

5-1/4 Inch Disk Peripheral

Model: 2275

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**Customer Engineering
Product Maintenance Manual**

741-1345-A

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PREFACE

This document is the Product Maintenance Manual (PMM) for the Wang Disk Peripheral. The manual is organized in accordance with Customer Engineering Technical Documentation's approved PMM outline. The scope of this manual reflects the type of maintenance philosophy selected for this product.

The purpose of this manual is to provide the Wang-trained Customer Engineer (CE) with sufficient instructions to operate, troubleshoot, and repair the Disk Peripheral. The manual will be updated on a regular schedule or as necessary. Such updates will be published either as Publication Update Bulletins (PUBs) or as full revisions.

Second Edition (October, 1985)

This edition of the Disk Peripheral PMM manual obsoletes document 729-1345. Use of the material in this document is authorized only for the purpose stated in the Preface, above.

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SECTION

1

**INTRO-
DUCTION**

INTRODUCTION

1.1 Scope and Purpose

This manual contains detailed installation, operation, troubleshooting, and repair information for the 2275 Disk Peripheral unit. Also included are a description of component function and a breakdown of replaceable parts.

The purpose of the manual is to provide the Wang Customer Engineer with adequate information to enable him to install, troubleshoot, and repair the 2275 Disk Peripheral.

1.2 Organization and Layout

Beyond this introductory section, the manual contains eleven sections, numbered 2 through 12. Each section addresses a separate subject and covers its subject as completely as possible so that a minimum of references to other sections is required. Also, insofar as possible, all information pertaining to each task is contained on a single frame.

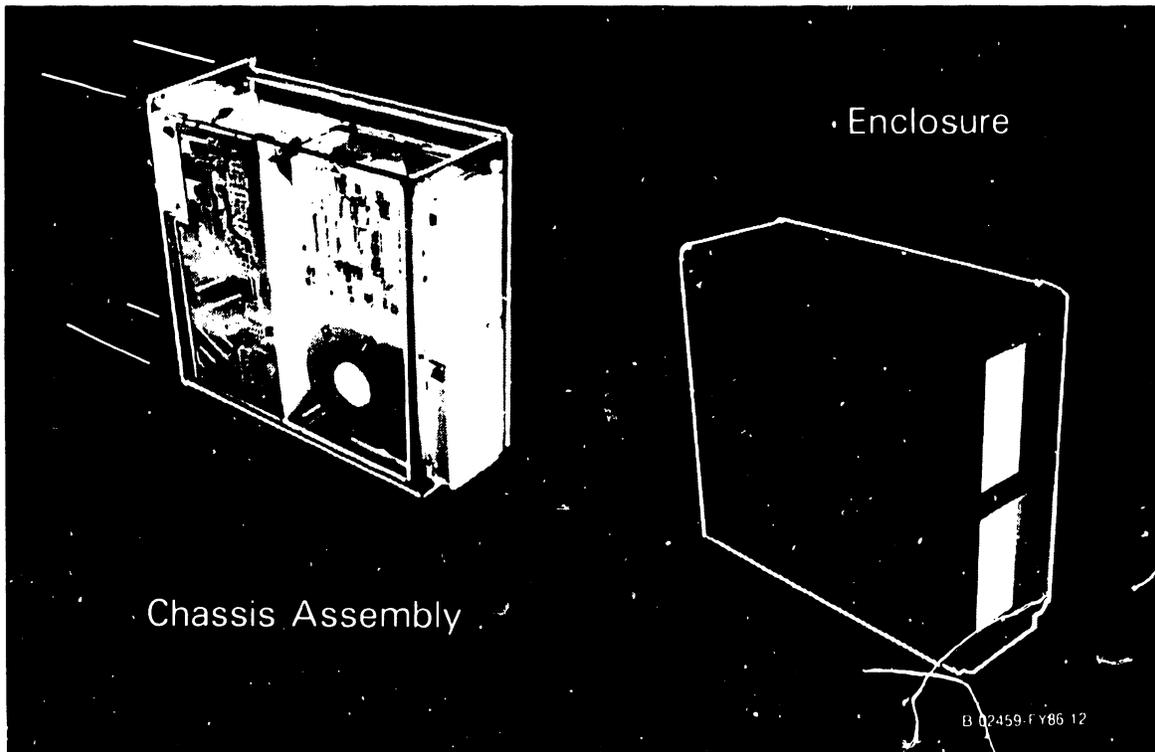
SECTION

2

**IDENTI-
FICATION**

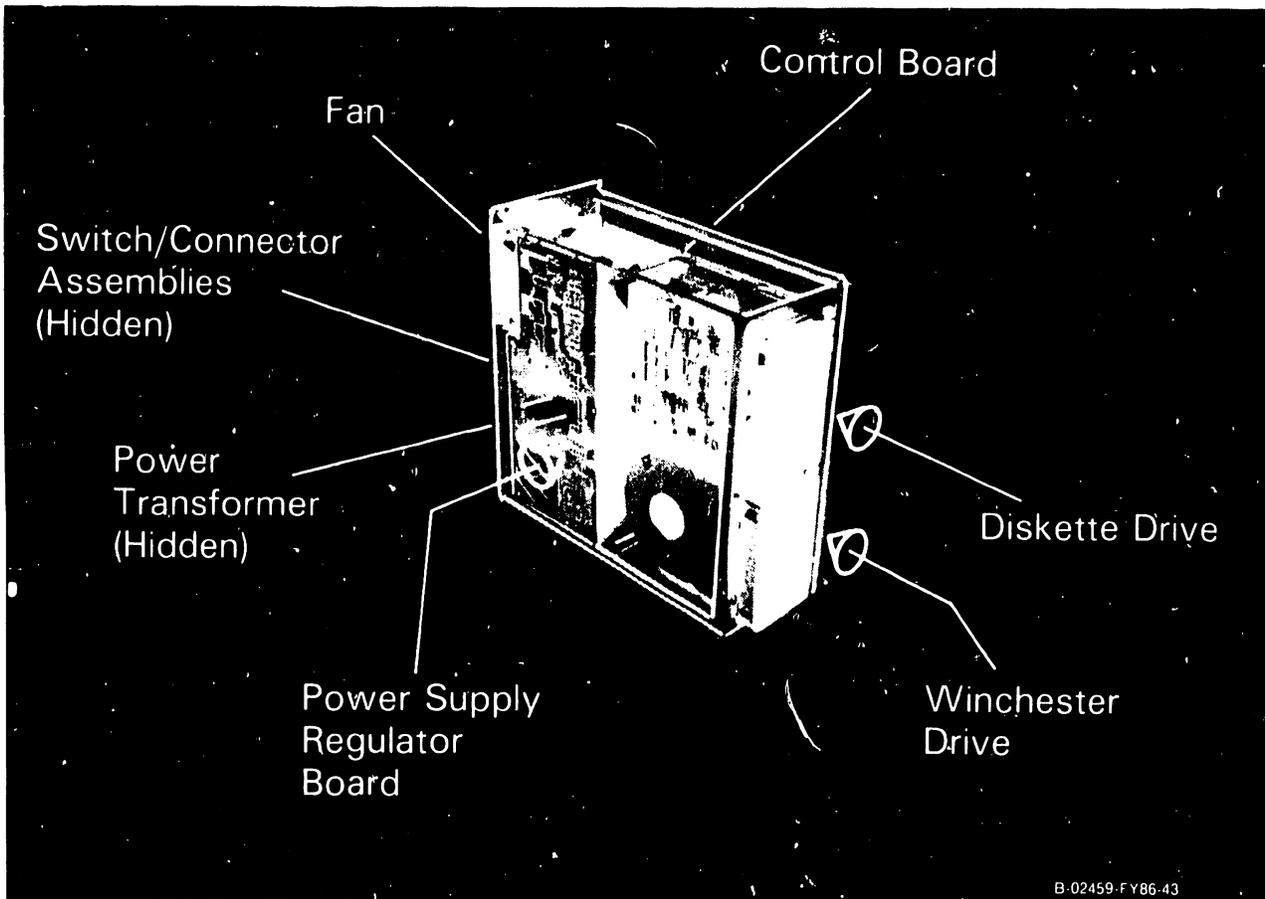
IDENTIFICATION

2.1 Major Assemblies



IDENTIFICATION

2.2 Subassemblies



SECTION

3

**CONTROLS AND
INDICATORS**

CONTROLS AND INDICATORS

3.0 Section Contents

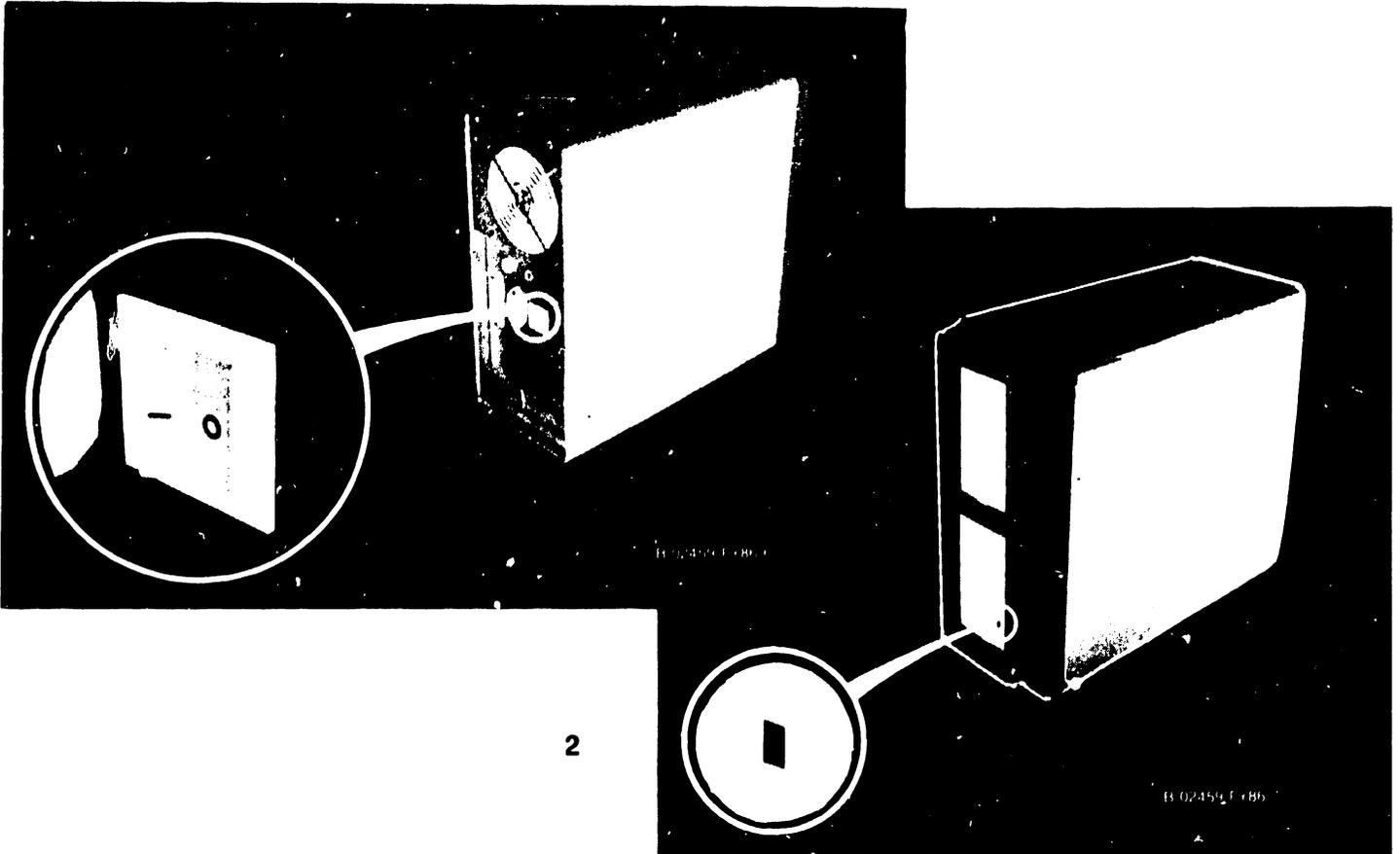
3.1 Operator Controls and Indicators

3.2 Service Controls

CONTROLS AND INDICATORS

3.1 Operator Controls and Indicators

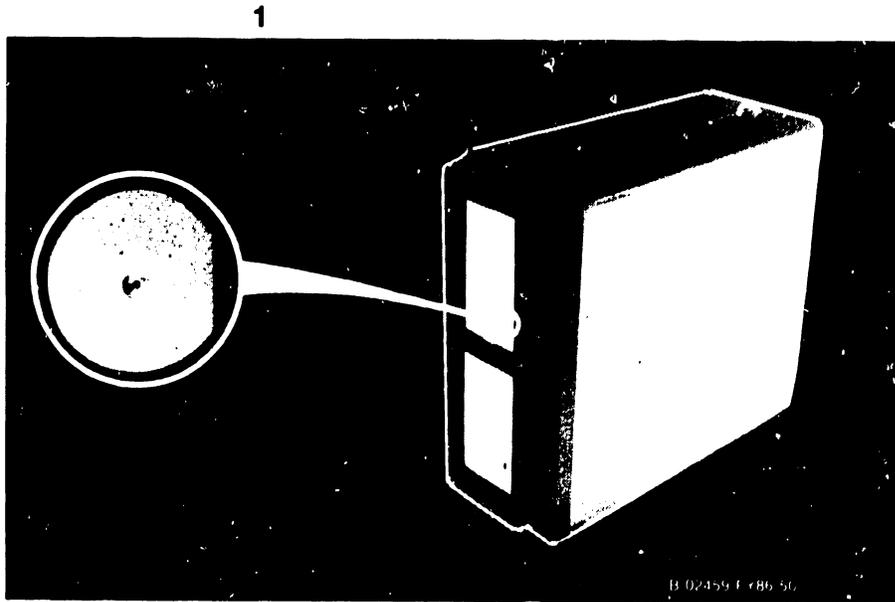
1



Item	Name	Type and Function
1	AC Power Switch	Rocker switch; applies ac power to the power supply and cooling fan.
2	Error Code	LED, displays error codes during power-up diagnostic. Flashing = drive fault Steady on = Control Board fault Lights, during normal operation, when drive is accessed by system.

CONTROLS & INDICATORS

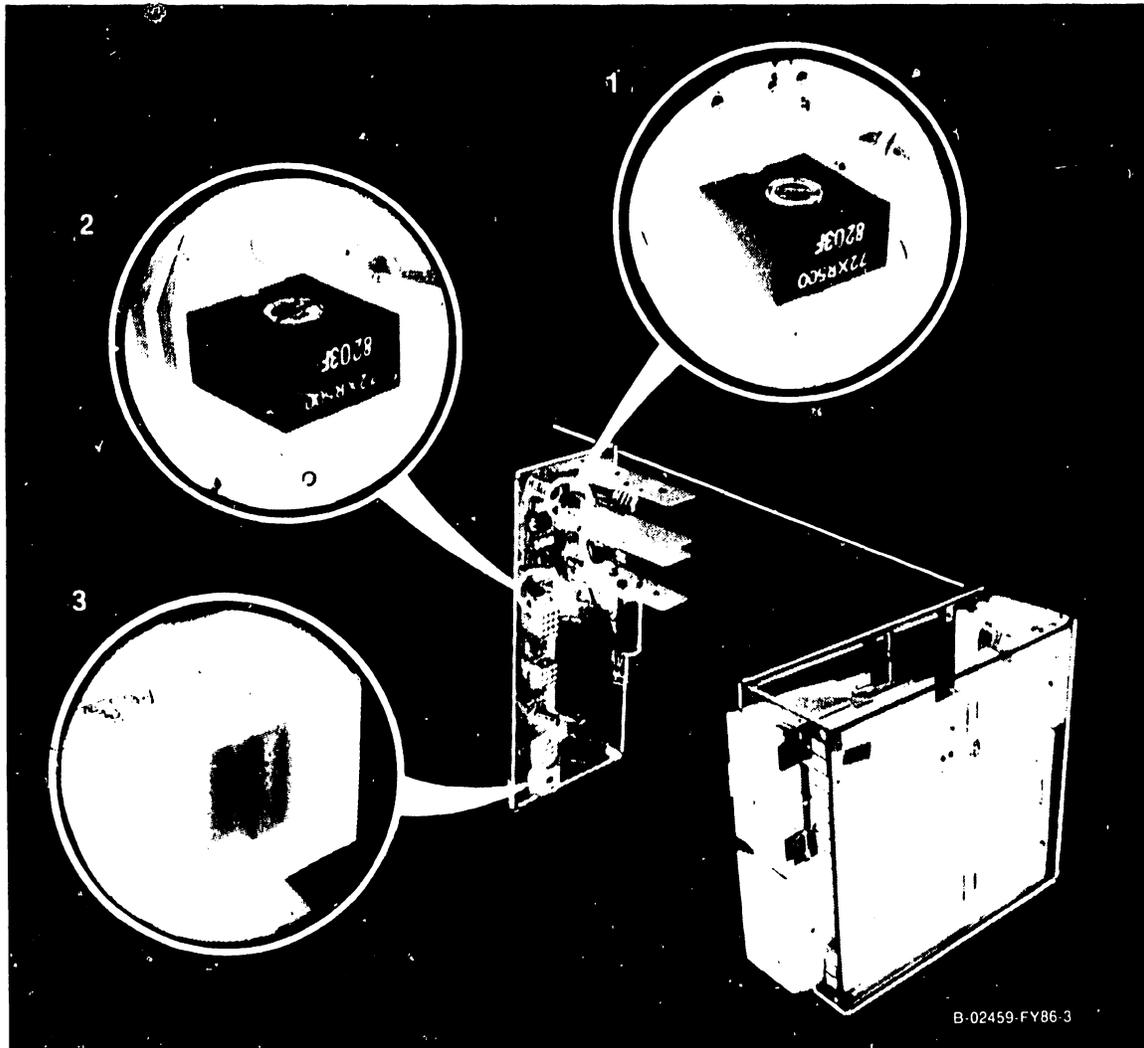
3.1 Operator Controls & Indicators (cont)



Item	Name	Type and Function
1	Status	LED: Flashes to indicate drive fault Steady on - indicates drive accessed by system.

