "open".

APPENDIX D
DIP SWITCH SETTING FOR TRIDENT DUAL ACCESS PWB P/N 25991-001

1. Verify the part number of the Dual Access I/O PWB before starting.

2. Figures D-1 and D-2 show the three switch blocks located on the P/N 25991-001 Trident Dual Access I/O PWB.

3. The Trident Dual Access I/O PWB also contains eight Fault (maintenance) indicators (LED's) that are shown in Figure D-1. Refer to Table D-1 for the fault condition and description. Refer to Figure D-2 for location of LED's.

Maximum Cylinder Switch (See Figures D-1 and D-2)

The setting of this switch (S3-8) is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S3-8) is closed, the maximum legal cylinder address is 814. With the switch in the open position, the maximum legal cylinder address is 844. Set the switch according to the maximum cylinder address recognized by your system.
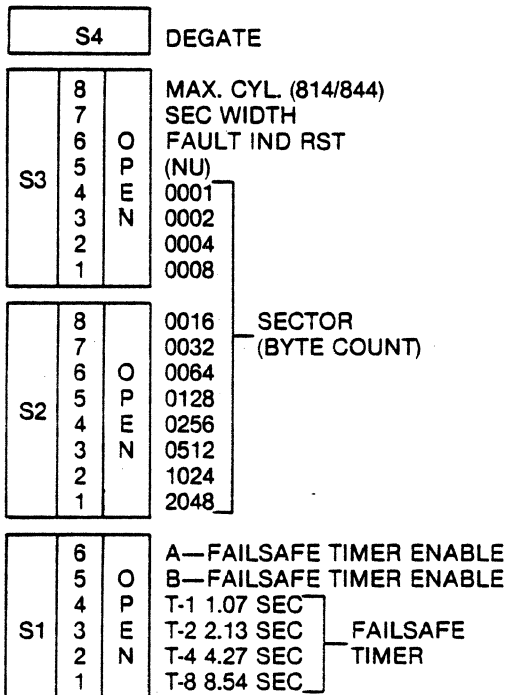
Figure D-1. Switch Blocks P/N 25991-001
(Trident Interface Only)

Sec Width Switch (See Figures D-1 and D-2)

This switch (S3-7) is used to select the width of the SECTOR pulse. With the switch opened it is 0.83 microseconds wide and with the switch closed it is 1.24 microseconds wide (1½ clock times).

Fault Indicator Reset Switch (See Figures D-1 and D-2)

This switch (S3-6) clears the DS1 through DS8 LED indicators which hold the last Fault condition.

Eight different fault conditions are indicated by individual LED's located on the I/O & Control PWB. During maintenance (fault finding) the Fault Indicator Reset switch (S3-6) can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the switch was kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table D-1 shows the fault LED's.

Sector Switches (See Figures D-1 and D-2)

The sector switches (S2-1 thru S2-8 and S3-1 thru S3-4) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.