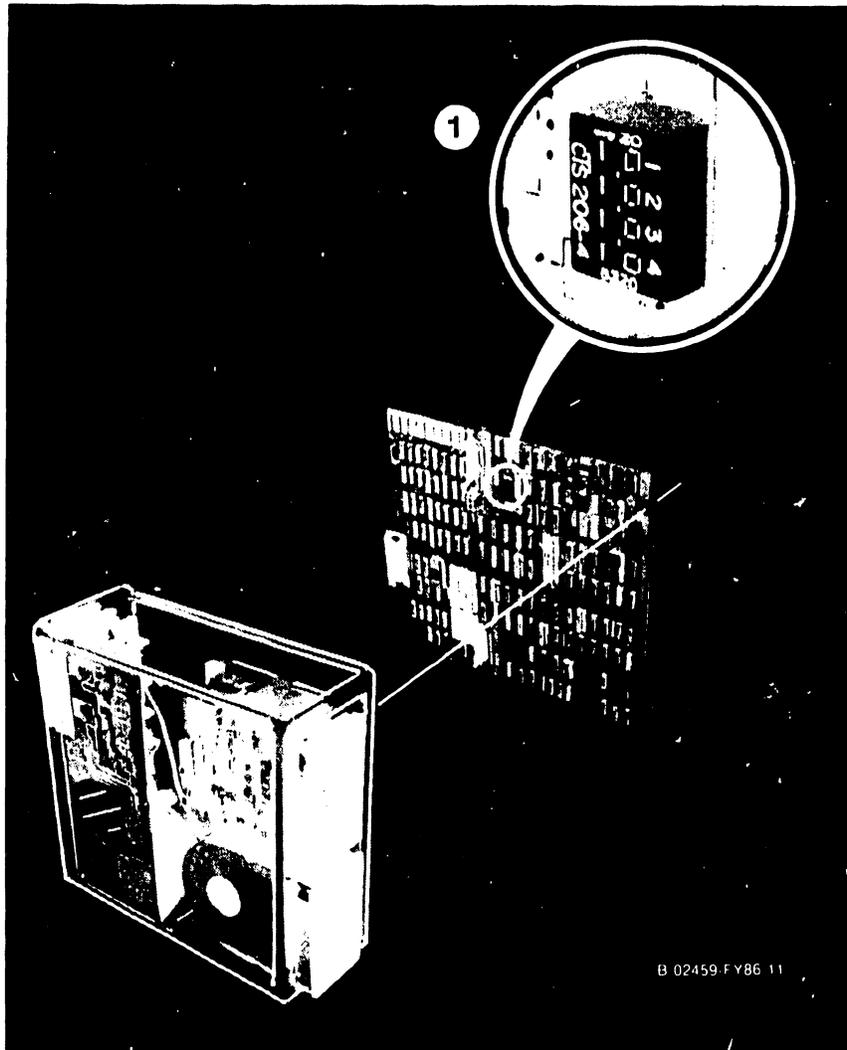
CONTROLS & INDICATORS

3.2 Service Controls



Item	Name	Type and Function
1	R24	Potentiometer: adjusts +12 volts, dc.
2	R9	Potentiometer: adjusts +5 volts, dc.
3	Power Source	Slide switch: adapts power supply to power input of either 230 or 115 volts, ac.

3.2 Service Controls (continued)



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Item	Name	Type and Function
1	Device Identification	DIP switch, 4-pole: Identifies size and type of drives used. Example: 1 Floppy + 10-meg Winchester

SECTION

4

**OPERA-
TION**

OPERATION

4.0 Section Contents

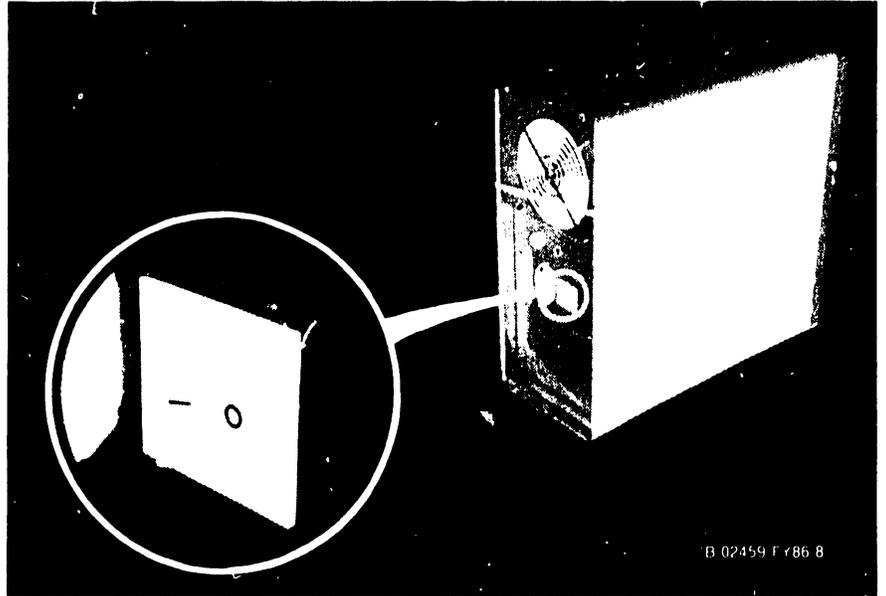
4.1 Power Up

4.2 Power Down

OPERATION

4.1 Power Up

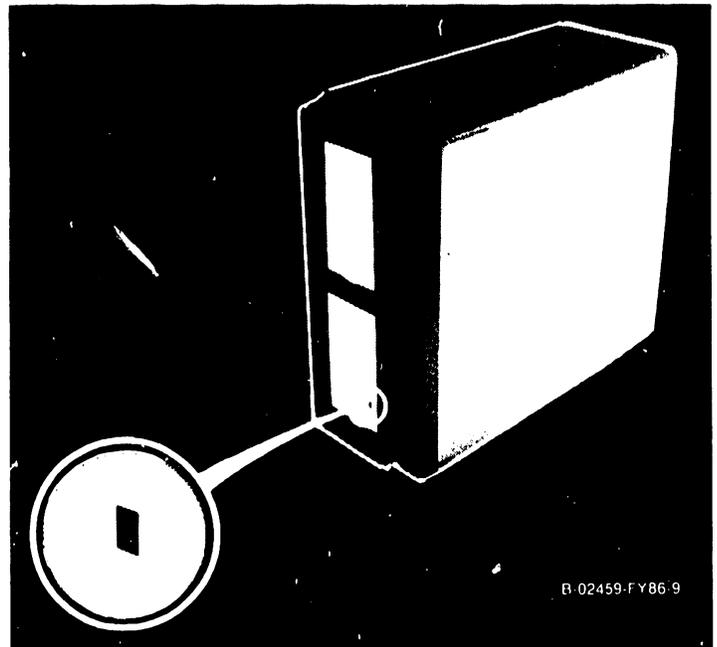
1. Turn on MVP CPU.
2. Turn on MVP system disk.
3. Turn on primary MVP workstation.
4. Turn on 2275 Disk Peripheral.



5. Observe that MVP workstation displays:

MOUNT SYSTEM PLATTER
PRESS RESET

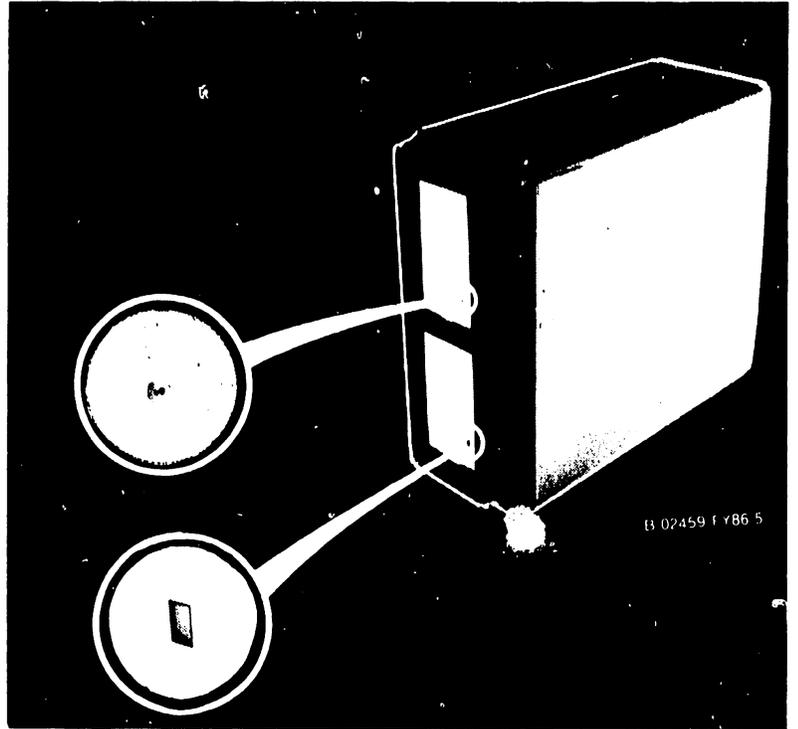
6. Observe that 2275 Winchester drive LED lights at turn on and goes out when power up is complete.



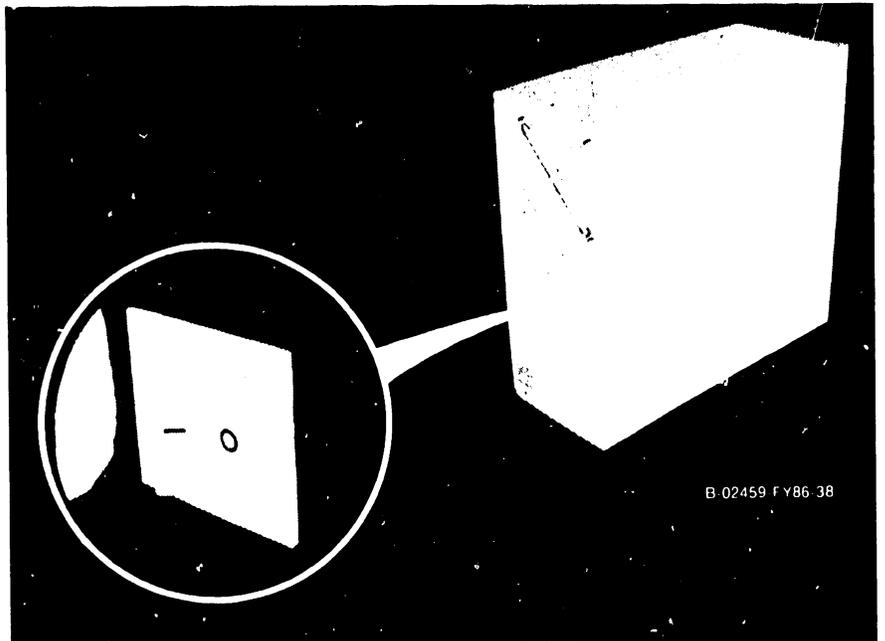
OPERATION

4.2 Power Down

1. Ensure that disk drive LEDs are not illuminated, and that floppy-drive door is open.



Set ac power switches to off ("0") position.



SECTION

5

**PREVENTIVE
MAINTENANCE**

PREVENTIVE MAINTENANCE

There is no scheduled preventive maintenance for the 2275 Disk Peripheral unit. Parts subject to gradual degradation of performance are not accessible for field servicing.

SECTION

6

**TROUBLE-
SHOOTING**

TROUBLESHOOTING

6.0 Section Contents

- 6.1 Tools and Equipment
- 6.2 Power-up Diagnostics
- 6.3 Other Diagnostic Aids
- 6.4 Power Supply Check

6.1 Tools and Equipment

No special tools or equipment are necessary.

6.2 Power-Up Diagnostics

At power-up completion, the two front-panel LEDs indicate diagnostic results:

-Both dark = system good

- Blinking = respective drive failed

- Steady on = control board failed

Should one drive fail, depress system RESET to resume operation. Failed drive may be re-accessed only by a repetition of the power-up procedure.

6.3 Other Diagnostic Aids

6.3.1 Read/write problems:

Observe whether read/write heads are clean.

Verify that diskette does not show any head-to-media contact.

Read/write to both drives.

- If one drive fails, replace. If trouble not cleared, replace Control Board.
- If both drives fail, replace control board.

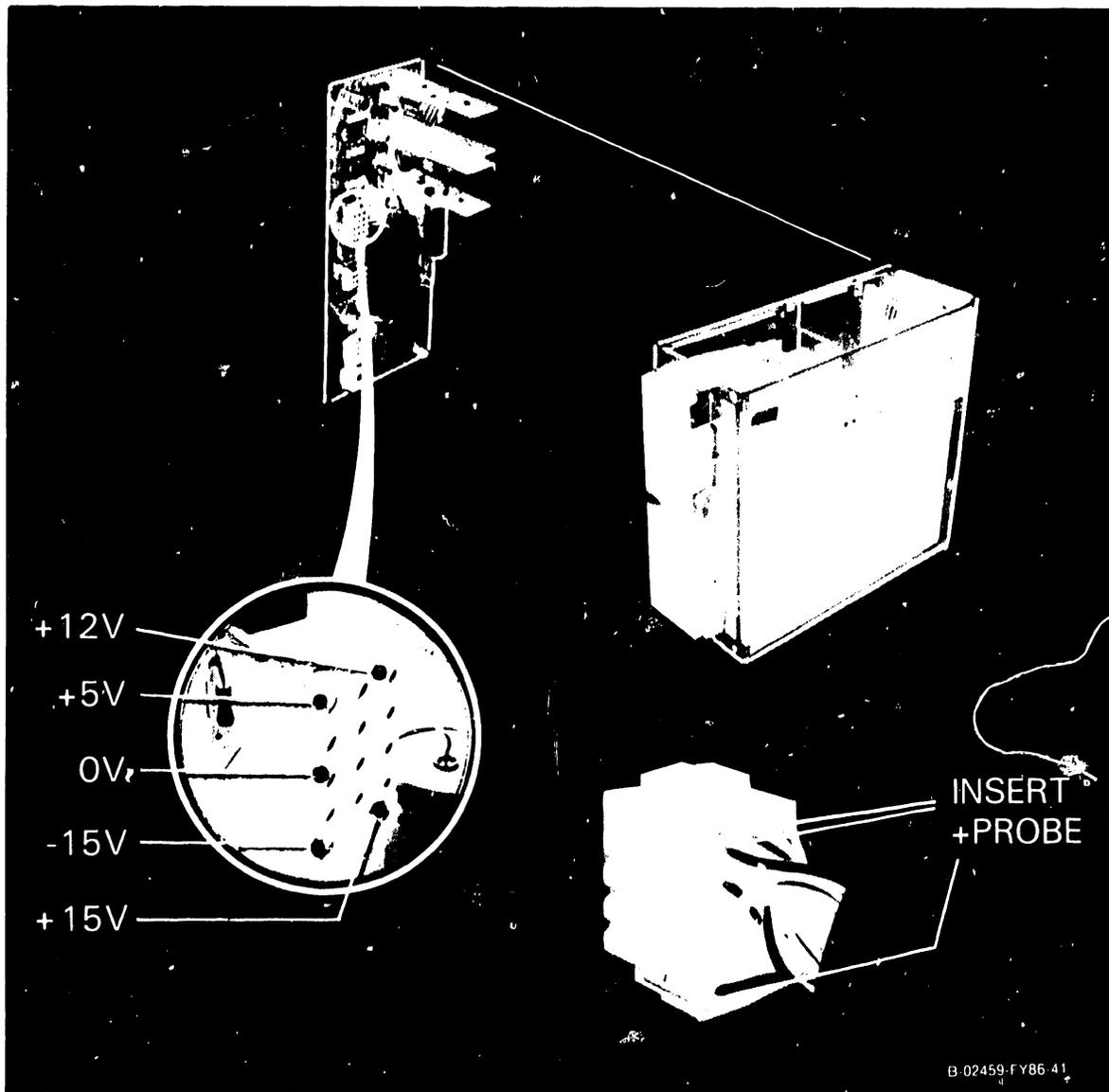
6.3.2 Failure of Drive(s) to Activate

- If both drives fail, check power supply (see 6.4).
- If one drive fails, replace drive.

TROUBLESHOOTING

6.4 Power Supply Check

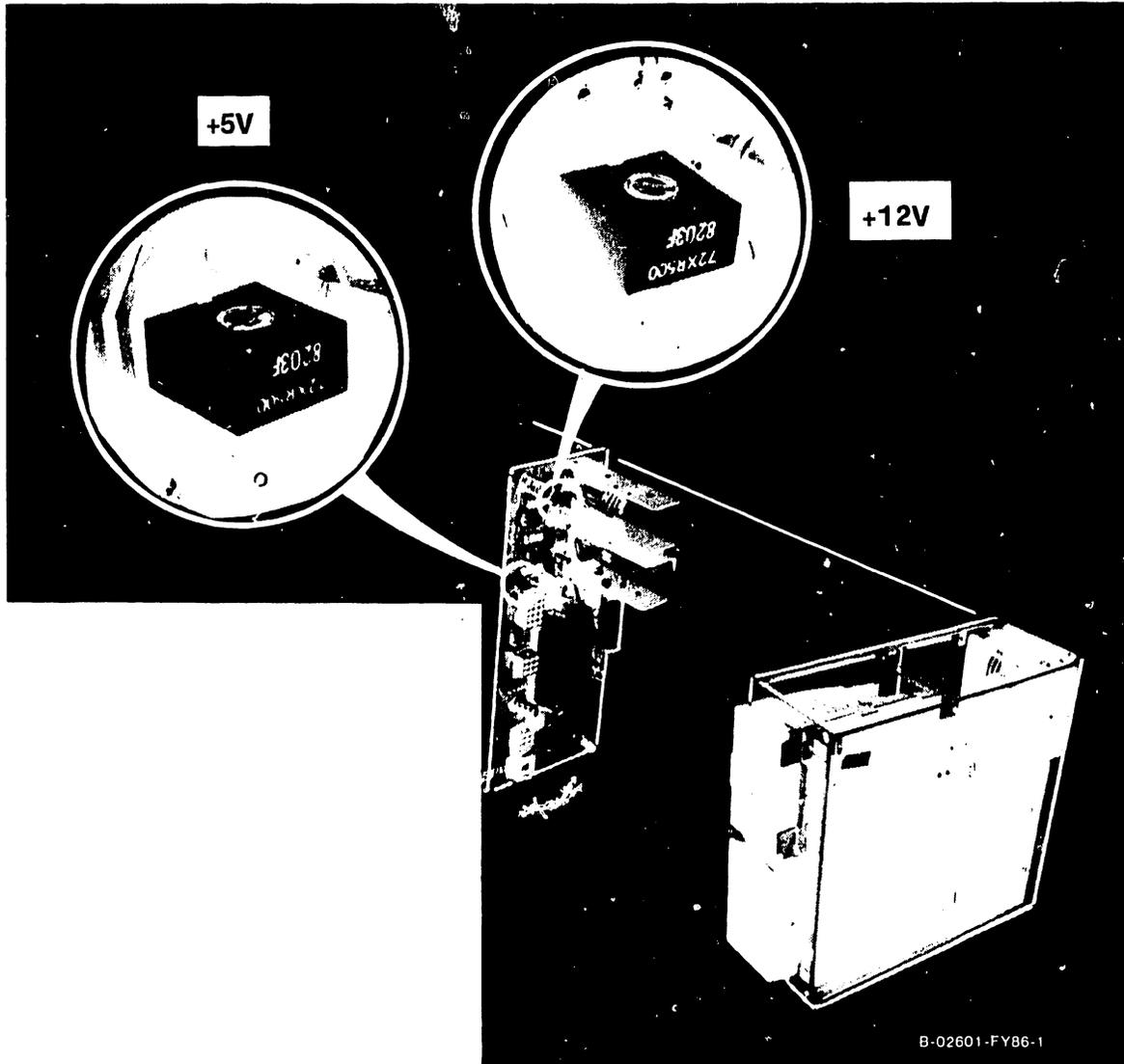
1. Remove 2275 chassis from enclosure (see 7.1).
2. Set power switch on (depress 1).
If fan fails to turn on, verify power source.
3. Check J3 voltages at wire inserts
(All cables must be connected):



TROUBLESHOOTING

6.4 Power Supply Check (continued)

4. Adjust +12V and +5V if necessary.



If voltages are not adjustable within +4.5V - +5.5V and +10.8V - 13.2V, go to step 5.

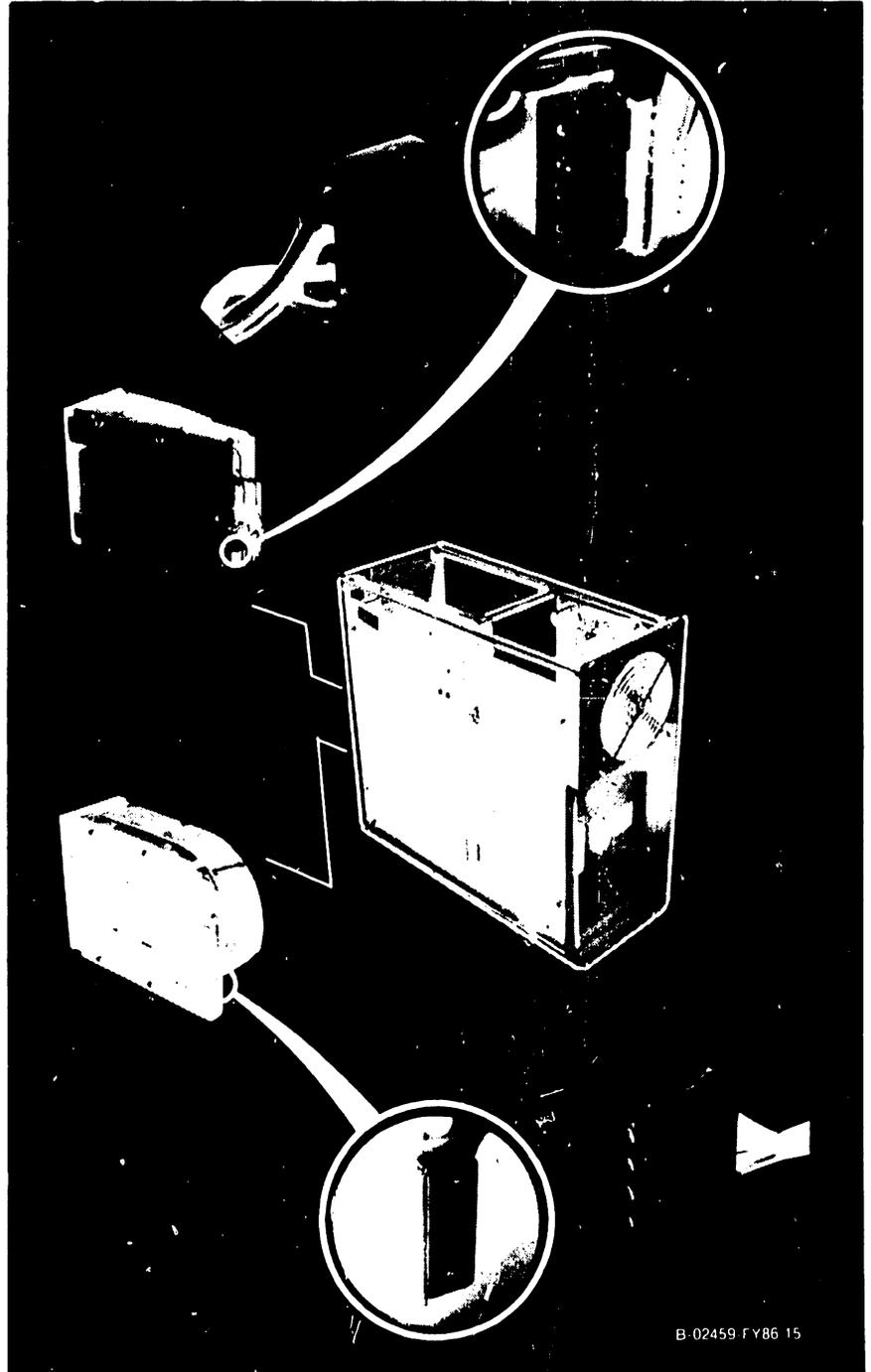
TROUBLESHOOTING

6.4 Power Supply Check (continued)

5. Disconnect disk drive power cable. Recheck voltages.

If voltage corrected, replace disk drive.

If voltage still failing, go to step 6.



6. Re-connect cable, and disconnect other disk drive power cable. Recheck voltages.

If voltage corrected, replace disk drive.

If voltage still failing, go to step 7.

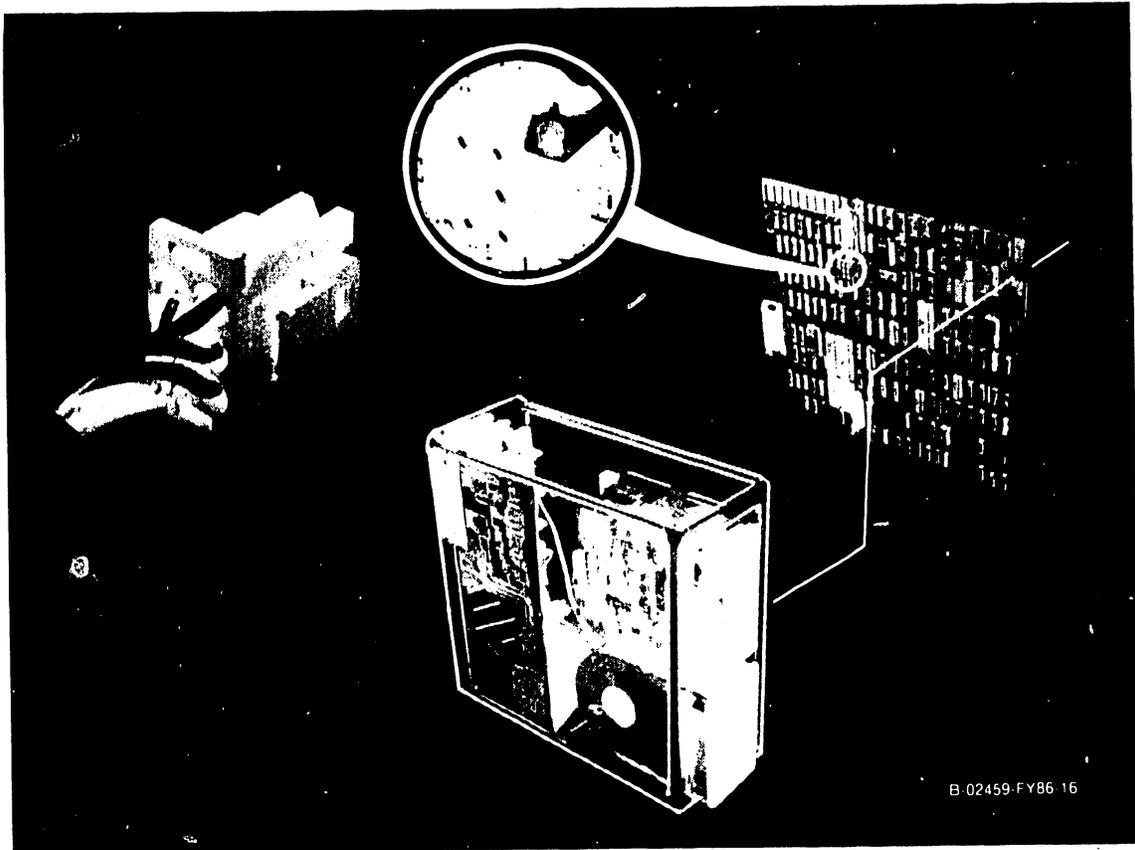
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6.4 Power Supply Check (continued)

7. Re-connect cable, and disconnect Control Board power cable.
Recheck voltages.

If voltage corrected, replace Control Board.

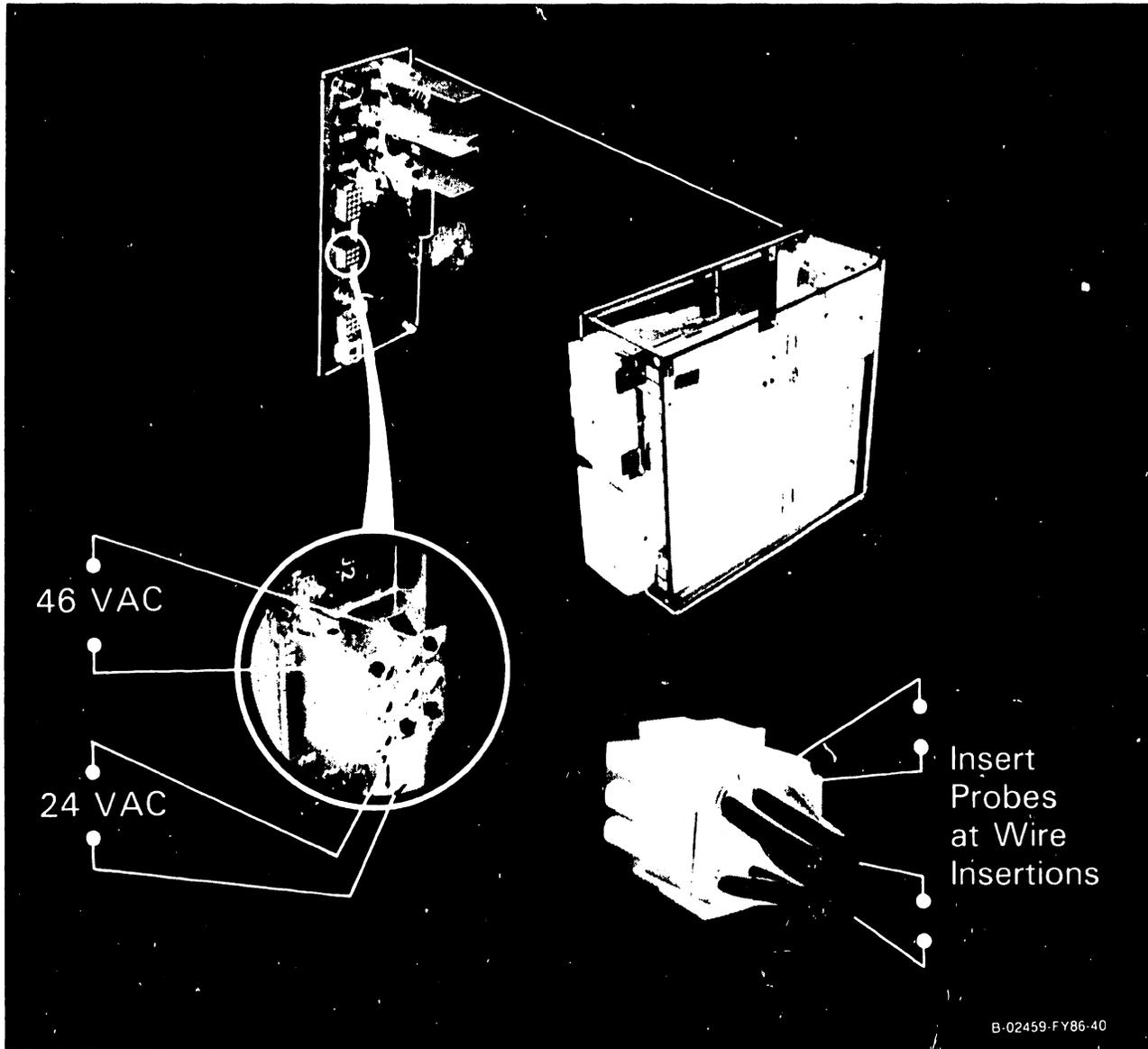
If voltage still failing, go to step 8.



TROUBLESHOOTING

6.4 Power Supply Check (continued)

8. Re-connect Control Board power cable, and Check J2 voltages at wire inserts (All cables must be connected):



If ac voltages check OK, replace rectifier board. Should either ac voltage fail, replace transformer.

SECTION

7

REPAIR

REPAIR

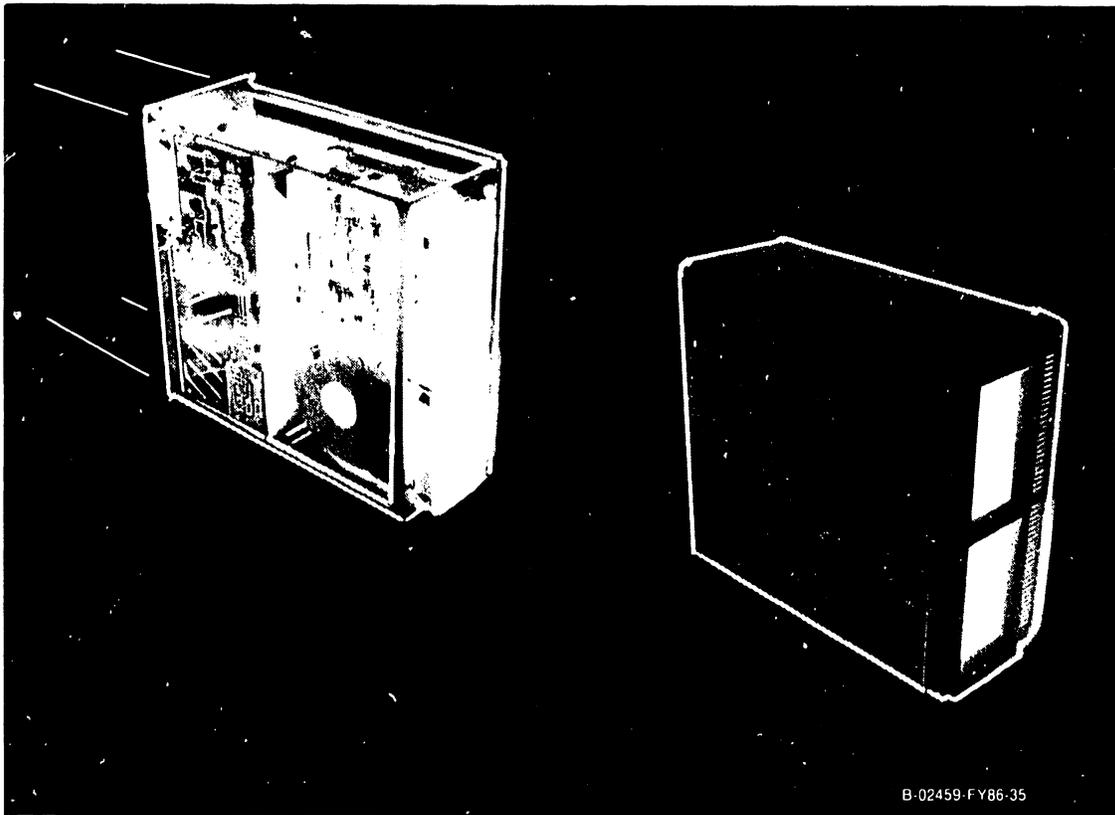
7.0 Section Contents

- 7.1 Chassis Removal
- 7.2 Disk Drive Removal
- 7.3 Control Board Removal
- 7.4 Power Supply Regulator Removal
- 7.5 Transformer and Fan Removal
- 7.6 Cable Replacement