**Failsafe Timer Switches (S1-1 thru S1-6)
(See Figure D-1)**

When in automatic dual access mode, utilizing both interfaces; if the active interface fails to activate a tag line for 10 seconds or more, the fail safe timer will time out and allow selection by the other access, if so requested. This 10 second delay is the nominal time delay provided on all drives but may be varied from 1.067 to 17.07 seconds through the setting of these four switches. The four switches are arranged in a binary configuration with each increment being equal to 1.067 seconds. Also, the fail safe timer may be enabled for either A or B accesses, or both, utilizing S1-6 and S1-5. See Figure D-3.
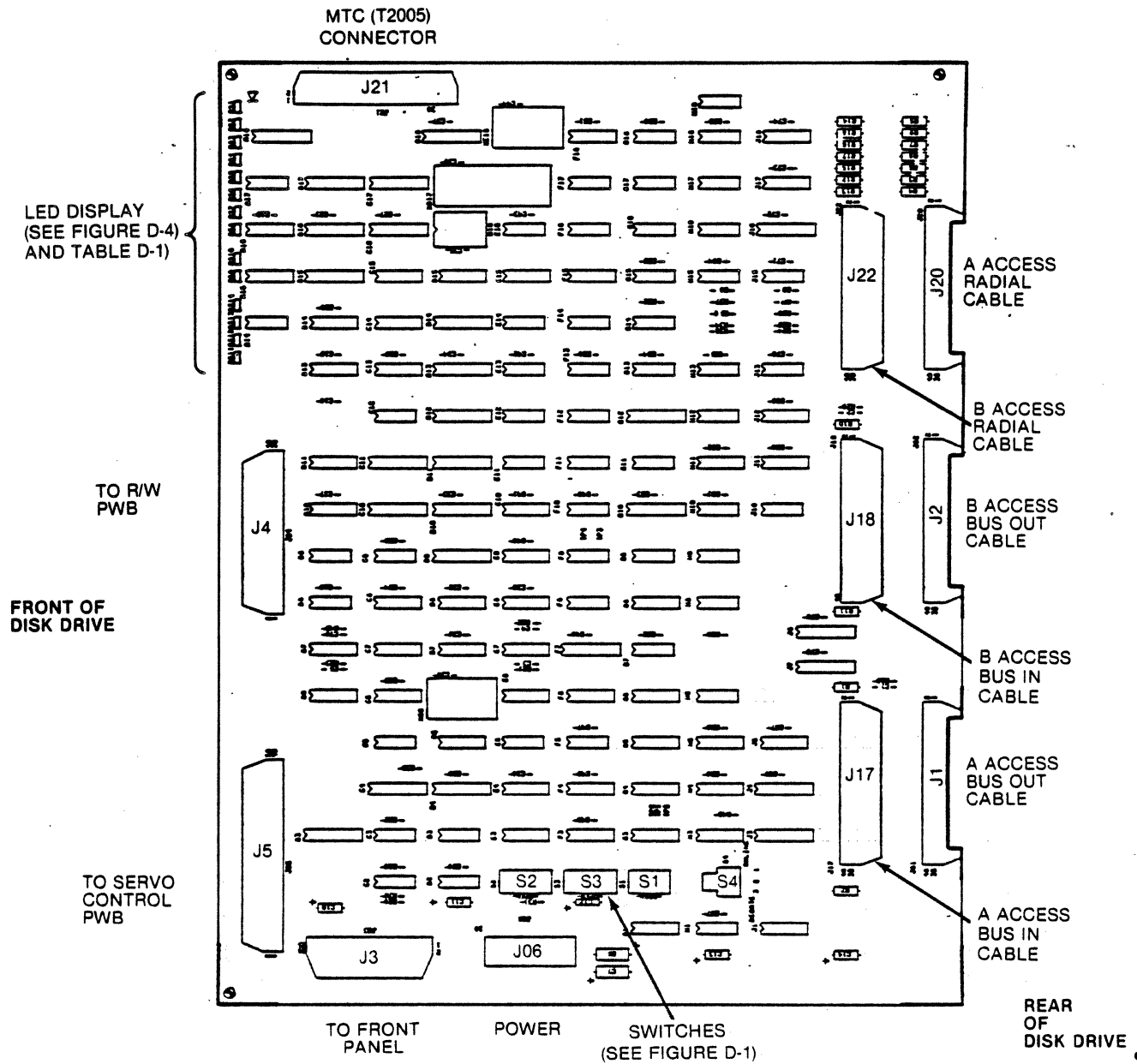
Figure D-2. Trident Dual Access I/O PWB P/N 25991-001

Degate Switch (S4)

Switch S4, shown in Figure D-2, will degate both interfaces on a dual access disk drive. Refer to Figure D-3 for logical operation.

TRIDENT I/O PWB LED'S

On the Trident Dual Access PWB are 14 LED's labeled DS1 thru DS14 whose functions are shown in Table D-1. The LED's are located toward the front of the PWB and are not labeled in consecutive order right to left. See Figure D-2 for physical arrangement of LED's.