REPAIR

7.1 Chassis Removal

1. Remove four screws at rear of chassis.
2. Slide chassis from enclosure.

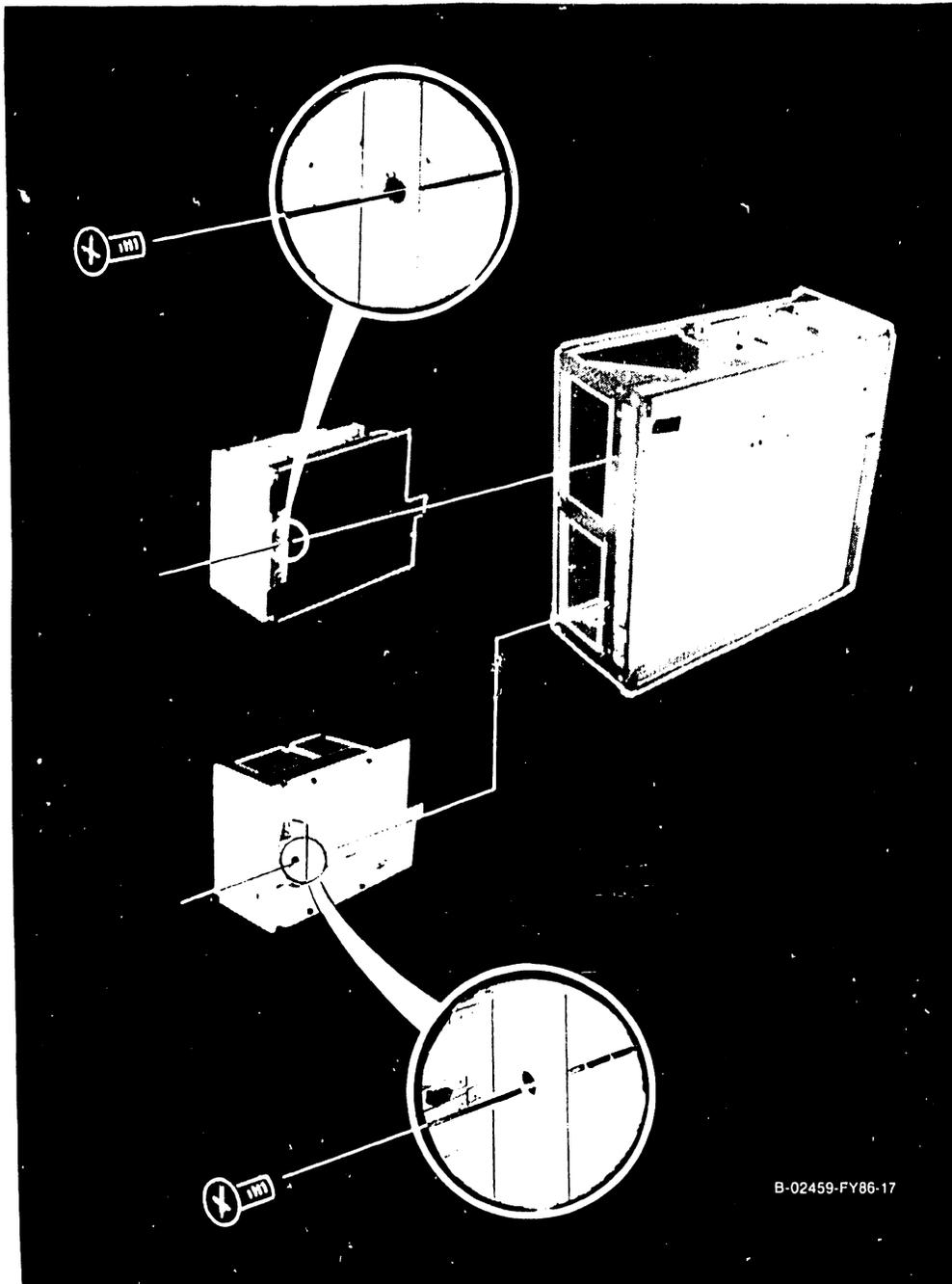


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REPAIR

7.2 Disk Drive Removal

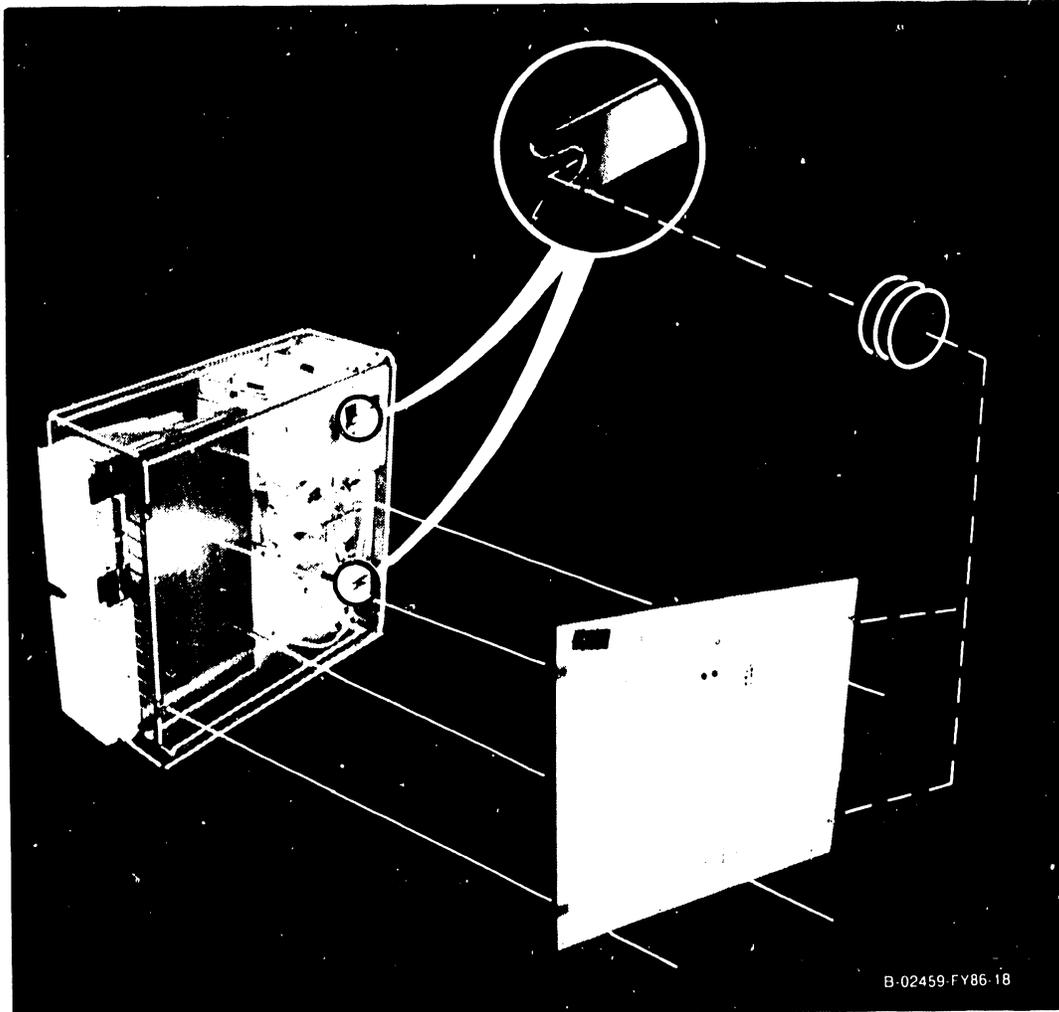
1. Disconnect cables from drive to be replaced.
2. Remove single screw securing respective drive in place.
3. Slide drive from chassis.



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7.3 Control Board Removal

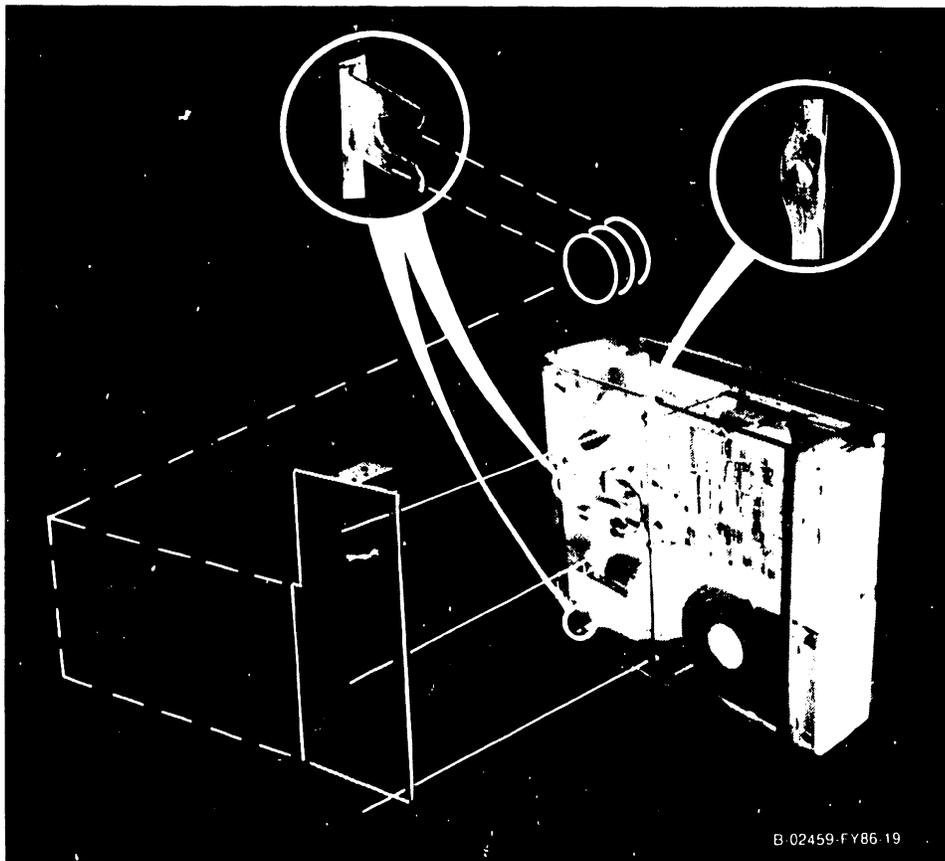
Disconnect power and signal cables before removing control board.



REPAIR

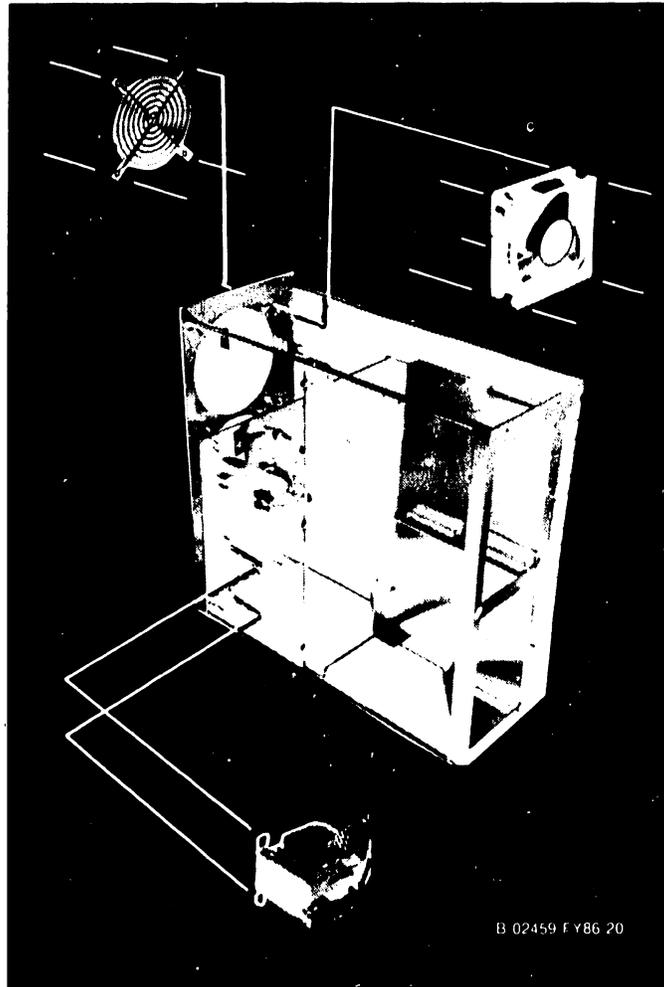
7.4 Power Supply Regulator Removal

Disconnect cables before removing regulator board.



7.5 Transformer and Fan Removal

Disconnect transformer cables before removing either transformer or fan.



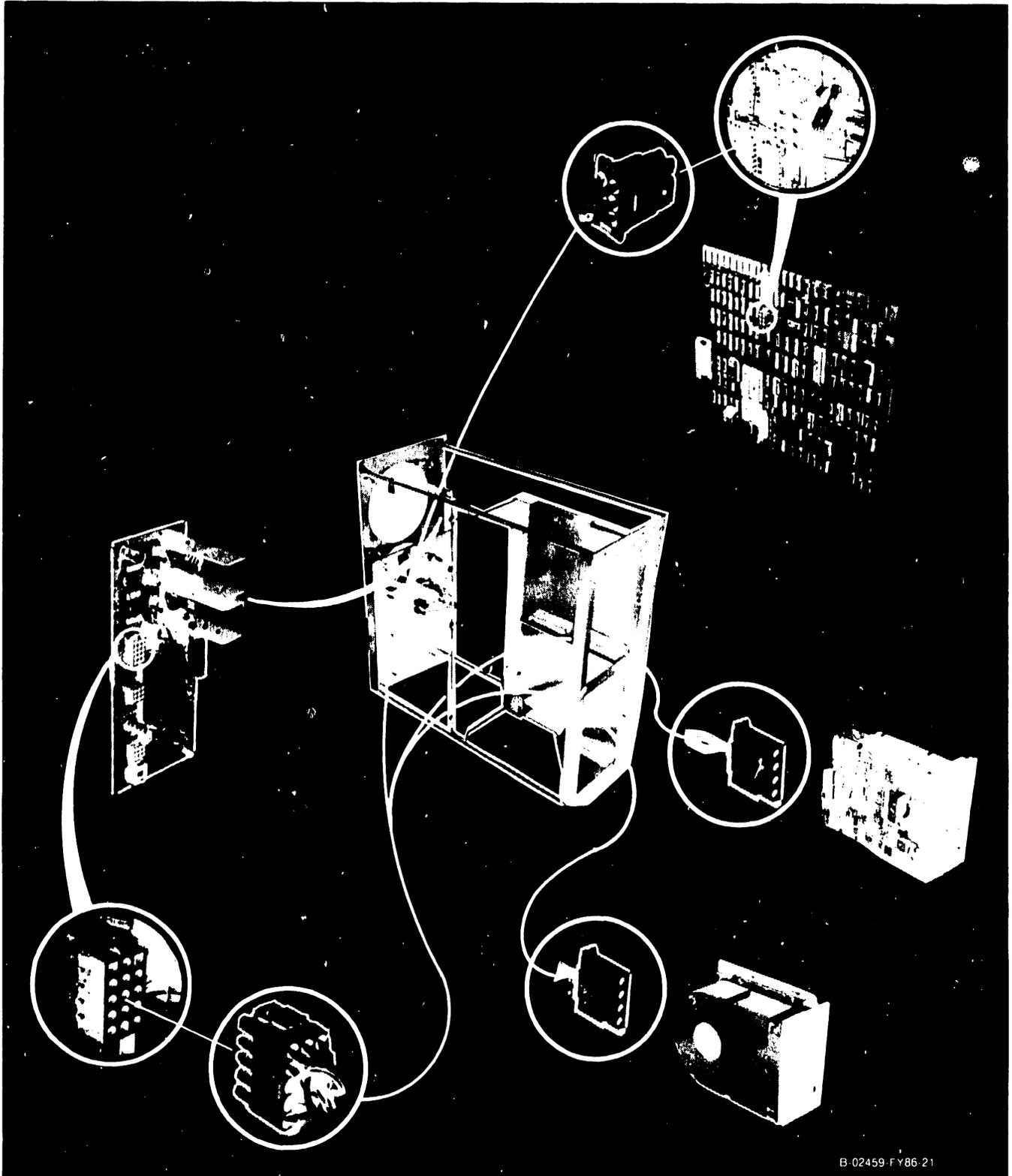
7.6 Cable Replacement

When replacing either cables or components, reconnect cables as shown in the following illustrations:

- 7.6.1 Power Distribution Cabling
- 7.6.2 Transformer Power Input Cabling
- 7.6.3 Transformer-to-Regulator Connections
- 7.6.4 Regulator Center-Tap Connection
- 7.6.5 Winchester Signal Cable Connections
- 7.6.6 Diskette Drive Signal Connections

7.6 Cable Replacement (continued)

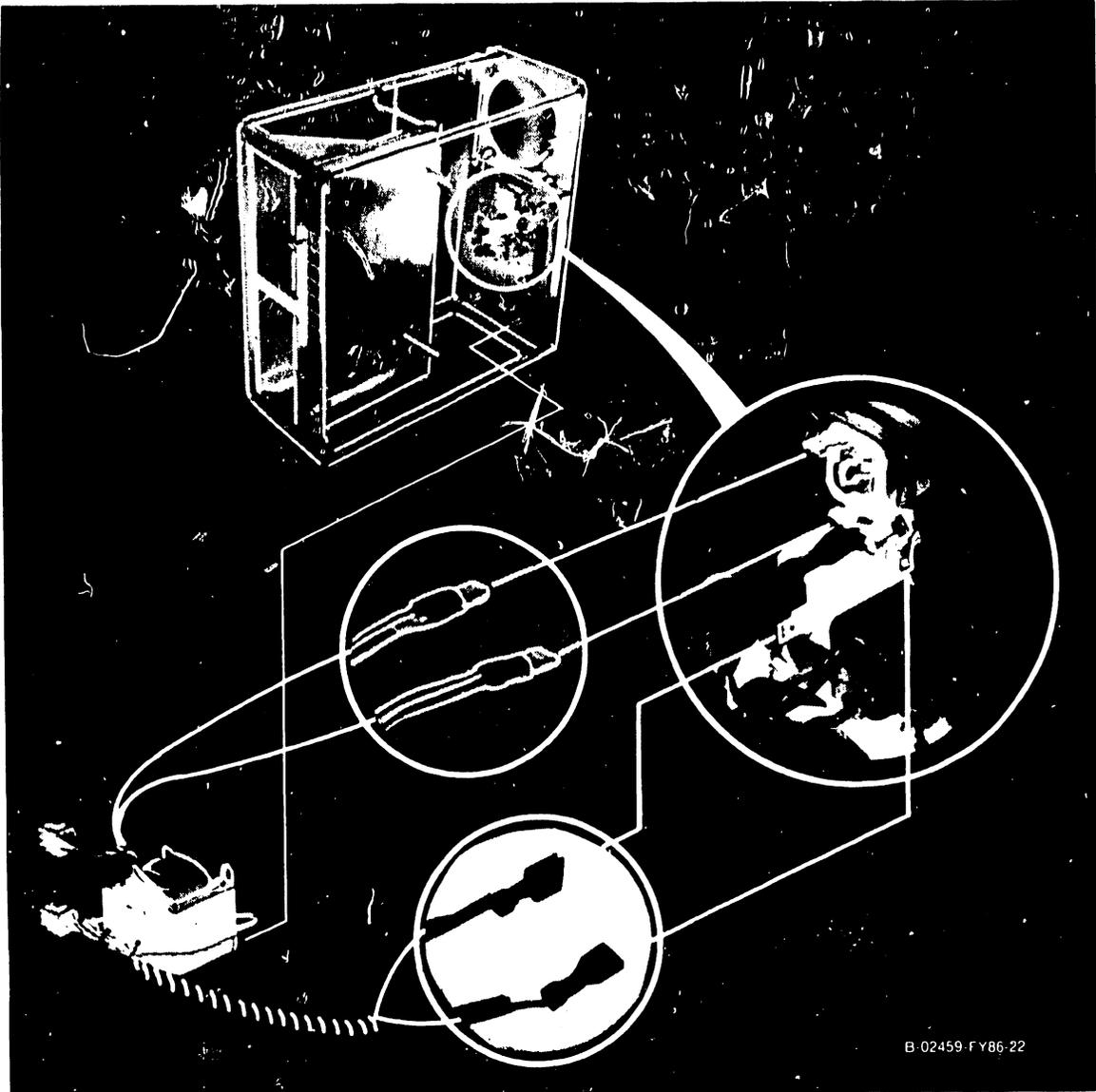
7.6.1 Power Distribution Cabling



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7.6 Cable Replacement (continued)

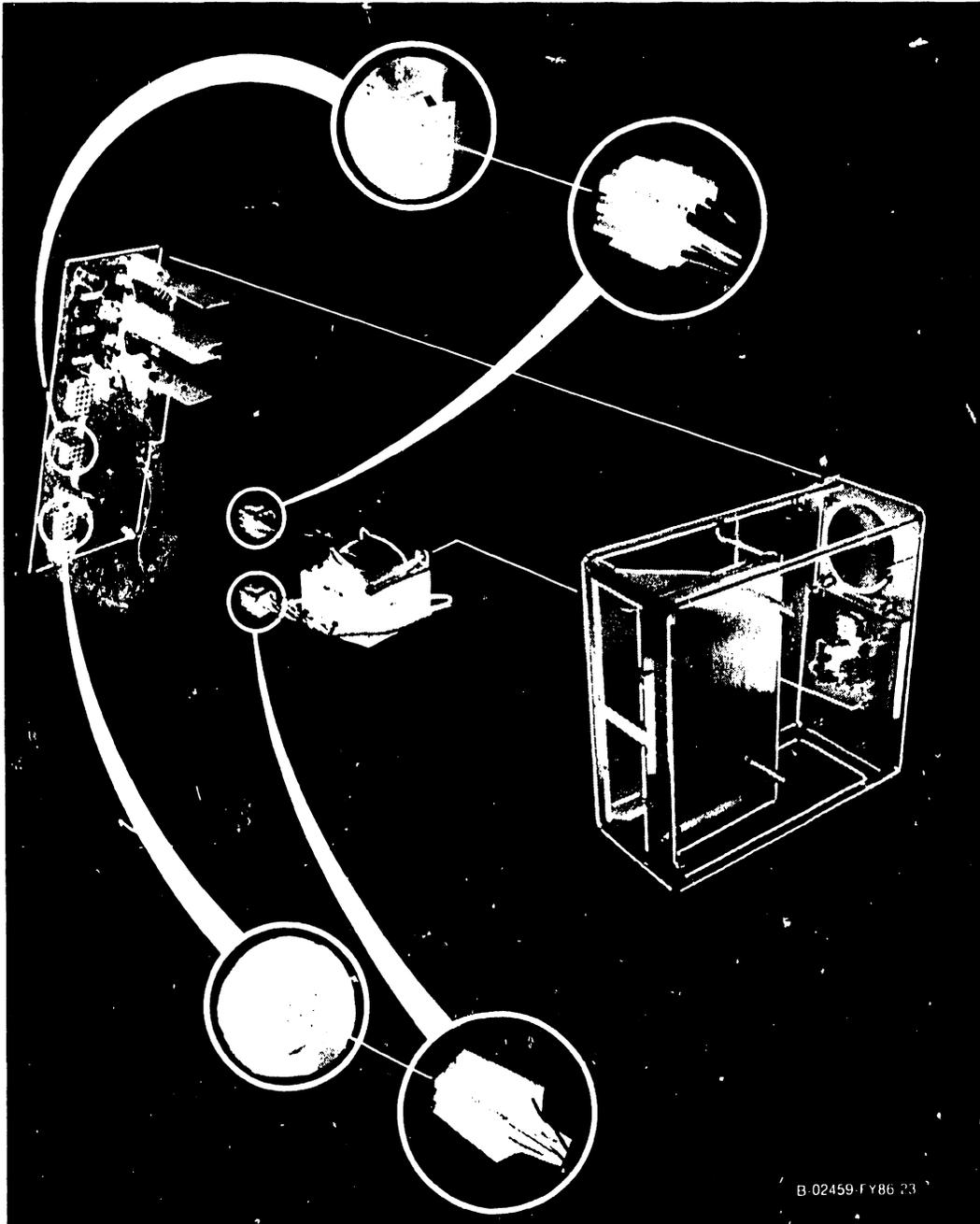
7.6.2 Transformer Power Input Cabling



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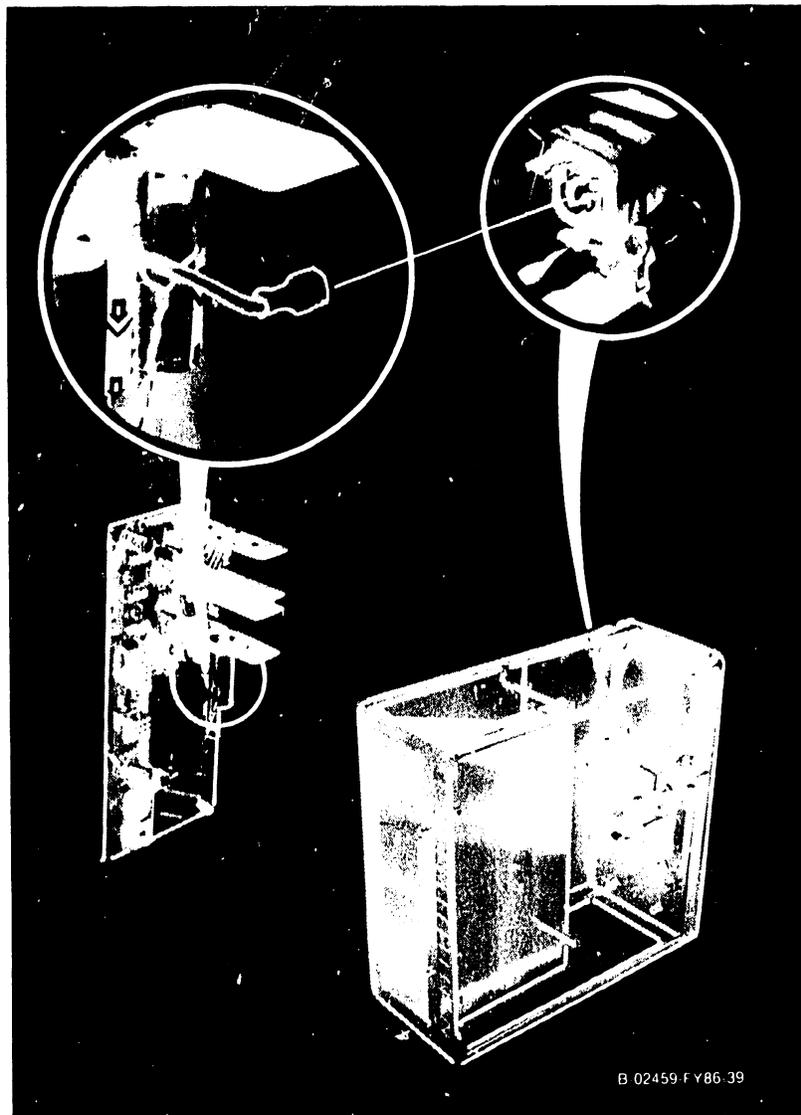
7.6 Cable Replacement (continued)

7.6.3 Transformer-to-Regulator Connections



7.6 Cable Replacement (continued)

7.6.4 Regulator Center-Tap Connection

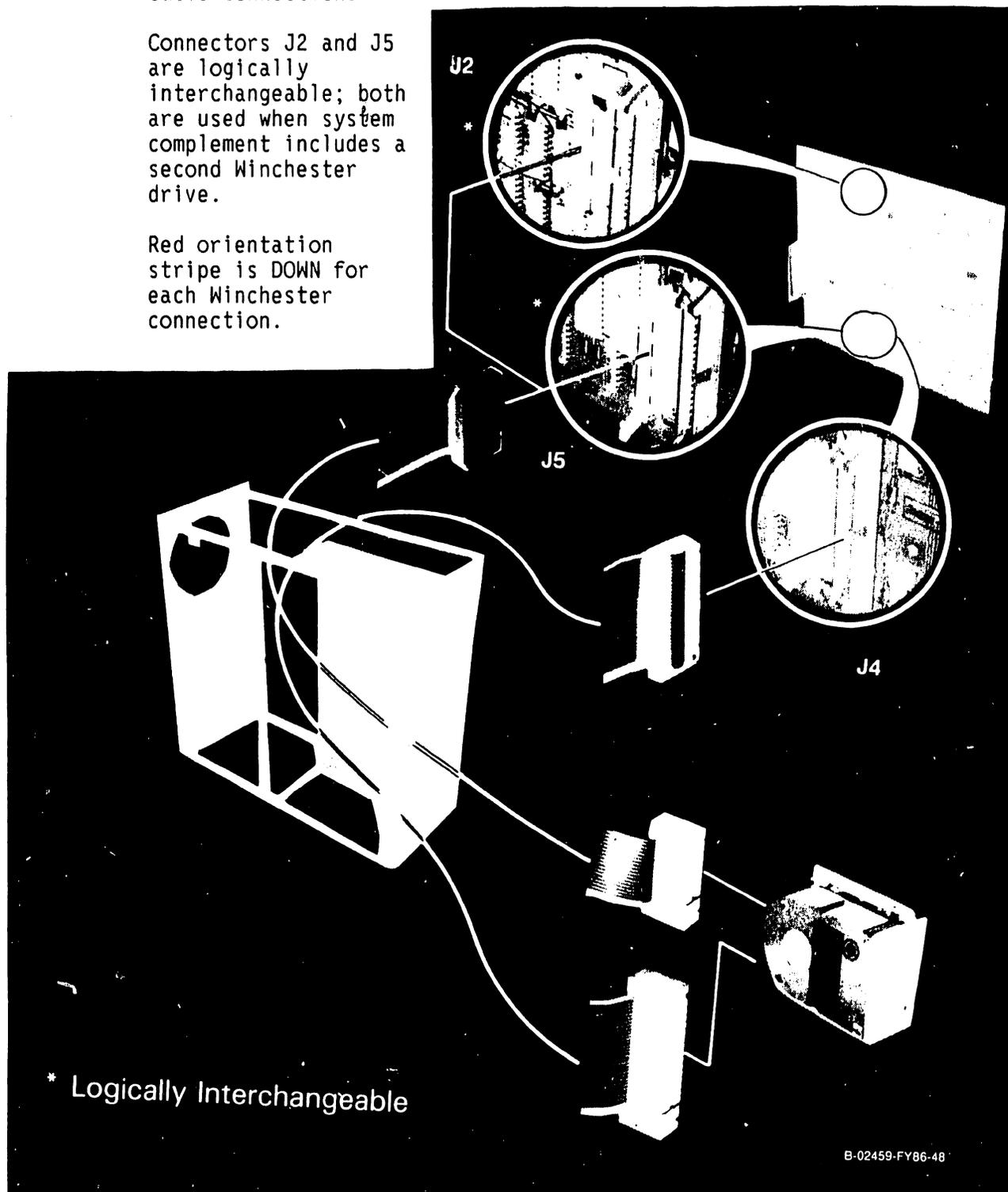


7.6 Cable Replacement (continued)

7.6.5 Winchester Signal Cable Connections

Connectors J2 and J5 are logically interchangeable; both are used when system complement includes a second Winchester drive.

Red orientation stripe is DOWN for each Winchester connection.



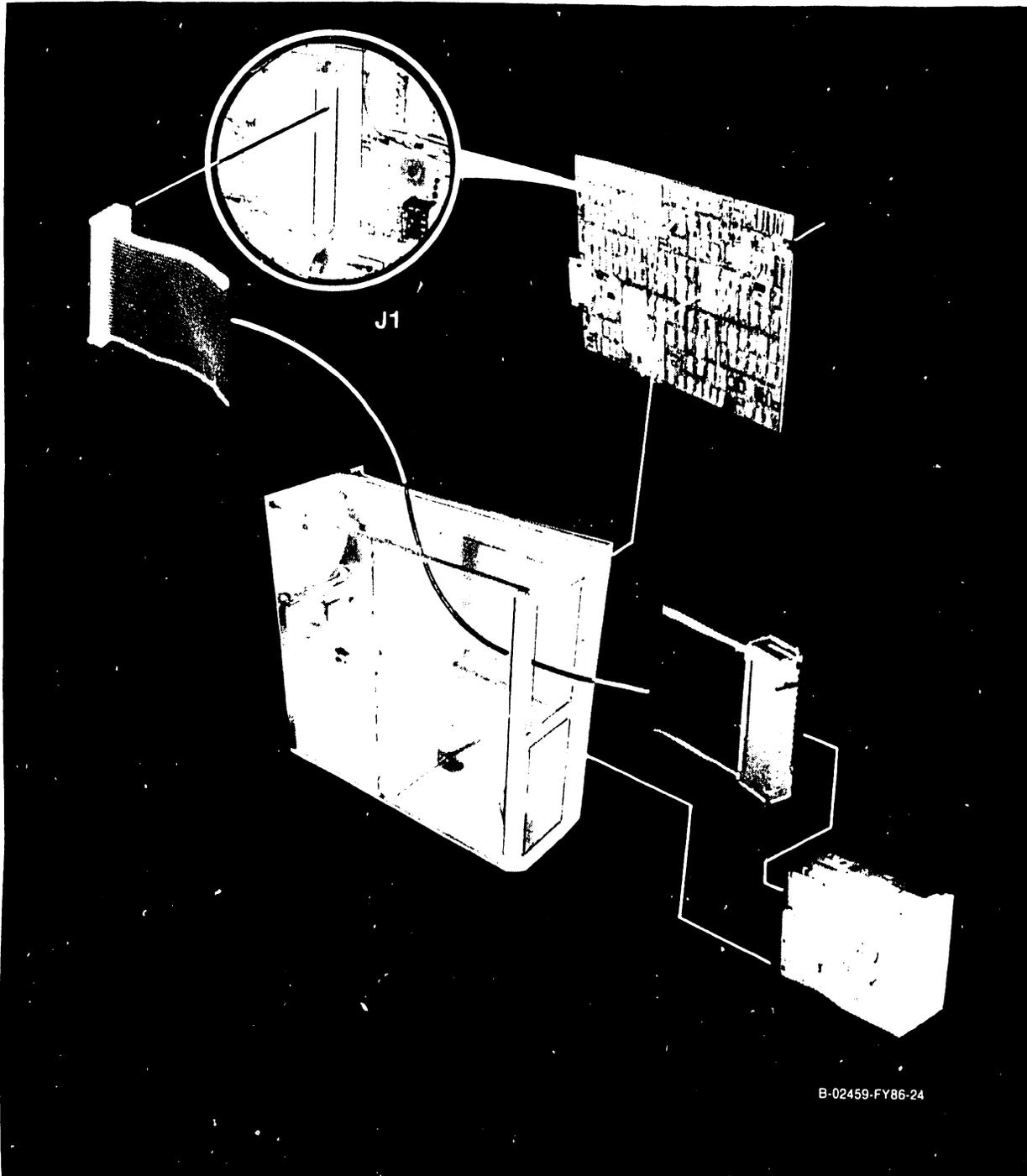
* Logically Interchangeable

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7.6 Cable Replacement (continued)

7.6.6 Diskette Drive Signal Connections

Red orientation stripe is UP for diskette drive signal connection.



SECTION

8

ADJUST-

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ADJUSTMENT AND ALIGNMENT

Individual disk drives are field replaceable. Field maintenance does not therefore include disk drive adjustment or alignment.

SECTION

9

UNPACK-

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SETUP

UNPACKING AND SETUP

9.0 Section Contents

9.1 Unpacking

9.2 Initial Settings

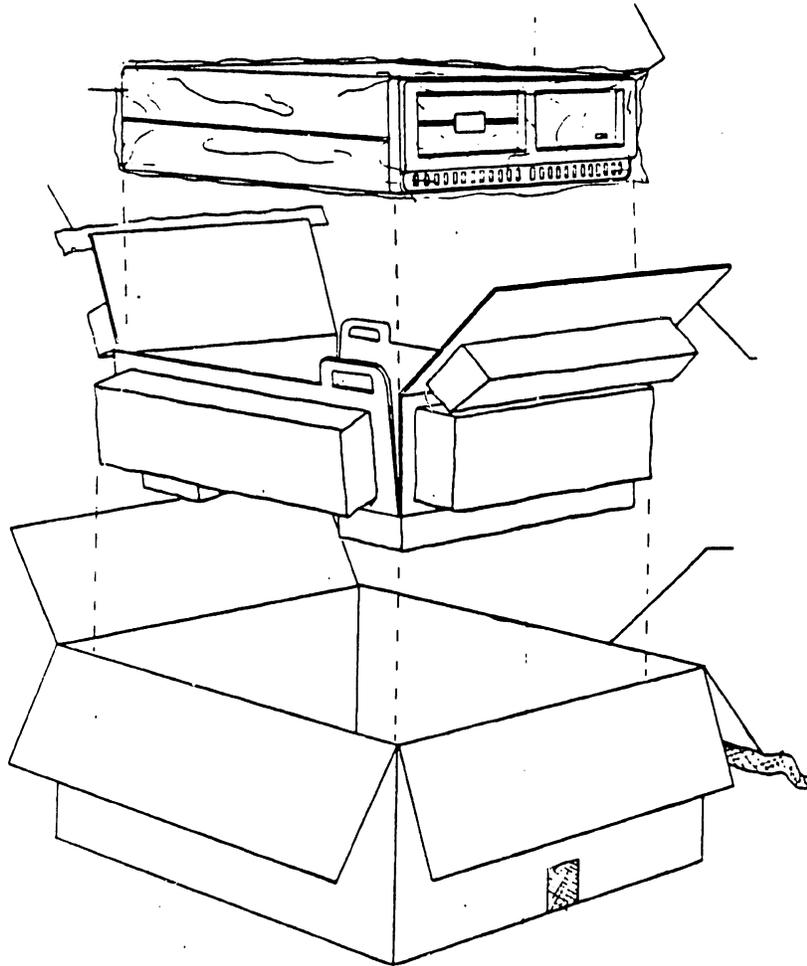
9.3 System Connections

9.4 System Checkout

UNPACKING AND SETUP

9.1 Unpacking

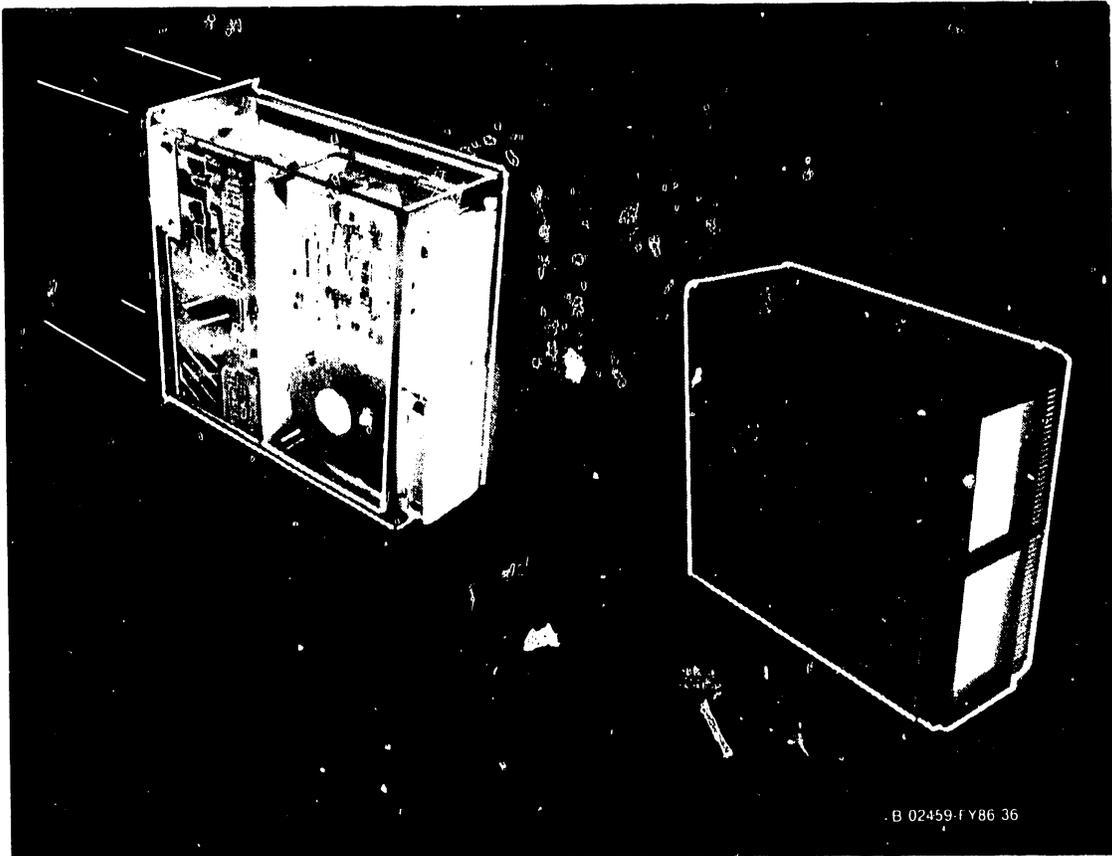
1. Cut reinforced tape; uncrate assembly packing.