Certain error conditions may require sampling more than one LED. For example, the FAULT LED will be illuminated with one or more others. DS5 and DS7 would indicate an attempt to write while offset. For other types of faults, refer to Table D-1.

TEST POINT JUMPERS

A jumper between TP1 and TP2 will keep the disk drive in READ ONLY mode (write protected). TP3 and TP4 are used for factory test purposes only.
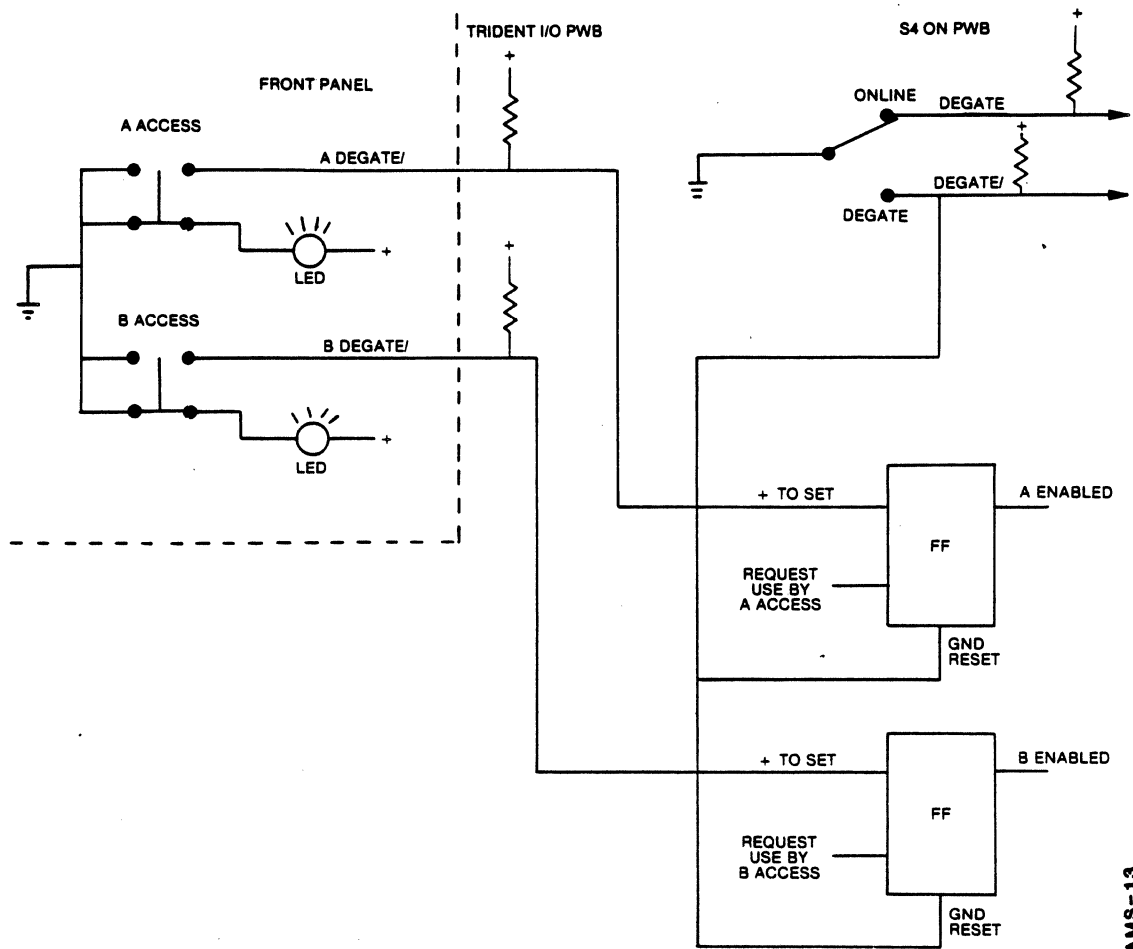
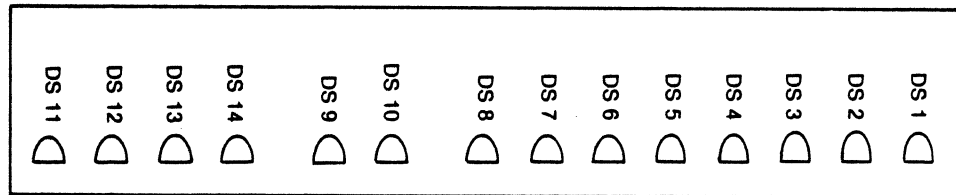D-2