UNPACKING AND SETUP

9.1 Unpacking (continued)

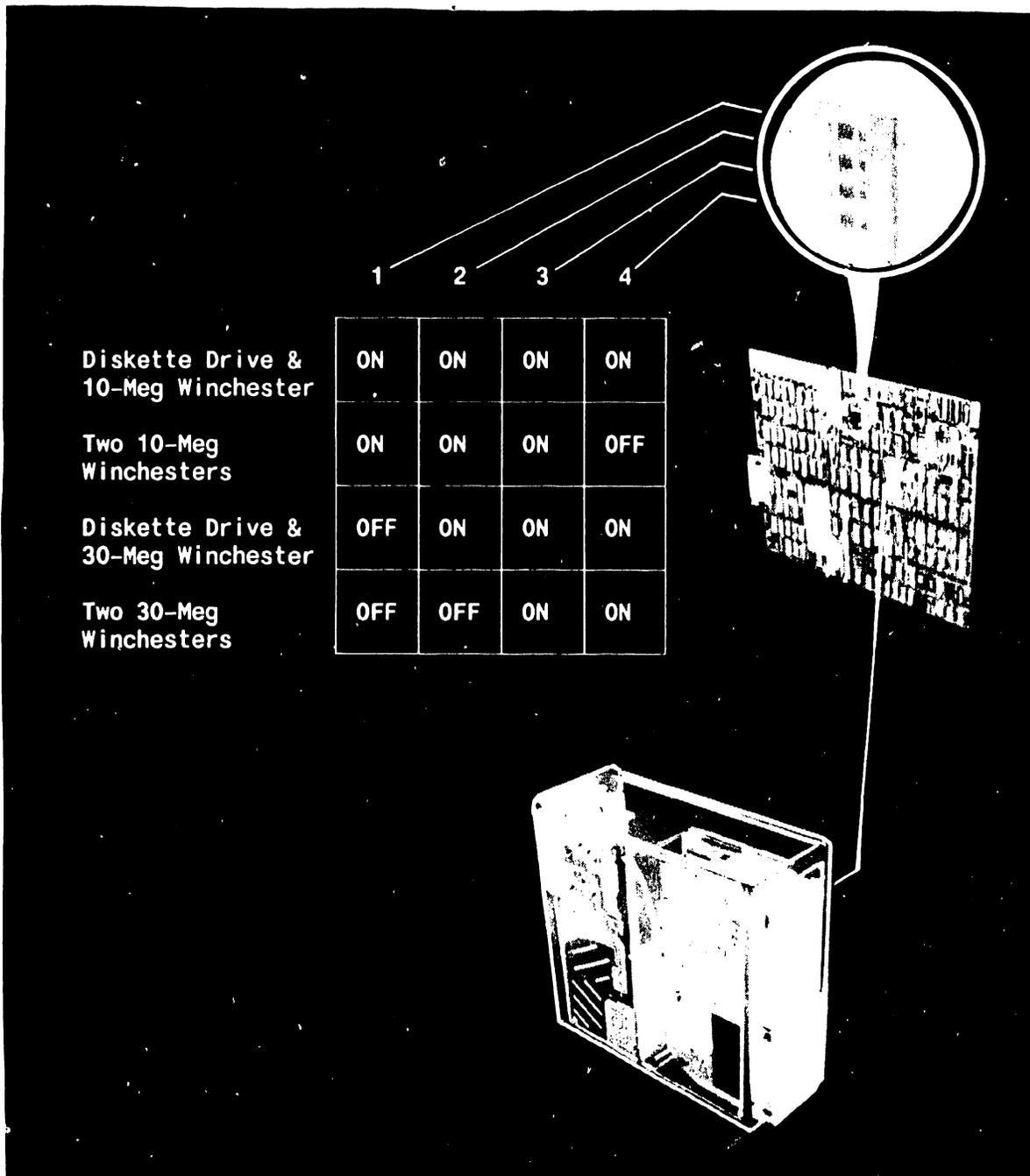
2. Remove four screws from rear panel; slide rear panel and chassis clear of cover.
3. Remove any internal packing material.
4. Inspect for internal damage and loose parts.



9.2 Initial Settings

9.2.1 Identification Switch Settings

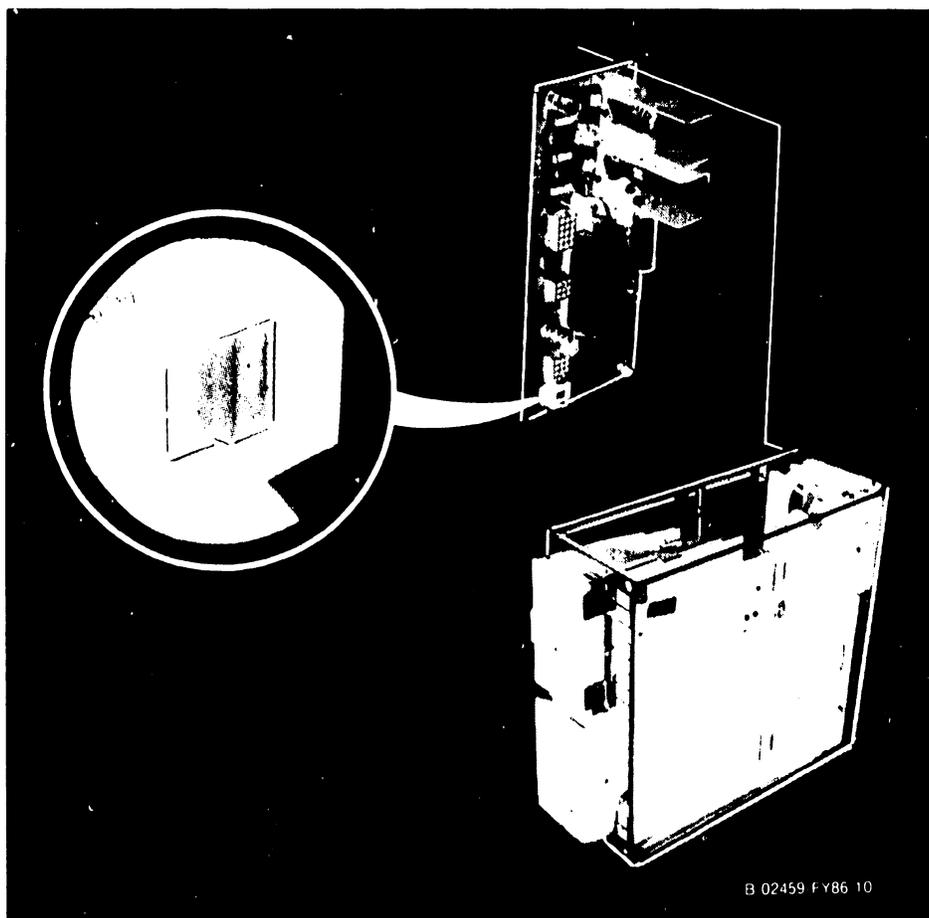
Set switch bank according to drive complement.



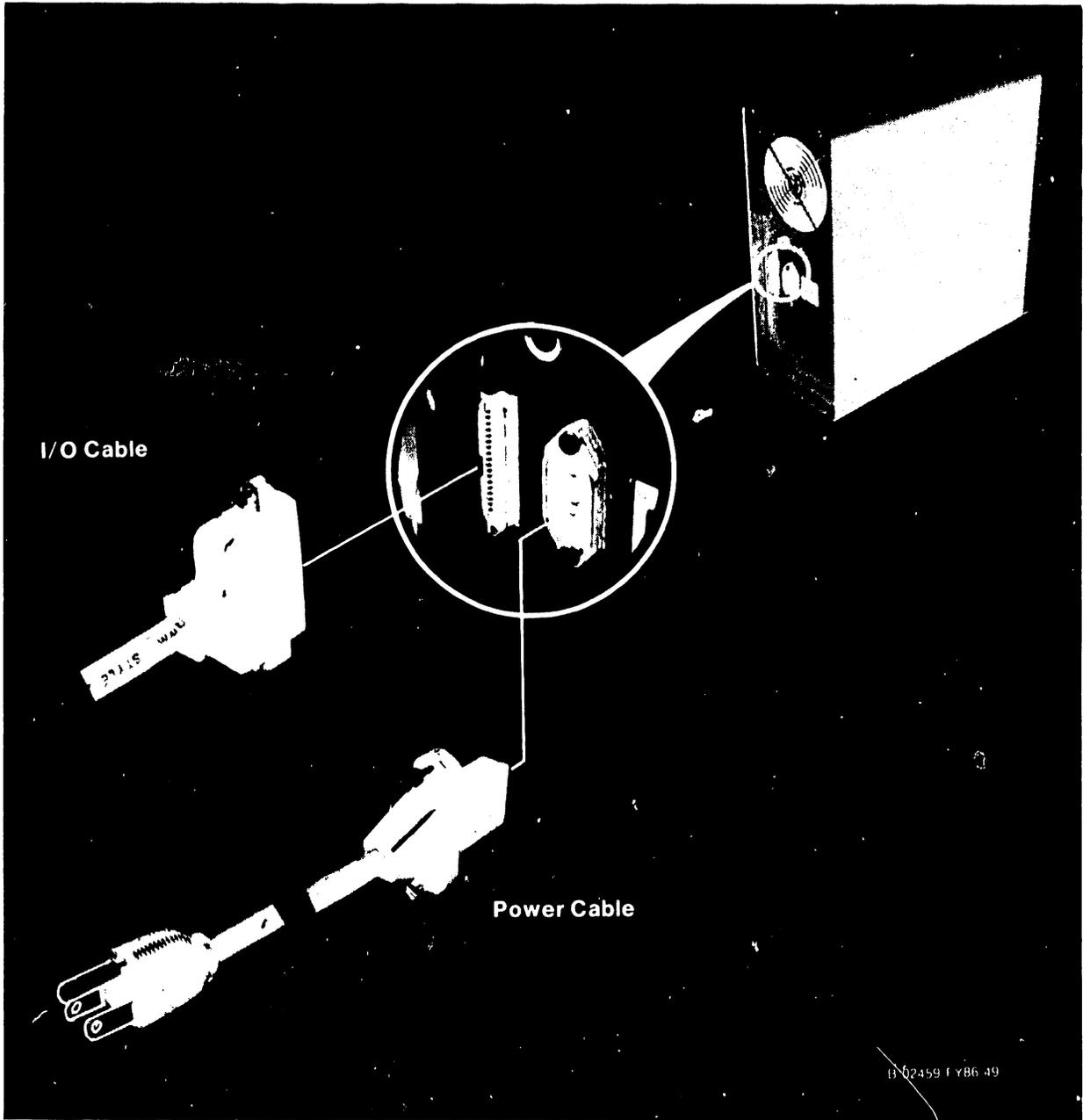
9.2 Initial Settings (continued)

9.2.2 Power source select switch setting

Set switch according to power source (115 VAC/230 VAC)



9.3 System Connections



9.4 System Checkout

1. Ensure that address for each drive is set on 2200 controller.
2. Perform Power Up (paragraph 4.1). Should failure occur, go to Troubleshooting (Section 6).
3. Format each diskette/hard disk in system:
 - Mount system utilities; enter LOAD RUN. Utilities menu should appear on CRT.
 - Select Format Platter; answer prompts. Approximate format time required:

DSDD diskette = a minimum of
1 minute 15 seconds.

Winchester disk = a minimum
of 3 minutes (longer for
30-meg drives).

Should formatting fail
(system indicates ERR 93), go
to step 4.
4. For diskette drive only:
 - Check that drive latch is closed.
 - Check that write-protect notch is uncovered.
 - Try another diskette.

For either drive, if problem is uncorrected, go to Troubleshooting (Section 6).

SECTION
10
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FUNCTIONAL DESCRIPTION

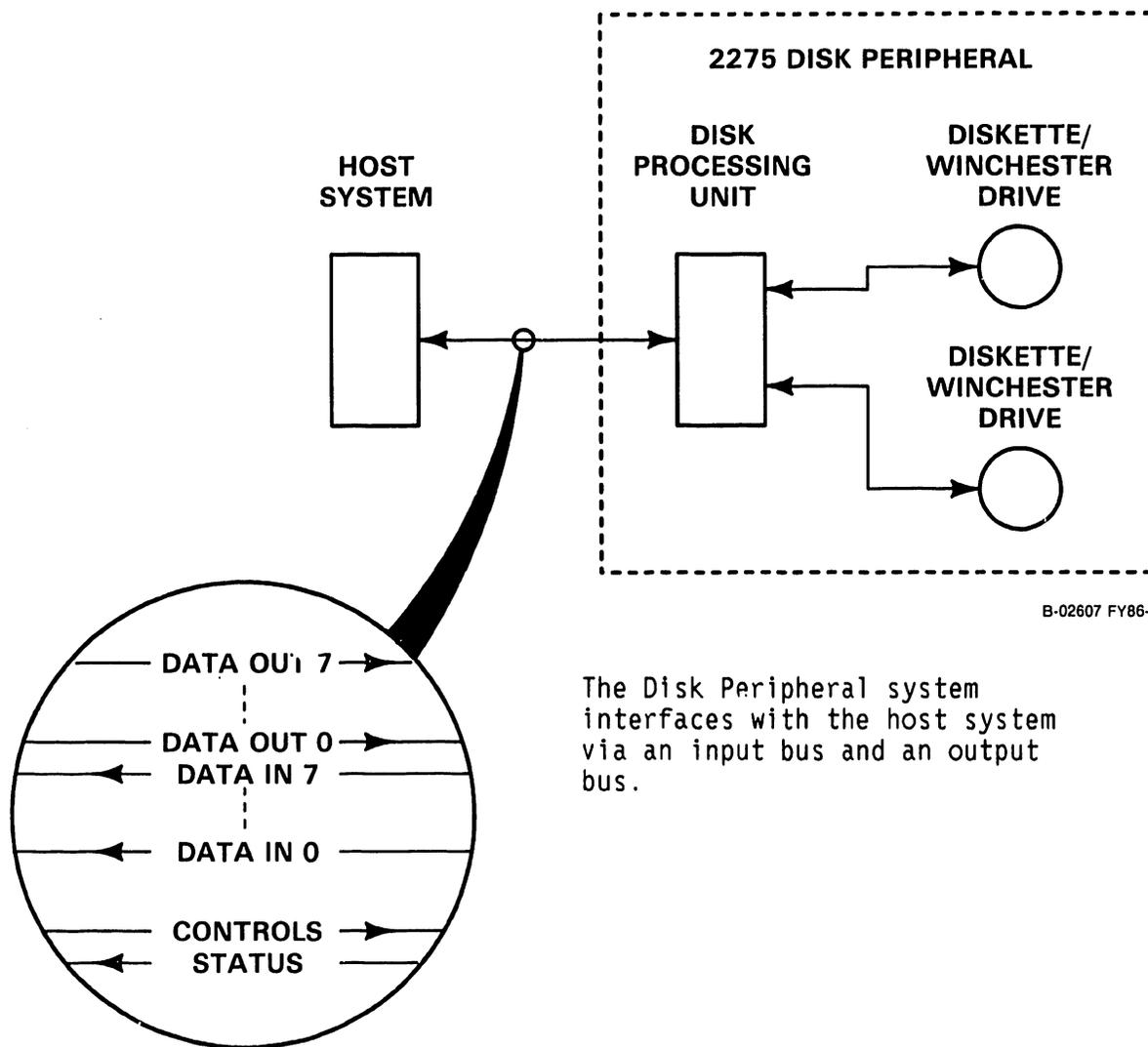
10.0 Section Contents

- 10.1 Overview
- 10.2 Input/Output Control
- 10.3 System Control
- 10.4 Memory
- 10.5 Diskette Drive Control
- 10.6 Winchester Drive Control

FUNCTIONAL DESCRIPTION

10.1 Overview

The 2275 Disk Peripheral system provides on-line disk storage to 2200MVP, LVP, and VP systems. The system may comprise a combination of either a diskette drive and Winchester drive or two Winchester drives.



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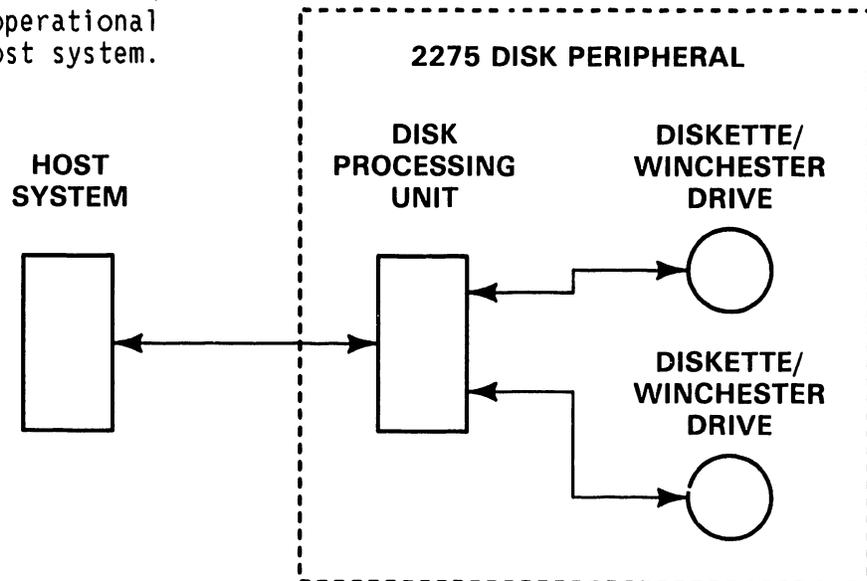
The Disk Peripheral system interfaces with the host system via an input bus and an output bus.

FUNCTIONAL DESCRIPTION

10.1 Overview (continued)

At Disk Peripheral power on:

- 2275 firmware selects the Winchester drive.
- When drive reaches readiness, firmware deselected drive and sets Disk Processing Unit (DPU) to ready status.
- DPU indicates operational readiness to host system.



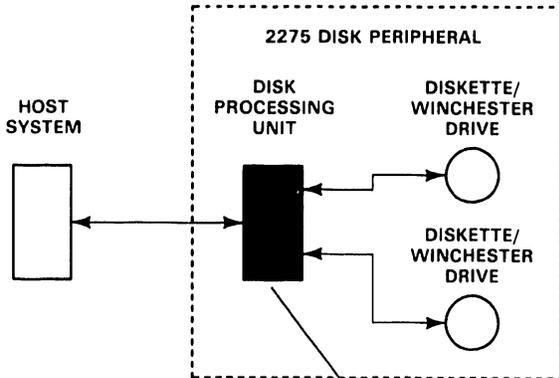
B-02607 FY86-2

The host system communicates with the Disk Peripheral through a series of disk-command sequences generated by the host system. Upon sensing DPU readiness, the host system initiates a command sequence (interrupts Disk Peripheral CPU). Upon receiving status information from the DPU, host specifies disk operation to be performed. Upon execution of the disk operation, the DPU indicates completion of operation, and status (including either success or failure of disk operation).

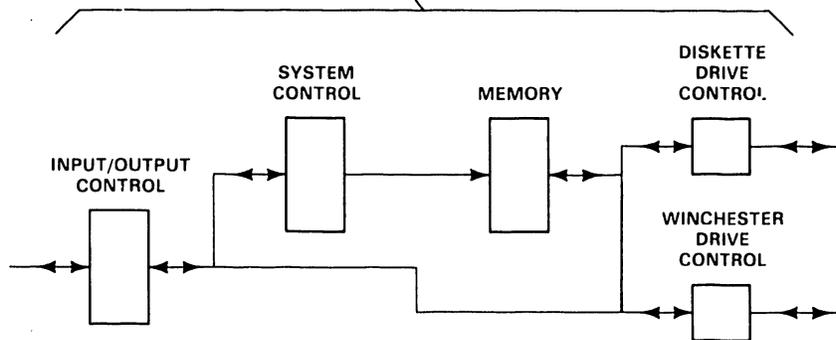
FUNCTIONAL DESCRIPTION

10.1 Overview (continued)

The DPU contains the Disk Peripheral components for operations sequencing, temporary data storage, and input/output communications.



The DPU may be divided functionally into five areas.

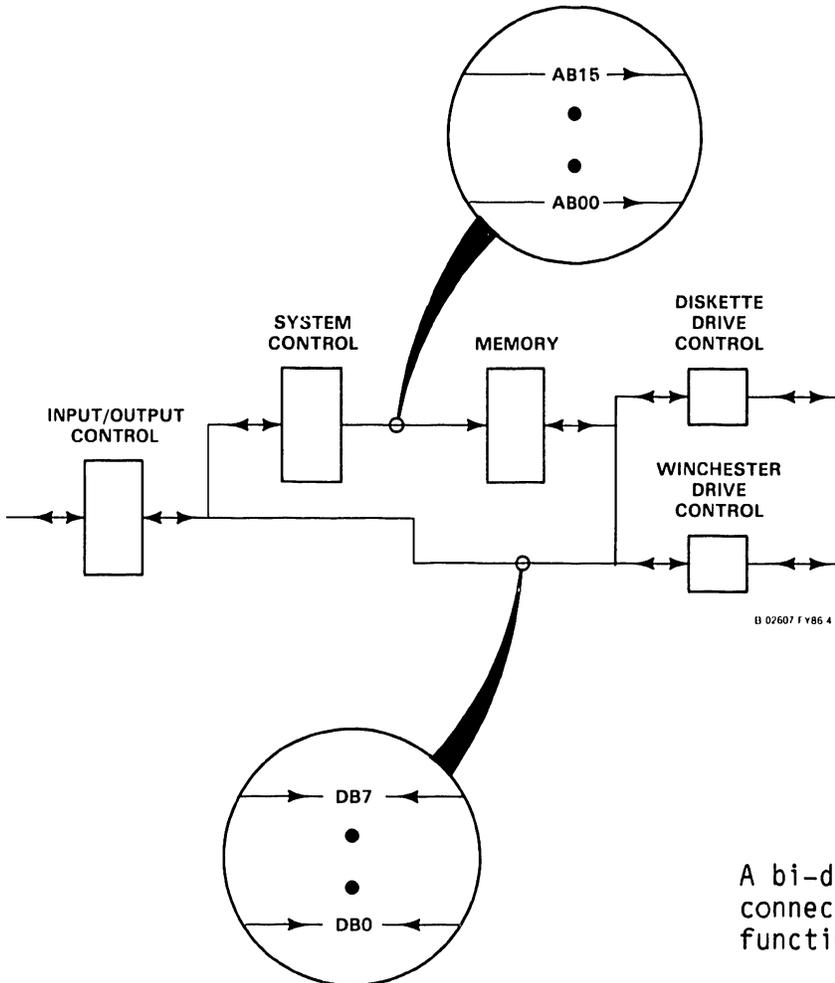


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FUNCTIONAL DESCRIPTION

10.1 Overview (continued)

An address bus provides direct addressing capability of $2^{16} = 64K$ locations.

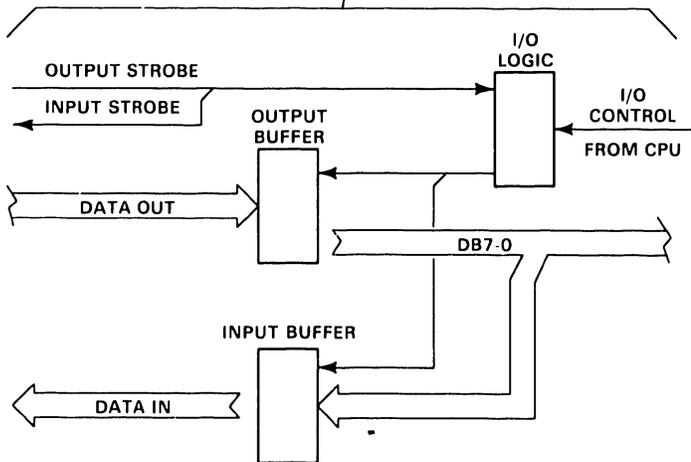
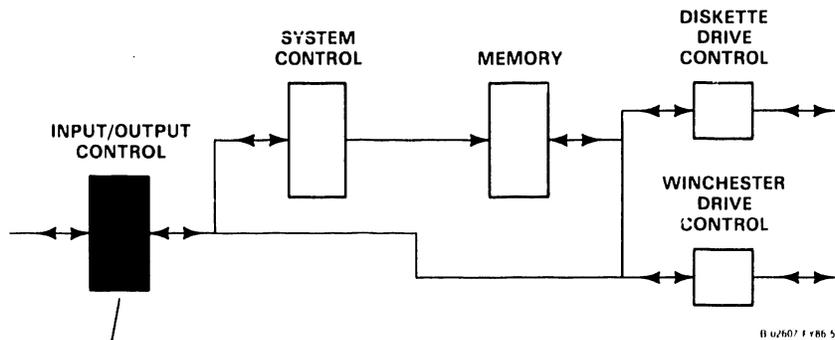


A bi-directional data bus connects to the principal functional groups.

FUNCTIONAL DESCRIPTION

10.2 Input/Output Control

The input/output control logic sequences flow of data between the DPU and the host system.

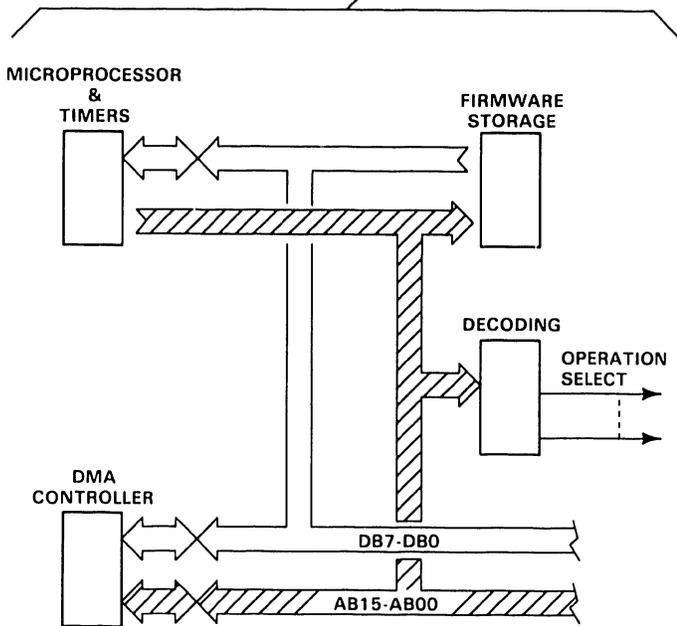
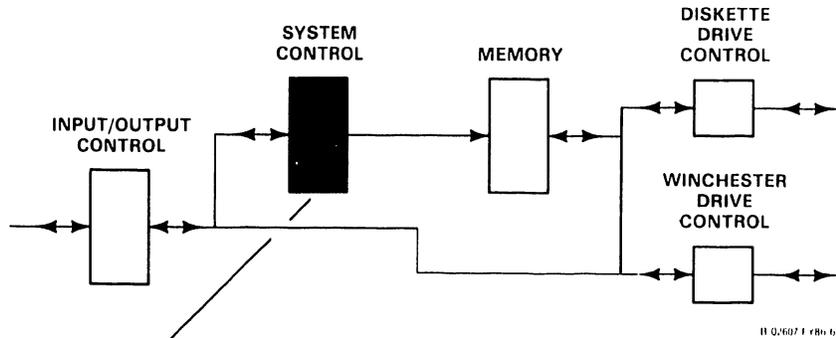


The host system places output data on the output bus and latches it via the output strobe. The DPU sends input data, in conjunction with the input strobe, to the host system. Data goes to/from the data bus when the control logic enables the respective input/output buffer.

FUNCTIONAL DESCRIPTION

10.3 System Control

The system control sequences all DPU operations.



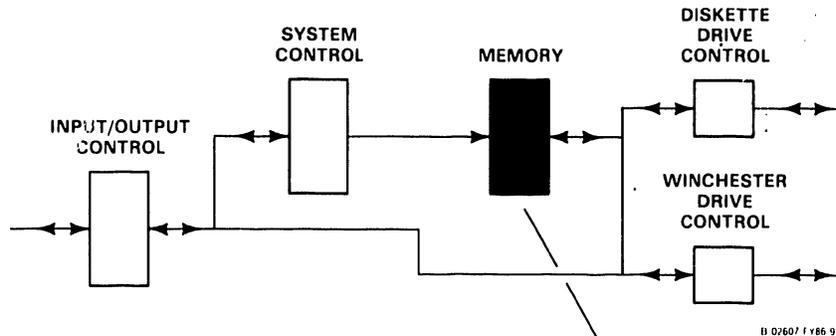
The microprocessor (CPU) receives instructions from a PROM-stored firmware program. Via address-bus decoding, the microprocessor selects DPU operation in sequence specified by program.

For block transfers of data between DPU memory and either host system or disk controller, the microprocessor selects the direct memory access (DMA) controller. The DMA controller can address consecutive memory locations without instruction-fetch cycles; therefore, DMA data transfers are faster than programmed I/O transfers.

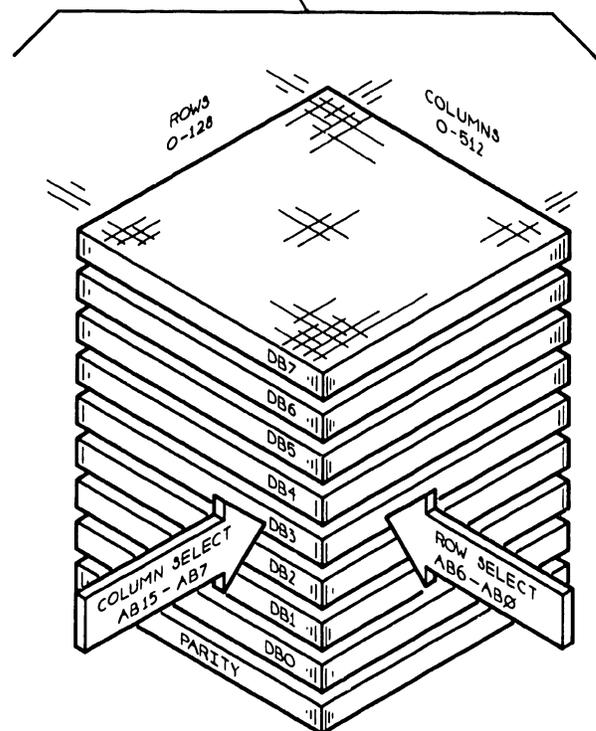
FUNCTIONAL DESCRIPTION

10.4 Memory

DPU memory comprises nine, parallel 64K D-RAMs. There are therefore 64K locations; each location contains 8 data bits plus a parity bit. Mapping reserves sections of memory for various purposes; the largest sections serve as data caches for the disk drives.



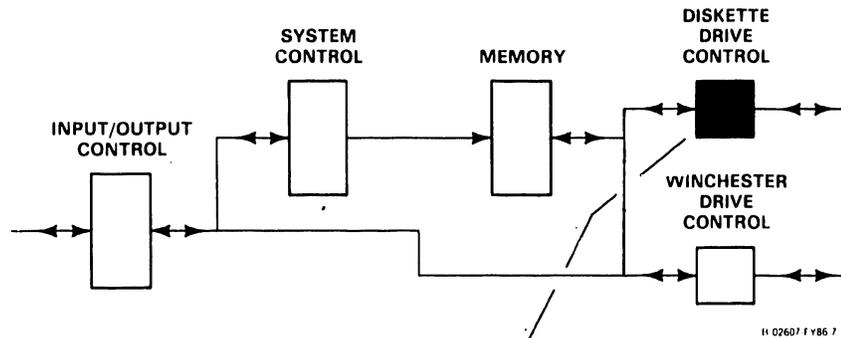
The addressing of 64 K-bytes requires 16 address bits. Two memory-address strobes, Row Address Strobe and Column Address Strobe, multiplex an 8-bit row address and an 8-bit column address into each chip to form, internally, a 16-bit address. The location thus selected either stores data bits DB7-DB0 from the data bus (memory write) or places the bits on the bus (memory read).



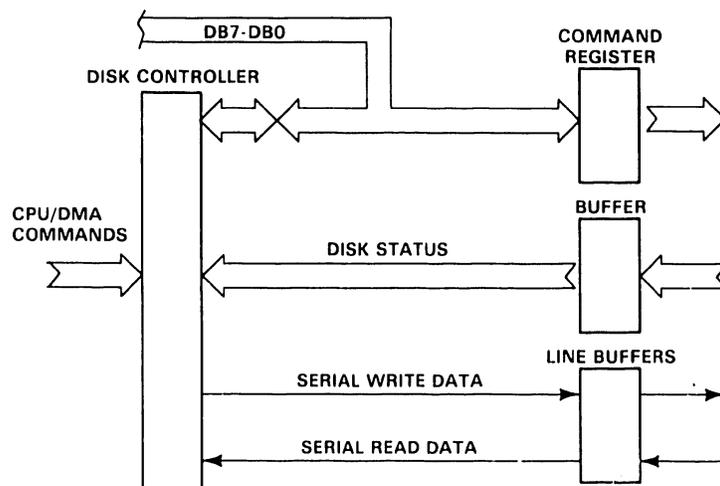
FUNCTIONAL DESCRIPTION

10.5 Diskette Drive Control

The Diskette Drive (floppy disk) Control interfaces with the disk drive via command/status/data cabling. DPU memory provides temporary storage for data transfer between host system and the floppy disk.



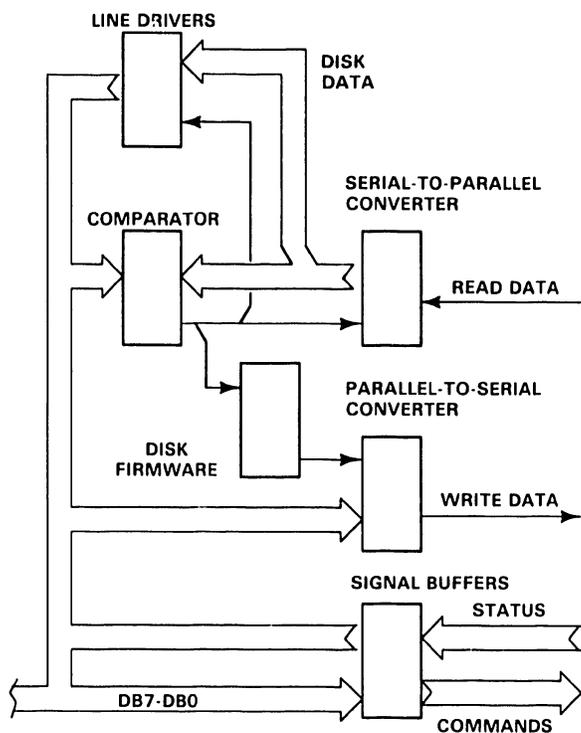
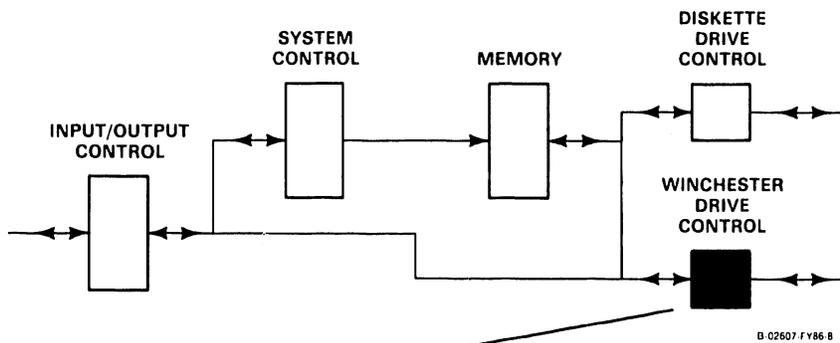
The CPU and the DMA Controller address the floppy-disk controller via the main data bus. The CPU programs the disk controller; the DMA controller sequences block transfers of data. Floppy disk control lines not handled directly by the disk controller are actuated by the CPU via the command register.



FUNCTIONAL DESCRIPTION

10.6 Winchester Drive Control

The Winchester Drive Control communicates with DPU System Control, and exchanges data with DPU Memory via the main data bus.



A comparator checks Winchester header data against updated header data stored in DPU Memory. A compare indicates that the drive head is over the desired sector. A non-compare causes the comparator to disable read/write circuits thus blocking invalid sector read/write operations. System Control issues disk control commands via the data bus. A disk firmware microprogram controls write sequencing.

SECTION

11

**SPECIFI-
CATIONS**

SPECIFICATIONS

11.1 Hardware Specifications

Dimensions

Height: 14.9 inches (37.8 cm)
Width: 6.5 inches (16.5 cm)
Depth: 16.0 inches (40.6 cm)

Weight

23 pounds (10.4 kg)

Power Requirements

1.8 Amp at 115 Volts AC
0.9 Amp at 230 Volts AC

Environmental Requirements

50° to 90° Fahrenheit
(10° to 32° Centigrade)
10% to 90% Relative Humidity
Non-condensing

11.2 Software Specifications

The 2275 is compatible with any 2200 series data and word processing software.

Storage Capacity

Model 2275-10:

	<u>Last Sector</u>
10 Megabytes fixed	1279
320 Kilobytes removeable	38911

Model 2275-20:

20 Megabytes fixed (Two Winchester drives)	38911
---	-------

SPECIFICATIONS

11.2 Software Specifications (continued)

Storage Capacity (continued)

Model 2275-30:

	<u>Last Sector</u>
30 Megabytes fixed	64023
320 Kilobytes removeable	1279

Model 2275-60:

60 Megabytes fixed (Two Winchester drives)	64023
---	-------

Formatting

Winchester Drives:

256 bytes per sector
32 sectors per track
304 tracks per side
Either two or six dual-sided disks

Diskette Drive (DSDD):

256 bytes per sector
16 sectors per track
40 tracks per side

or for interchange with PC:

512 bytes per sector
9 sectors per track
40 tracks per side

SPECIFICATIONS

11.2 Software Specifications (continued)

Address

Controller selected as 310:

<u>Model</u>		<u>Address</u>
2275-10	Floppy	D10
	Winchester	D11
2275-20	Winchester #1	D10
	Winchester #2	D11
2275-30	Floppy	D10
	Winchester	D11/D12
2275-60	Winchester #1	D11/D12
	Winchester #2	D10/D13

SECTION

12

ILLUSTRATED

PARTS

BREAKDOWN

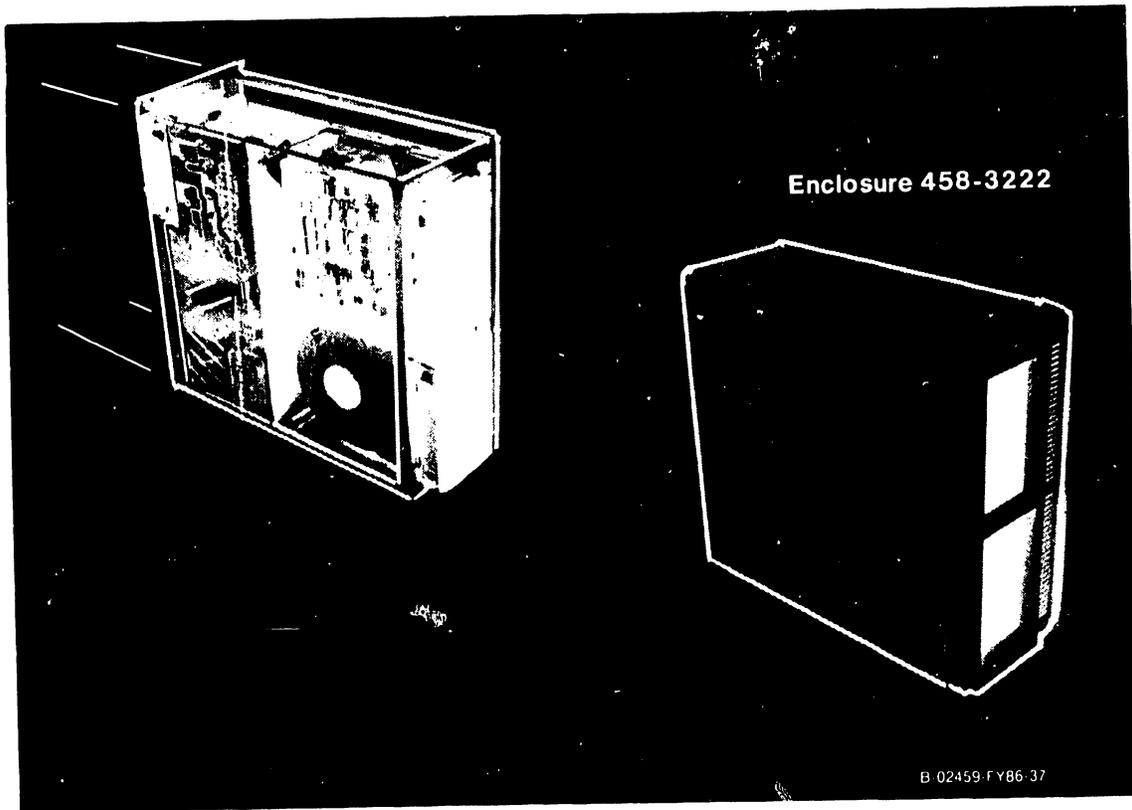
ILLUSTRATED PARTS BREAKDOWN

12.0 Section Contents

- 12.1 Enclosure and Chassis Assembly
- 12.2 Subassemblies
- 12.3 Switches and Connectors
- 12.4 Power Fuse
- 12.5 Internal Cabling
- 12.6 External Cabling
- 12.7 Disk Drive Replacement Chart

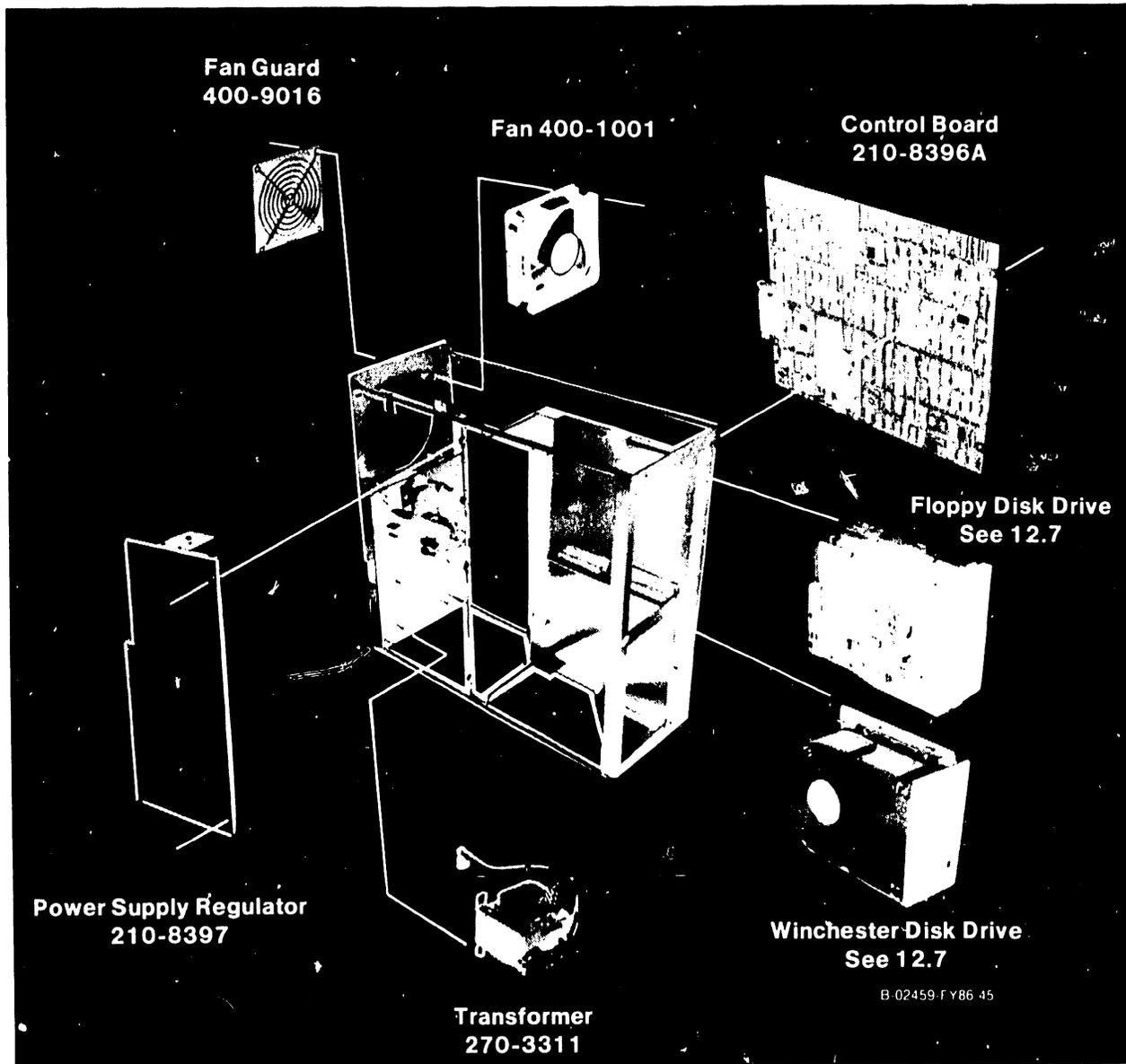
ILLUSTRATED PARTS BREAKDOWN

12.1 Enclosure and Chassis Assembly



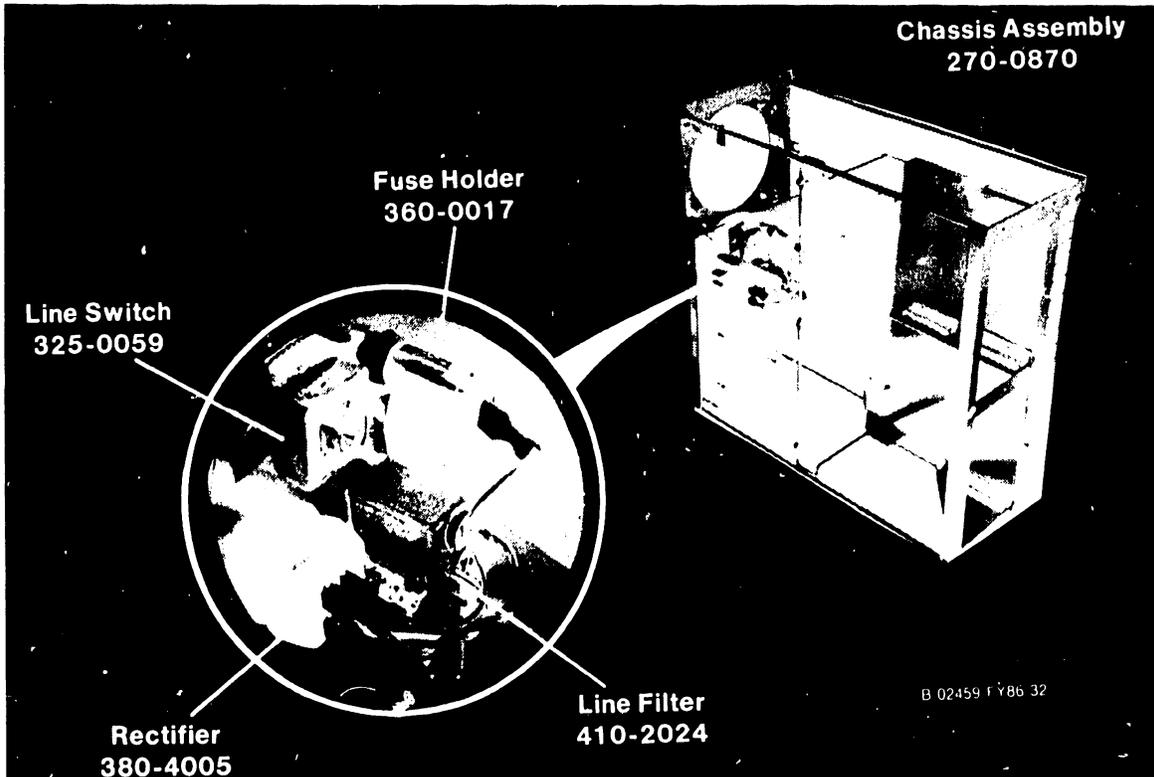
ILLUSTRATED PARTS BREAKDOWN

12.2 Subassemblies



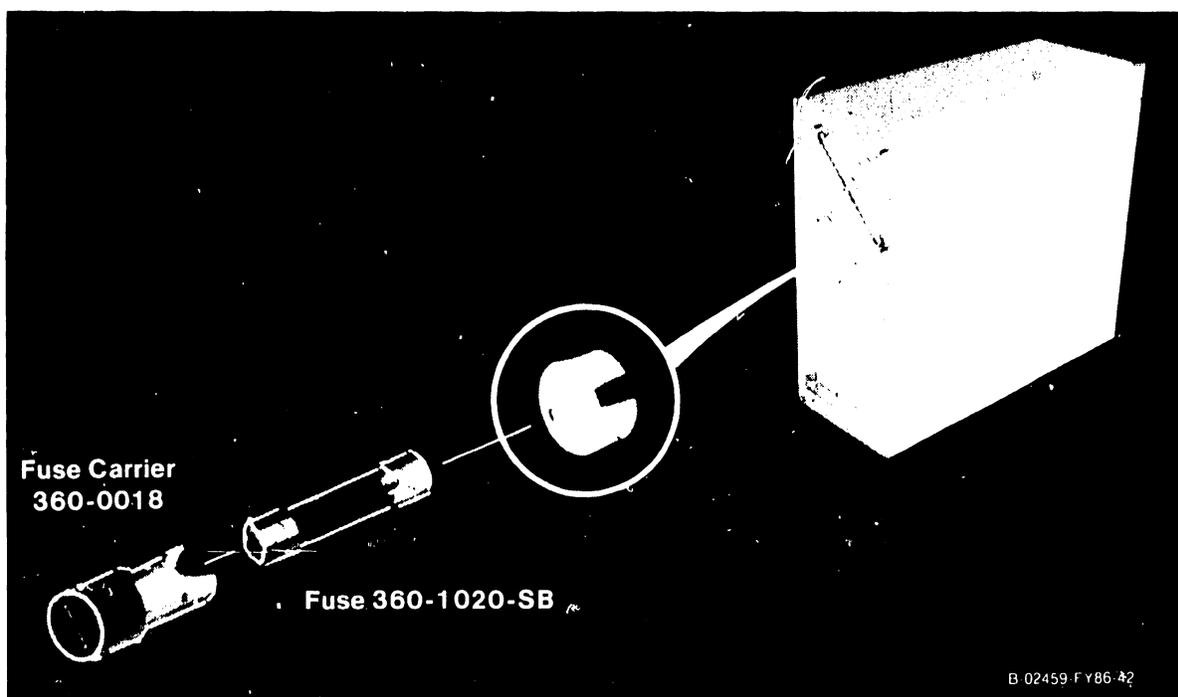
ILLUSTRATED PARTS BREAKDOWN

12.3 Switches and Connectors



ILLUSTRATED PARTS BREAKDOWN

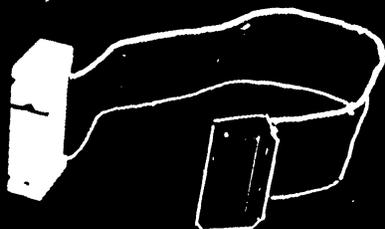
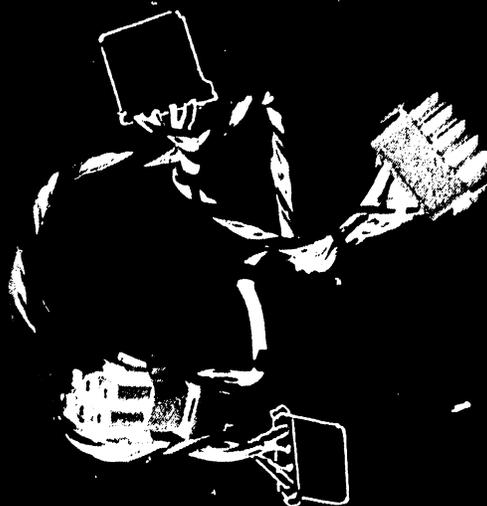
12.4 Power Fuse



ILLUSTRATED PARTS BREAKDOWN

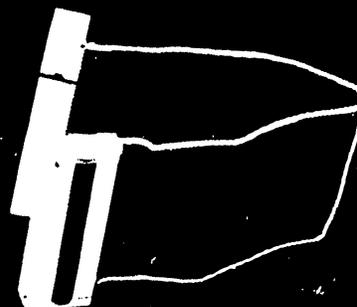
12.5 Internal Cabling

Power Harness - 220-2013



20-Pin Interface, Edge Keyed
220-3313
(One Per Each Winchester Drive)

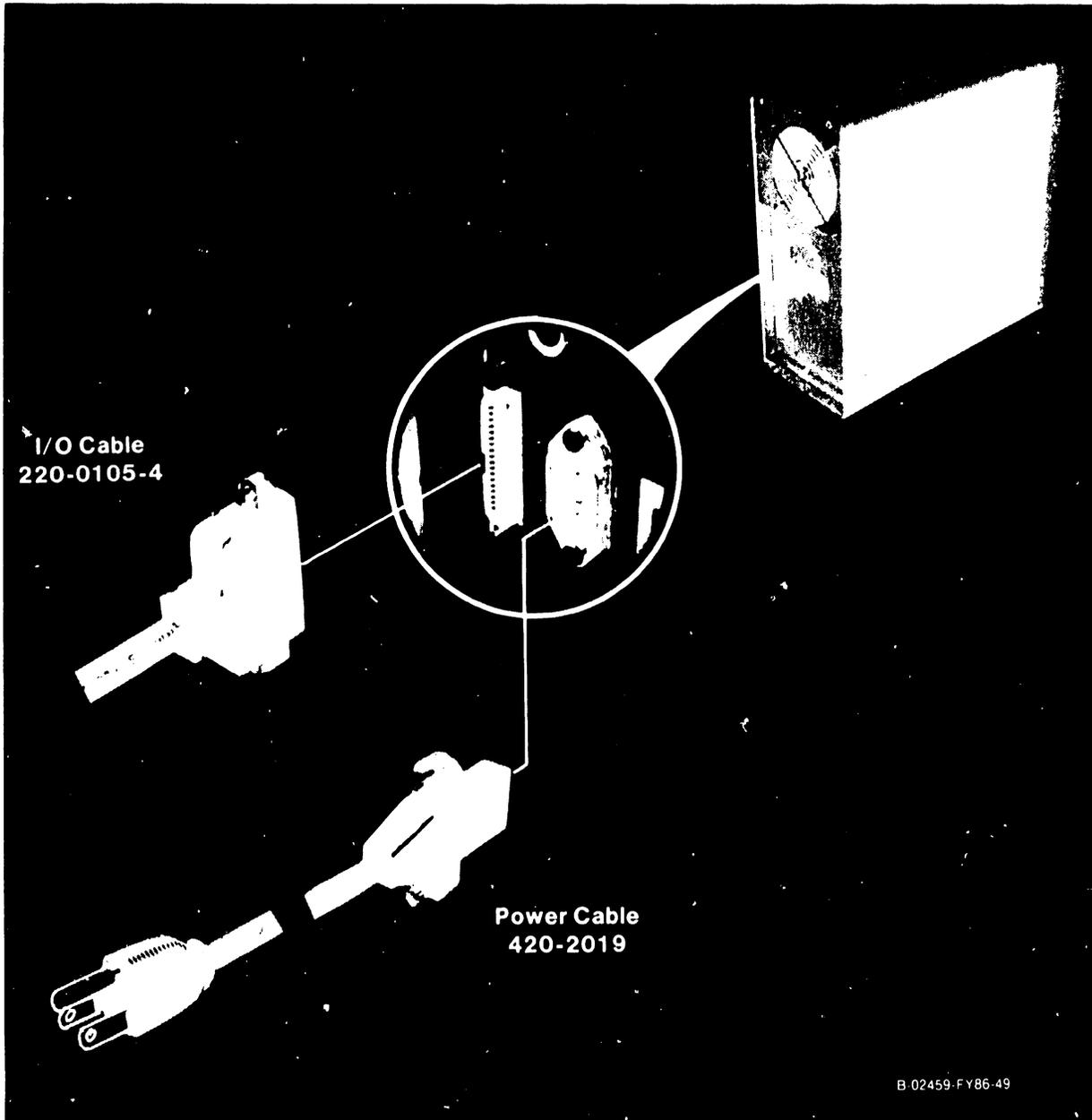
34-Pin Interface Cable, Edge Keyed
220-3312
(One Per Winchester/Diskette Drive)



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ILLUSTRATED PARTS BREAKDOWN

12.6 External Connections



ILLUSTRATED PARTS BREAKDOWN

12.7 Disk Drive Replacement Chart

Depending upon model version, the 2275 complement of disk drives may contain any of the following:

Floppy Drive	278-4026
1/2-High Floppy	278-4033
Winchester Drive (10-Meg)	278-4030
Winchester Drive (30-Meg)	278-4034

A replacement of a standard Floppy Disk Drive (278-4026) with a 1/2-High Floppy (278-4033) requires the the following adapting hardware:

Bezel	449-0834
Screws (4)	650-3327
Washers (4)	653-3001

WANG

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