Figure D-3. Trident Dual Access and Degate Switches

Figure D-4. Trident I/O PWB LED's (Viewed from Rear)

TABLE D-1. TRIDENT INTERFACE LED'S

LED	Condition/Fault
DS1	Overtemperature (Linear Motor)
DS2	DC Unsafe
DS3	Power Amp. Unsafe
DS4	Read/Write Fault
DS5	Read Error
DS6	Write Error
DS7	Read Only
DS8	Offset Or Not On Cylinder
DS9	Attention
DS10	Fault
DS11	A Connected
DS12	B Connected
DS13	A Selected
DS14	B Selected

APPENDIX E
DIP SWITCH SETTING FOR SMD DUAL ACCESS PWB P/N 27015-001
AND 27076-001

1. Verify the part number of the SMD Dual Access PWB before starting.

2. Figures E-1, E-2 and E-3 show the three switch blocks located on P/N 27015-001 and P/N 27076-001 SMD Dual Access PWB's.

3. Each SMD Dual Access PWB also contains 14 Fault (maintenance) and access indicators (LED's) that are shown in Figures E-2 and E-3. Refer to Table E-1 for the fault indicator condition and description.

Maximum Cylinder Switch (See Figure E-1)

The setting of this switch (S3-8) is used by the disk drive control firmware to determine the maximum legal cylinder address. When this switch (S3-8) on Dual Access PWB is closed, the maximum legal cylinder address is address 844. With the switch in the open position, the maximum legal cylinder address is 822. Set the switch according to the maximum cylinder address
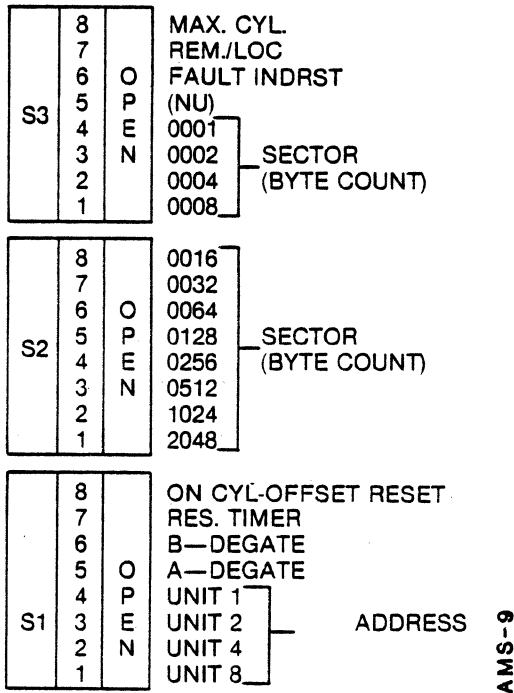
recognized by the system. This switch should be left in the 844 position (closed).

Local/Remote Switch (See Figure E-1)

The Local/Remote switch (S3-7) determines whether the disk drive is to be sequenced up and down locally (by the front panel START switch only) or remotely (by the PICK and HOLD signals issued by the system controller). The PICK and HOLD signals are routed from the system controller to each disk drive serially. To initiate a sequence-up function, the PICK and HOLD signals are routed to the first disk drive, starting its sequence-up function. When the first disk drive is up to speed, the signals are routed to the next disk drive and so on down the line until all disk drives are sequenced up.

When the switch (S3-7) is in the LOCAL (closed) position it is not necessary to issue a PICK or HOLD signal and sequencing is done by opening and closing the front panel START switch. When it is in the REMOTE (open) position PICK and HOLD signals must be issued from the system controller (START switch must be closed).

Fault Indicator Reset Switch (See Figure E-1)

Nine different fault conditions are indicated by individual LED's located on the DA SMD PWB. During maintenance (fault finding) the Fault Indicator Reset switch (S3-6) on Dual Access PWB can be used to reset the fault flip-flops (switch closed) which causes the fault LED's to turn off. During normal operations, this switch should be placed in the open position, allowing a fault condition to set the appropriate fault flip-flop and turn on the LED. If the switch is kept in the closed position, fault conditions would be reported to the system, but would not be captured in a fault flip-flop. Table E-1 shows the fault LED's.

Sector Switches (See Figure E-1)

The sector switches (S2-1 thru S2-8 and S3-1 thru S3-9) are used, when the system uses hard sectoring, to set the total byte capacity for each sector on the disks. Refer to Section 5 for the sector switches settings table and formula.
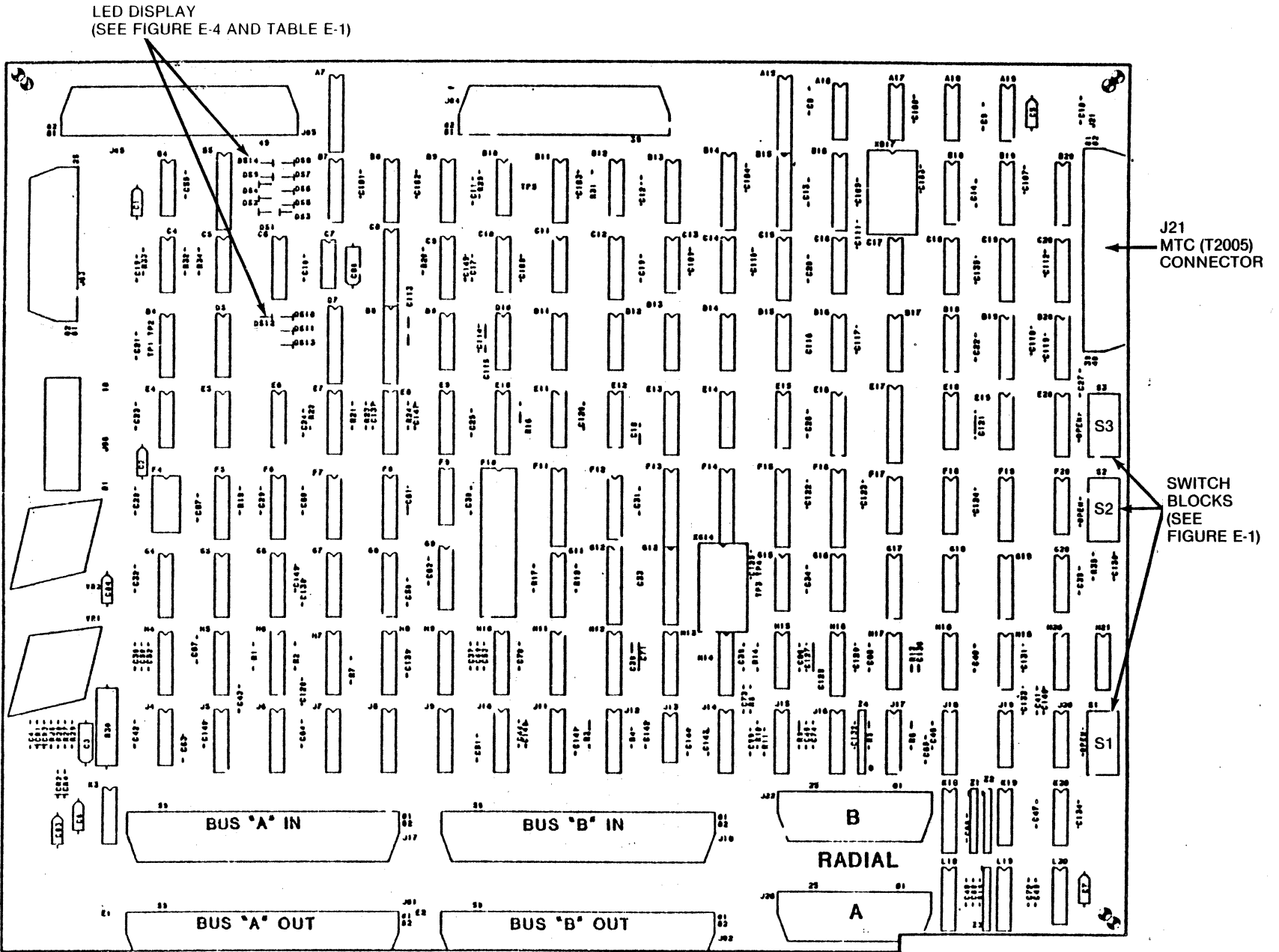

Figure E-1. Switch Blocks P/N 27015-001 and 27076-001 (SMD Dual Access Only)

Figure E-2. SMD Dual Access PWB, P/N 27015-001 Switch Blocks and Indicators

LED DISPLAY
(SEE FIGURE E-4 AND TABLE E-1)

J21
MTC (T2005)
CONNECTOR

SWITCH
BLOCKS
(SEE
FIGURE E-1)

S3

S2

S1

BUS "A" IN

BUS "B" IN

B
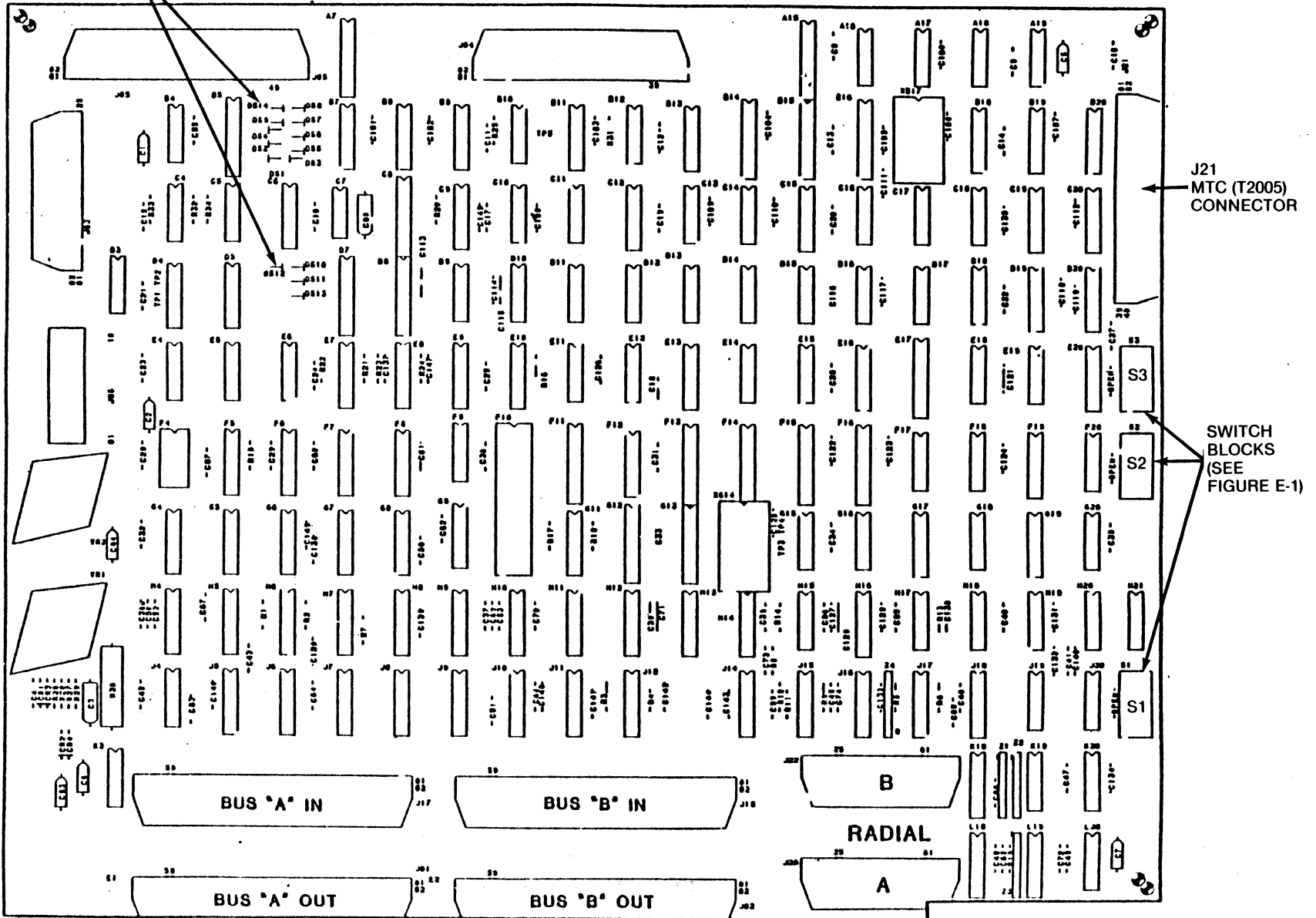
RADIAL

BUS "A" OUT

BUS "B" OUT

A

Figure E-3. SMD Dual Access PWB, P/N 27076-001 Switch Blocks and Indicators

TABLE E-1. DA SMD PWB INTERFACE LED'S
(27015-001 AND 27076-001)

LED	Condition/Fault
DS1	Overtemperature (Linear Motor)
DS2	DC Unsafe
DS3	Power Amplifier Unsafe
DS4	Read/Write Fault
DS5	Read Error
DS6	Write Error
DS7	Read Only
DS8	Offset Or Not On Cylinder
DS9	Seek Error
DS10	A Priority
DS11	A Reserved
DS12	B Priority
DS13	B Reserved
DS14	Fault

On Cylinder Offset Switch (See Figure E-1)

The On Cylinder Offset switch (S1-8) allows for SMD or CMD compatibility of the interface signal ON-CYLINDER. With the switch closed, signal ON-CYLINDER drops at the beginning and end of an Offset Operation (CMD). With the switch open, signal ON-CYLINDER drops at the beginning of an Offset Operation only (SMD).

Reserve Timer Switch (See Figure E-1)

This switch (S1-7) is the Dual Access Reserve Timer mode switch. When the switch is open, the first access to select the drive, reserves the drive until that access specifically releases the drive by activating Control Tag and Bus Bit 9. When the switch is closed, the reserve status of the drive is automatically released 500 milliseconds after the end of an I/O operation.

The AMS Disk Drive uses a dual access host interface. The dual access feature contains the interface and control electronics that allows the drive to be selectively connected to two control units. The interface electronics provides separate line receivers and line drivers for interfacing to each control unit. The control electronics implements a "hardware interlock", via the select signal, allowing one control unit to control the drive at any one time. The logical state of the interlock, controlled either by manual switches or control unit selection, assures that an operation is started and completed with a control unit without interference from the second control unit. Once a control unit has selected the drive through the dual access interface, all disk operations are allowed, as specified for a single access drive. A control unit must first select the drive before any communications with the drive is possible.

The access switches on the enclosure front panel provide separate enable switches for each access. The DA SMD PWB has two DEGATE switches (S1-5 and S1-6), one for each access, that are in parallel with the front panel access switches. When the front panel access switches are to be used, both DEGATE switches must be in the open position. See Figure E-4.
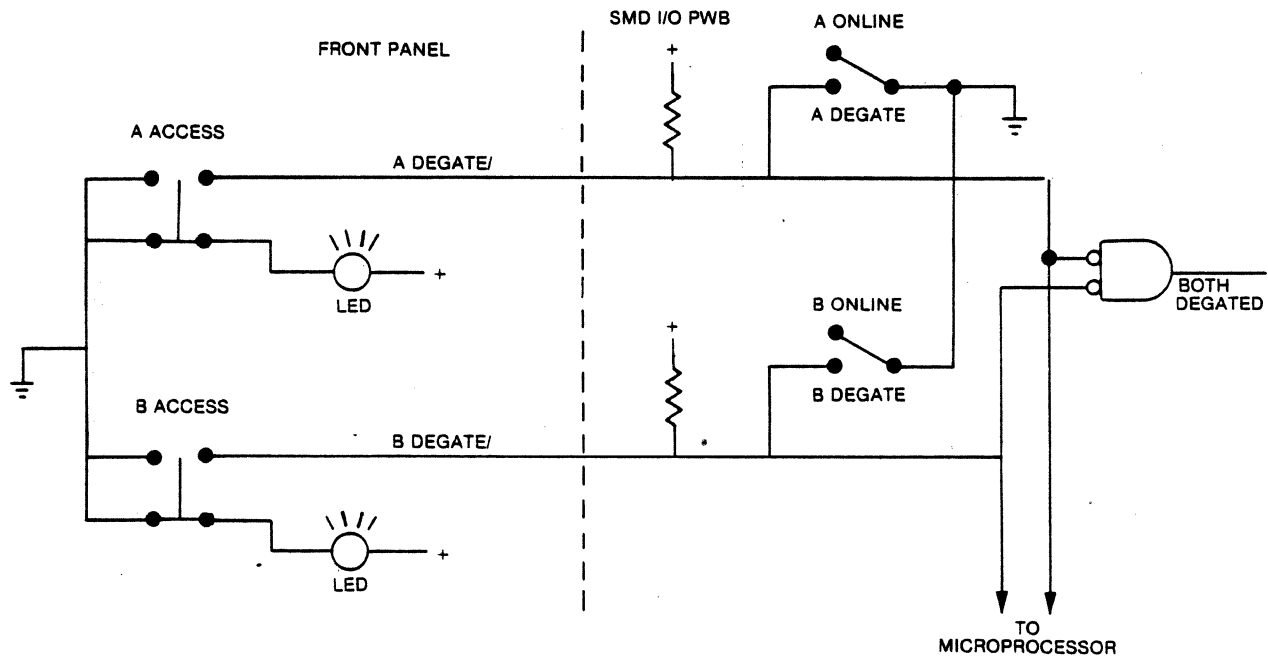

Figure E-4. SMD Dual Access and Degate Switches

E-4

Note

The DEGATE switches should only be used when the front panel switches are not available and/or when the drive is being operated in the maintenance mode.

The switches are used to configure which control unit(s) can access the drive. Internally, each access can be configured for operation with its associated control unit be completely disabled. With both switches enabled (open), the drive is configured for automatic operation and drive selection may be made by either control unit. Table E-2 lists the configurations established from the four functional states of the two switches.

Unit Address Switches (See Figure E-1)

System software usually determines what unit address the disk drive is to use. In systems with more than one disk drive, each drive will be assigned a different unit address. In systems with only one disk drive the unit address for the drive is usually "zero". The unit address switches (S1-1 thru S1-4) are in parallel with the unit address plug on the front panel of the enclosure. If the front panel plug is to be used, the switches must be left in the open position to prevent interaction with the front panel address plug. The unit address is set by these switches for drives without a front panel. Each switch is binary weighted and when open equals a binary 'one' in that weighted position.

TABLE E-2. DUAL ACCESS SWITCH CONFIGURATIONS

State	Access A	Access B	Configuration
1	ON	ON	Automatic (Hardware Controlled)
2	ON	OFF	Manual (Forced Connection to A)
3	OFF	ON	Manual (Forced Connection to B)
4	OFF	OFF	Degated (Offline)

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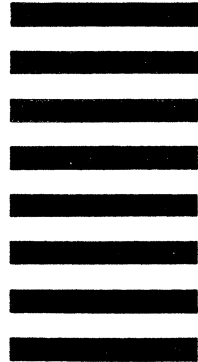FIRST CLASS   PERMIT NO. 19   ANAHEIM, CA

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Additional Comments: