intel®

SYSTEM 86/380
HARDWARE REFERENCE MANUAL

Order Number: 172761-001

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PREFACE

This manual contains the information required for a qualified technician to install the System 86/380 Microcomputer System and to maintain the System 86/380 in operational condition.

PRODUCT SAFETY

The System 86/380 is CSA and UL approved when in the "as-shipped" configuration. If modifications are performed to the System 86/380, you should contact CSA and UL to ensure your continued approval.

The System 86/380 generates, uses, and radiates radio frequency energy. Radio frequency interference (RFI) may result if the equipment is not installed and operated in accordance with the procedures in this manual.

NOTATIONS

Throughout this manual, <cr> represents the CARRIAGE RETURN key on a standard keyboard.

RELATED PUBLICATIONS

The following manuals provide additional information that may be helpful to users of this manual.

- Introduction To The System 86/380 and System 86/330A Microcomputer Systems, Order Number 172758

- System 86/300 Series Diagnostic Maintenance Manual, Order Number: 144813

- iSBC® 86/14 and iSBC® 86/30 Single Board Computer Hardware Reference Manual, Order Number: 144044

- iSBC® 215 Winchester Disk Controller Board Hardware Reference Manual, Order Number: 121593

- iSBX™ 218 Flexible Disk Controller Board Hardware Reference Manual, Order Number: 121583

- iSBC® 016A/032A/064A/028A/056A RAM Memory Board Hardware Reference Manual, Order Number: 143572

- iSBC® 680/681 Multistore User System Package Hardware Reference Manual, Order Number: 162432

- iSXM™ 100 Xenix Extension Module Installation Instructions, Order Number: 144599

- iSXM™ 101 Memory Management Extension Module Installation Guide, Order Number: 173077

- iSBC® 308/309 Memory Management & Protection Multimodule™ Board Hardware Reference Manual, Order Number: 144686

- iSBC® 534 Communications Expansion Board Hardware Reference Manual, Order Number: 9800450

- iSBC® 544 Intelligent Communications Expansion Board Hardware Reference Manual, Order Number: 9800616

LIST OF SAFETY PRECAUTIONS

Use recommended lifting techniques when moving either chassis. System 86/380 weighs in excess of 120 pounds.

Unlock the Winchester shipping restraint before applying power. Failure to comply may cause damage to drive components.

Lock the Winchester shipping restraint before moving the Peripheral Chassis. Failure to comply may cause damage to drive components.

Never attempt to service any sub-assembly while the AC power cord on the chassis is connected to a power source. Hazardous voltages are present within the chassis whenever the AC power cord is connected to a power source.

Exercise care when turning the unit over to gain access to the four screws securing the bottom cover to the chassis. If the Winchester drive is subjected to shock where the platters are parallel to the shock surface, media pitting may result.

WARNING

HAZARDOUS VOLTAGE AND CURRENT LEVELS
ARE PRESENT WITHIN THIS SYSTEM. TO
AVOID RISKS OF ELECTRIC SHOCK OR FIRE,
ONLY QUALIFIED TECHNICAL PERSONNEL
SHOULD ATTEMPT TO SERVICE THIS
EQUIPMENT.

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CHAPTER 1. GENERAL INFORMATION

1.1 INTRODUCTION

This chapter describes the features and specifications for the System
86/380 Microcomputer System. The Intel System 86/380 Microcomputer
System is an integrated, high-performance 16-bit hardware/software
package providing access to all of the advantages of the latest VLSI
technology and performance without requiring complex integration.

Included in this manual are a description of the system's features and
specifications, and a physical and functional overview of the hardware
and software components.

1.2 SYSTEM FEATURES

The System 86/380 Microcomputer System, shown in Figure 1-1, is available
with either the iRMX 86 Operating System, a dedicated real-time,
multitasking operating system, or is available with the Xenix Operating
System, a multi-user, time-sharing, operating system. The system
features include:
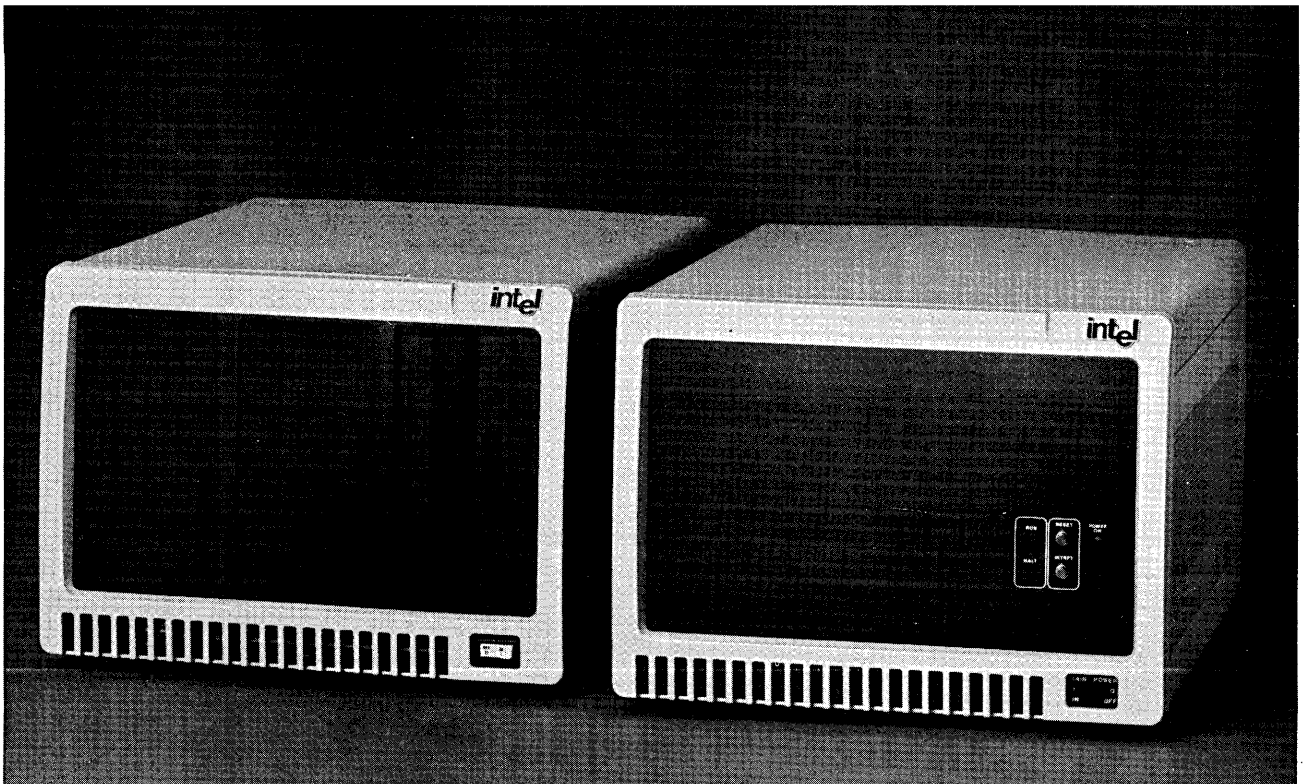
Figure 1-1. System 86/380 Microcomputer System

- 11 Multibus slots for system expansion, supporting a maximum of 6 bus masters (10 slots with Xenix product)
- Full development and run-time software support
- Extensive diagnostic support
- Convenient external form factor for both chassis' approximately 16 3/4" by 12 3/4" by 21"
- High-speed 16-bit 8086 microprocessor
- 32k bytes of ROM containing bootloader and diagnostics
- Floating-point math hardware (iSBC 337 board)
- 384k bytes of RAM memory
- One high-performance Winchester drive
- One floppy disk drive
- Expansion capability for one other peripheral device
- Multiple sector transfer capability for both drives
- Extensive error checking and reporting over the disk subsystem
- High-level language support

1.3 PHYSICAL DESCRIPTION

The System 86/380 Microcomputer System (hereafter referred to as the System 86/380) is composed of two chassis boxes; a processor chassis and a peripheral chassis. The contents of each chassis is listed in the following text and shown in Figures 1-2 and 1-3.
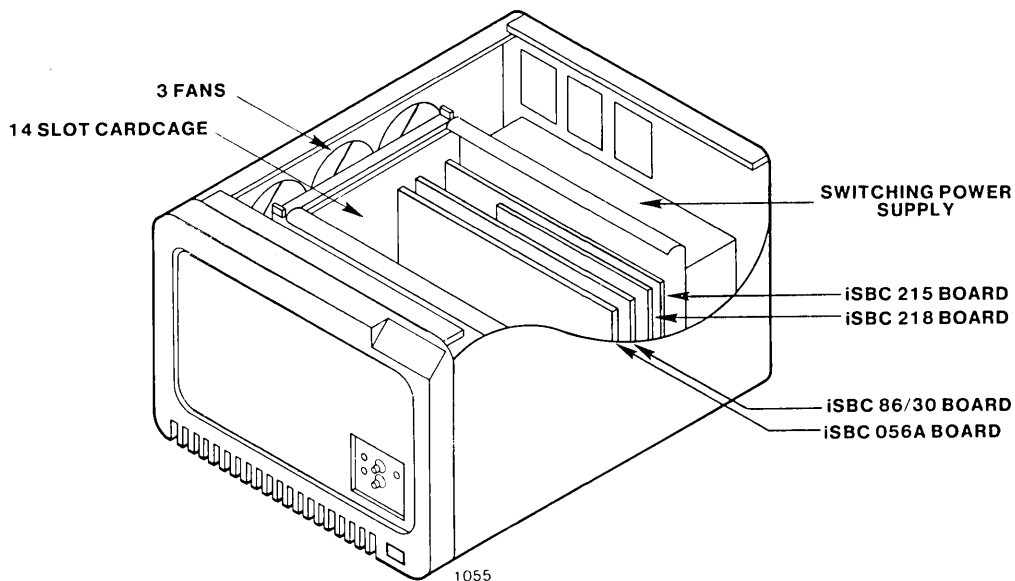
Figure 1-2. Processor Chassis Component Location

PROCESSOR CHASSIS   (iSYP 86/383 Chassis)

- o   14-slot Multibus-compatible cardcage
- o   iSBC 86/30 Single Board Computer
- o   iSBC 337 Numeric Data Processor Multimodule Board
- o   iSBC 215 Winchester Disk Controller Board
- o   iSBX 218 Floppy Disk Controller Multimodule Board
- o   iSBC 056A Memory Controller Board
- o   Switching power supply

PERIPHERAL CHASSIS   (iSYP 86/384 Chassis)

- o   One 35-megabyte, eight-inch Winchester disk drive
- o   One 1-megabyte, eight-inch floppy disk drive
- o   Switching power supply

The following paragraphs provide a more detailed description of the contents of each chassis in the System 86/380.
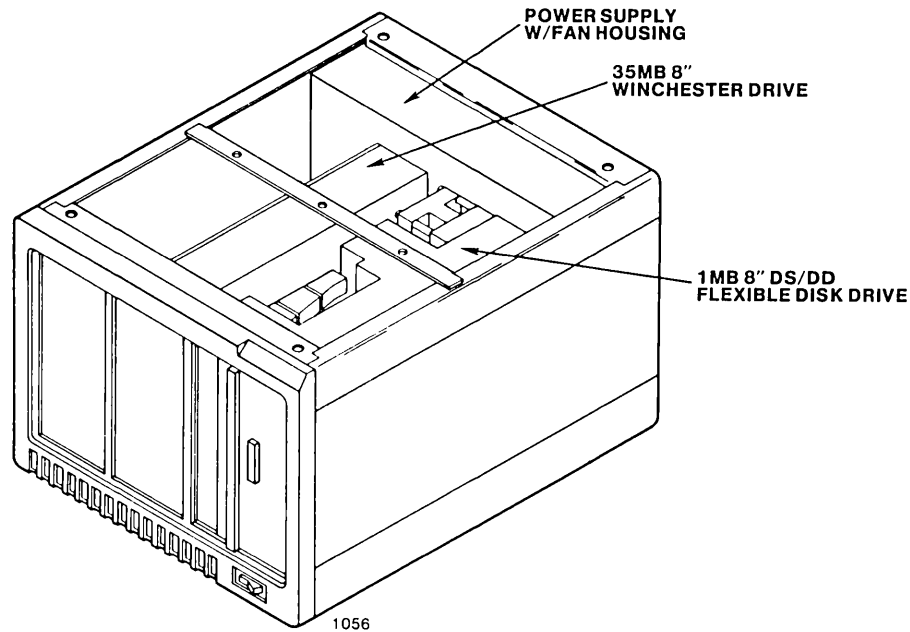
Figure 1-3.   Peripheral Chassis Component Location

1.3.1 PROCESSOR CHASSIS

The Processor Chassis, Figure 1-2, is designed such that access for
servicing the chassis is both easy and convenient. The chassis contains
a removable front cover, top cover, side panels, and bottom cover
providing quick access to the internal components of the system. The
front cover on the chassis is attached with ball-stud fasteners, the
bottom cover and side panels are attached with screws, and the top cover
is attached with 1/4-turn fasteners.

The front of the Processor Chassis provides access to the system control
functions. Mounted onto the lower right of the front panel on the
chassis are two pushbutton switches and three indicator LEDs (refer to
Figure 1-1). The switches provide an INTERRUPT signal and a RESET signal
to the system. The INTERRUPT signal is jumper-configurable and
interrupts the iSBC 86/30 board via INT1/ (on the Multibus interface)
when in the default configuration. Mounted onto the lower right corner
of the front of the chassis is a power switch that controls power for all
components within the chassis.

The rear panel on the Processor Chassis provides I/O connectors for
interfacing to serial I/O and parallel I/O applications. The connectors
on the rear panel are shown in Figure 1-4.

- Connector J1 is a 50-pin connector dedicated to providing the
  floppy disk drive link between the Processor chassis and the
  Peripheral Chassis.

- Connector J2 provides a non-standard 50-pin Centronics printer
  interface.

- Connector J3 is a 50-pin connector dedicated to providing the
  Winchester disk drive interface between the Processor Chassis and
  the Peripheral Chassis.

- Connector J9 provides a serial interface for a keyboard or
  terminal interface.

- The rear panel contains 10 spare knock-out holes into which you
  may install up to nine 25-pin and one 36-pin cable connectors, if
  required.

The power cord attaches to the power socket at the upper left corner
(when viewed from the rear) of the chassis.

The Processor Chassis contains a 14-slot cardcage that provides a
Multibus-standard interface between the various board-level components of
the system. All boards are installed into the cardcage such that the
component side faces toward the front of the chassis.

```
1 = Flexible Disk Drive Link to Peripheral Chassis
2 = Empty 50-pin or Tape Connector
3 = Winchester Disk Drive Link to Peripheral Chassis
4 = Serial Port Connector for Keyboard/Terminal
A = 36-pin Connector
B = Empty 25-pin I/O Connector Cut-out                    x-470
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Figure 1-4. Processor Chassis Rear Panel Connectors

In the standard configuration, the Processor Chassis contains an iSBC 215
Winchester Disk Controller Board (with the iSBX 218 board) in Connector
J1 of the cardcage, the rear-most card slot (when viewed from the front
of the chassis). The iSBC 86/30 Single Board Computer (with the iSBC 337
Multimodule board) is installed at cardcage connector J3. Cardcage
connector J5 contains the iSBC 056A RAM board. The remaining connectors
in the cardcage provide user-expansion of the system via installation of
Intel board-level products.

The front panel board on the Processor Chassis is mounted in front of the
cardcage and interfaces to the cardcage via Connector P2. The interface
supports the Intel Multibus interface standard for 8- and 16-bit data
transfers and for 20-bit addressing.

The main processing element of the system is the iSBC 86/30 Single Board
Computer on which is mounted a Numeric Data Processor (iSBC 337)
Multimodule board. The iSBC 86/30 board is a Multibus system bus master
with a 16-bit microprocessor (8086), 32k of ROM memory, 128k of dual port
RAM memory, a Programmable Interval Timer (8253) that controls baud
rates, a Programmable Interrupt Controller (8259A), a programmable USART
(8251A) for RS232C serial I/O communications, and a Programmable
Peripheral Interface (8255A) terminated at a non-standard Centronics
interface at Connector J4. The interface cable for connecting the
Processor Chassis to the printer is not included. Two iSBX connectors on

1-5

the iSBC 86/30 board provide I/O expansion capability. The details of operation of the iSBC 86/30 board are described in greater detail in the iSBC 86/14 AND 86/30 SINGLE BOARD COMPUTER HARDWARE REFERENCE MANUAL.

The RAM board contained in the as-shipped version of the system is an iSBC 056A RAM board providing 256k bytes of memory (in addition to the 128k bytes of RAM on the iSBC 86/30 board). The details of operation of the iSBC 056A RAM board are described in greater detail in the iSBC 016A/032A/064A/028A/056A RAM BOARD HARDWARE REFERENCE MANUAL.

The disk drive interfacing function of the system is performed through a combination of two separate disk controller board products; the iSBC 215 Winchester Disk Controller Board and the iSBX 218 Flexible Disk Controller Multimodule Board, that is mounted onto the iSBC 215 board.

The iSBC 215 Winchester Disk Controller board is an 8089-based I/O processor that controls a 35-megabyte Winchester drive, supports the Multibus System Bus environment, and provides full sector buffering. The iSBC 215 board also features automatic error recovery and retry, and transparent data error corrections. It can detect errors of up to 32 bits in length and can correct errors of up to 11 bits in length. The details of operation of the iSBC 215 board are described in greater detail in the iSBC 215 WINCHESTER DISK CONTROLLER HARDWARE REFERENCE MANUAL.

The iSBX 218 Flexible Disk Controller board is a double-wide Multimodule board which is attached to the iSBC 215 board. The iSBX 218 board controls all command, data, and status between a 1-megabyte floppy disk drive and system via the iSBC 215 board. The details of operation of the iSBC 218 board are described in greater detail in the iSBX 218 FLEXIBLE DISK CONTROLLER HARDWARE REFERENCE MANUAL.

The Processor Chassis contains a pin adapter board that converts the pin-out from the iSBC 215 Winchester Controller Board for the PRIAM Winchester Disk.

Contention between the iSBC 86/30 board and other Multibus master boards for use of the Multibus interface is resolved by a built-in parallel resolution circuit within the cardcage. As shipped, the Multibus priority is configured so that the iSBC 215 board is assigned the highest priority in the system.

The chassis contains three AC fans mounted to the left side (when viewed from the front) of the chassis. The fans move air from left to right through the chassis and exhaust at the right side of the unit. The fans provide adequate movement of air to cool the power supply and any computer boards within the cardcage to the temperature range specified in Table 1-1.

1.3.2 PERIPHERAL CHASSIS

The Peripheral Chassis, Figure 1-3, is designed such that access for
servicing the chassis is both easy and convenient. The chassis contains
a removable front cover, top cover, side panels, and bottom cover
providing quick access to the internal components of the system. The
front cover and side panels on the chassis are attached with ball-stud
fasteners, the bottom cover is attached with four screws, and the top
cover is attached with four 1/4-turn fasteners.

The front of the Peripheral Chassis provides access to the floppy disk
drive (right-most bay) and contains filler panels covering the front of
the Winchester disk drive (center bay) and a peripheral expansion site
(left-most bay). Mounted onto the lower right corner of the front of the
chassis is a power switch that is illuminated when +5Vdc power is applied.

The rear panel of the chassis (refer to Figure 1-5) provides I/O
connectors for interfacing the Winchester and floppy disk drives to the
Processor Chassis. Connector J1 is dedicated to the Winchester disk
drive and connector J2 is dedicated to the floppy disk drive. The rear
panel contains four spare knock-out holes into which you may install
cable connectors, if required. The additional connectors could provide a
means to daisychain additional Winchester drives or additional floppy
disk drives. The power cord for the Peripheral Chassis attaches to the
power socket at the lower left corner (when viewed from the rear) of the
chassis.

The Winchester disk drive is a 35-megabyte, non-removable media,
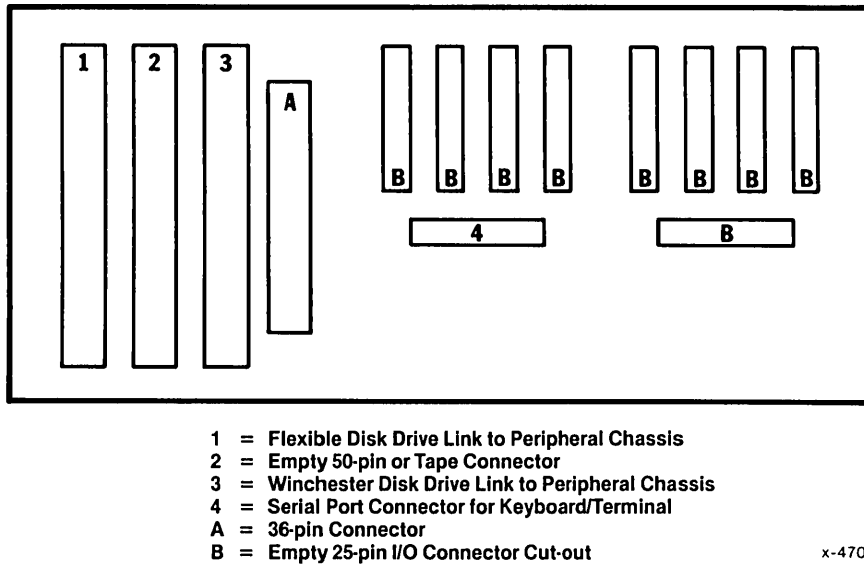eight-inch disk drive. The head/disk assembly is completely enclosed and
should not require servicing. The Winchester drive is mounted in the
center bay with a filler panel mounted in front of the drive. Refer to
Table 1-2 for the Winchester drive specifications.

The floppy disk drive is a 1 megabyte double-sided, double-density
drive. It is mounted in the right-most bay of the chassis such that the
door access button is positioned to the right of the diskette door as
viewed from the front. Refer to Table 1-3 for flexible disk drive
specifications.

The Peripheral Chassis provides installation space, adequate cooling, and
an additional power connector for user-installation of another floppy
disk drive or another Winchester disk drive into the left-most bay of the
chassis.

The power supply is a switching supply that is mounted in the rear of the
Peripheral Chassis. It provides power to all elements of the system that
are contained within the Peripheral Chassis. The power supply has
sufficient reserve (150 W) to power another user-installed peripheral
device. Refer to Table 1-4 for the power supply specifications.

The chassis contains three 3-1/2 inch fans mounted within the power
supply. The fans move air from front to back through the chassis and
exhaust at the rear of the unit. The fans provide adequate movement of
air to cool the two provided peripheral devices and one additional
user-provided peripheral device.

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┌─────────────────────────────────────────────────────────┐
│   ┌───────────┐      ┌───────────┐      ┌───────────┐    │
│   │     1     │      │     A     │      │  A or B   │    │
│   └───────────┘      └───────────┘      └───────────┘    │
│   ┌───────────┐      ┌───────────┐      ┌───────────┐    │
│   │     2     │      │     A     │      │     A     │    │
│   └───────────┘      └───────────┘      └───────────┘    │
└─────────────────────────────────────────────────────────┘
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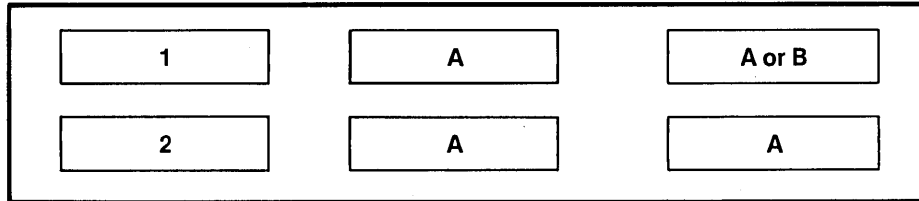
1 = Flexible Disk Drive Link to Processor Chassis
2 = Winchester Disk Drive Link to Processor Chassis
A = Empty 50-pin Connector Cut-out
B = Tape Drive Connector   x-467

Figure 1-5. Peripheral Chassis Rear Panel Connectors

1.4 SPECIFICATIONS

Table 1-1 lists the System 86/380 specifications. Table 1-2 lists the Winchester disk drive specifications. Table 1-3 lists the floppy disk drive specifications. Table 1-4 lists the power supply specifications for the power supply in each chassis.

Table 1-1. System 86/380 Specifications

WORD SIZE	
Instruction:	8, 16, or 32 bits
Data:	8/16 bits
INSTRUCTION CYCLE TIME:	400 nanoseconds for fastest executable instructions (assuming instruction is in the queue). 1.0 microseconds for fastest executable instructions (assuming instruction is not in the queue).
MEMORY CAPACITY	
RAM:	The base system is shipped with 384K bytes which can be expanded with other Intel RAM boards to 1 megabyte. The iSBC 86/30 board's on-board address range is 00000 to 1FFFFH. The iSBC 056A board's on-board address range is 20000H through 5FFFFH.
ROM:	32K bytes, on-board the iSBC 86/30 board; address range F8000H through FFFFFH.
INTERRUPTS:	Eight-level, maskable, nested-priority interrupt network and 1 nonmaskable interrupt.
INTERFACE	EIA Standard RS232C signals provided and supported.
Serial:	9600 baud (asynchronous) or 150 to 19.2k baud (synchronous); programmable baud rates and serial formats.
Parallel:	A parallel I/O port configured to provide a modified Centronics printer interface.
AC REQUIREMENTS (Domestic Systems)	
Processor Chassis:	12.5A @ 90 to 138VAC, 60Hz +5%, single-phase. Maximum total power consumption = 1250 Watts.
Peripheral Chassis:	6.5A @ 90 to 138VAC, 60Hz +5%, single-phase. Maximum total power consumption = 500 Watts.
AC REQUIREMENTS (European Systems)	
Processor Chassis:	6.25A @ 180 to 250VAC, 50Hz +5%, single-phase. Maximum total power consumption = 1250 Watts.
Peripheral Chassis:	3.25A @ 180 to 250VAC, 50Hz +5%, single-phase. Maximum total power consumption = 500 Watts.
AC REQUIREMENTS (Japanese Systems)	
Processor Chassis:	12.5A @ 90 to 138VAC, 50Hz +5%, single-phase. Maximum total power consumption = 1250 Watts.

Table 1-1. System 86/380 Specifications (continued)

AC REQUIREMENTS (Japanese Systems) (continued)
  Peripheral Chassis: 6.5A @ 90 to 138VAC, 50Hz +5%, single-phase.
                             Maximum total power consumption = 500 Watts.

ENVIRONMENTAL REQUIREMENTS

  OPERATING
    Temperature: 15°C to 35°C
                             26°C (maximum wet bulb)

    Relative Humidity: 20% to 80% non-condensing over the operating
                             temperature range.*

    Altitude: Sea level to 10000 feet.

    Vibration & shock: 0.0014" PTP 5 to 25Hz
                             0.007" PTP 25 to 55Hz
                             0.3g 0 to peak 55 to 300Hz
                             1.0g shock for 11ms duration (1/2 sine wave)

  NON-OPERATING
    Temperature: -25°C to 60°C

    Relative Humidity: 20% to 80% non-condensing.

    Altitude: Sea level to 12000 feet.

    Vibration & shock: 0.008" PTP 5 to 25Hz
                             0.004" PTP 25 to 55Hz
                             2.0g 0 to peak 55 to 300Hz
                             15.0g shock for 11ms duration (1/2 sine wave)

PHYSICAL CHARACTERISTICS

  PROCESSOR CHASSIS
    Width: 16.8 in. (42.6 cm)
    Height: 12.2 in. (31.1 cm)
    Depth: 21.0 in. (53.3 cm)
    Weight: 55 pounds (25 kg)

  PERIPHERAL CHASSIS
    Width: 16.8 in. (42.6 cm)
    Height: 12.2 in. (31.1 cm)
    Depth: 21.0 in. (53.3 cm)
    Weight: 70 pounds (32 kg)

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  * Note: the environmental combination of humidity and temperature
  together cannot exceed 26°C wet bulb.

Table 1-2. Winchester Drive Specifications

	PRIAM 3450 Drive
Recording Density:	6670 bpi
Track Density:	480 tpi
Cylinders:	526
R/W heads:	5
Bytes/sector:	1024
Sectors/track:	12
Bytes/track:	13.4K
Rotational speed:	3600 RPM
Avg. latency:	8.34 ms
Transfer rate:	6.44M bits/sec.
Head settling time:	8 ms
ACCESS TIMES:	
Track-to-track:	10 ms
Average:	45 ms
Maximum:	90 ms
Motor/on time:	30 sec
Soft error rate:	1×10^{10}
Hard error rate:	1×10^{13}
Seek error rate:	1×10^{6}

Table 1-3. Flexible Disk Drive Specifications

Data Storage Capacity:	800K bytes (unformatted) per side, or 500K bytes (IBM format - 26 sectors) per side.
Recording Density:	6816 bpi
Track Density:	48 tpi
Number of tracks:	77 per side
Number of heads:	2
Recording method:	MFM
Transfer rate:	500K bits/sec
Rotational speed:	360 RPM
Rotational latency:	83 ms (average)
Access time:	
Track-to-track:	3 ms
Average:	91 ms
Head settling time:	15 ms
Head loading time:	35 ms
Motor Start time:	2 sec.
ERROR RATES:	
Soft:	1 in 10^{9} bits read
Hard:	1 in 10^{12} bits read
Seek:	1 in 10^{6} seeks

Table 1-4. Power Supply Specifications

Component	Current Requirement					
	+5V	+12V	-5V	-12V	+24V	-24V
PROCESSOR CHASSIS						
iSBC 86/30 board	6.10A	0.31A	-	-	-	-
iSBC 215 board	3.25A	-	0.15A	-	-	-
iSBX 218 board	0.90A	-	-	-	-	-
iSBC 056A board	4.60A	-	-	-	-	-
Total	14.85A	0.31A	0.15A	-	-	-
Available for options	55A	5.7A	2.8A	5.0A	-	-
Regulation:	< 0.4%					
Ripple +5V:	50mV p-p					
+12V:	120mV p-p					
PERIPHERAL CHASSIS						
Flexible drive	1.0A	-	0.05A	-	0.6A	-
Winchester drive	2.5A	-	1.5A	0.4A	3.5A	-
Total	3.5A	-	1.55A	0.4A	4.1A	-
Available for options	26.5A	2.9A	2.45A	2.6A	3.7A	1.5A
Regulation:	+4%					
Ripple +5V:	50mV p-p					
+12V:	50mV p-p					
+24V:	240mV p-p					
-24V:	360mV p-p					

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CHAPTER 2. INSTALLATION AND SYSTEM START-UP

2.1 INTRODUCTION

This chapter provides the information required to inspect and install the
System 86/380 at your installation site. The installation procedures
presented in the following text include incoming inspection and unpacking
procedures, installation and diagnostic start-up procedures, and system
operation checkout procedures.

2.2 INCOMING INSPECTION

The System 86/380 is shipped from the factory in four separate boxes.
When you receive the System 86/380, immediately inspect the exterior of
the shipping cartons for evidence of mishandling during transit. If the
shipping cartons are either severely damaged or waterstained, request
that the carrier's agent be present when the cartons are opened. If the
carrier's agent is not present, and the contents of the cartons are
damaged, keep the cartons and packing material for the agent's inspection.

If your product was damaged during shipment, contact the Intel Technical
Service Center to obtain instructions on our repair procedures. Chapter
5 of this manual contains telephone numbers at which you may reach your
local Intel Technical Service Center. Note that the Intel Technical
Service Center requires a purchase order number to complete repairs. A
copy of the purchase order should be submitted to the carrier with your
claim.

It is suggested that salvageable shipping cartons and packing material be
saved for future use in the event the product must be shipped or returned
for repair.

2.3 INSTALLATION CONSIDERATIONS

The physical characteristics (width, height, depth, and weight) of the
System 86/380 are listed in Table 1-1. Ensure that the work area (bench,
table, desk, or other structure) will accommodate and support the
combined weight of the basic system and your I/O terminal.

The two-chassis system may be installed on a desk top (up to 3.0 feet
apart), or mounted in a standard 19-inch wide EIA equipment rack. If the
chassis' are stacked, ensure that the Peripheral Chassis (the one
containing the disk drives) is located on the bottom of the stack; this
configuration provides a better weight distribution.

The Processor Chassis contains fans mounted in the power supply enclosure and fans within the chassis for cooling. The Peripheral Chassis also contains fans for cooling. The air flow provided within each chassis is slightly different. The Peripheral Chassis is designed to draw ambient room air in through openings at the bottom of the front panel, pass the air over the peripheral devices, through the holes in the top of the power supply, down into the power supply, and exhaust it out the back of the chassis. The Processor Chassis is designed to draw ambient room air in through openings on the left side of the chassis, pass the air through the chassis and exhaust it out the right side of the chassis.

All external panels on both chassis must remain in place for optimum air circulation. To ensure proper cooling, the openings on each chassis should not be obstructed. At least five inches of open space should be maintained between the chassis and any wall or other obstruction.

The System 86/380 requires two power receptacles for standard 15 amp power plugs; each chassis requires a dedicated, three-conductor, 20 amp circuit breaker. The rounded pin on the power cords provides a safety power ground. If your facility does not have three-connector power outlets, do not defeat the safety ground by using three-prong to two-prong adapters. Have a qualified electrician rewire the power outlets to provide the third wire for the system.

As with most sensitive electronic equipment, the System 86/380 is not totally immune to its environment. To minimize performance degradation, you must:

- Maintain the temperature and humidity environment in accordance with the specifications listed in Table 1-1.

- Use antistatic mats in the work area.

- Install the system into a clean (dust free) environment such as an office, laboratory, or classroom.

2.4   UNPACKING

When shipped from the factory, the System 86/380 chassis units are packaged in two specially designed shipping cartons that protect against damage during shipment. To remove each chassis from its shipping cartons, proceed as follows:

1. Cut the retaining straps on the outside of each carton.

2. Remove the top portion and centering sleeve from each carton.

3. Remove the end caps, protecting the ends of each chassis.

{CAUTION}

A chassis weighs about 70 pounds. Use
recommended lifting techniques or find
a second person to help lift each
chassis.

4. Slowly, lift each chassis from the bottom of its shipping carton.

2.5 INSTALLATION AND POWER ON PROCEDURE

The System 86/380 is designed for simple installation. The System 86/380
is shipped with two AC power cords, two interconnect cables providing
50-pin connectors on both ends, a System Confidence Test and the iSBC 957
Monitor contained in EPROM on the iSBC 86/30 board. This installation
procedure provides instructions for checking the integrity of both
chassis after shipment, connecting the two chassis together, providing
power to the system, and invoking the self-test.

The installation procedure is primarily intended to be used on an initial
installation of the System 86/380. To install the system, proceed as
follows:

1. Unpack the System 86/380 as was described in paragraph 2.4.

2. Position the system at the installation site. The System 86/380
   is designed to be installed on a desk top, however, provisions
   are made for rack-mounting the system. If the System 86/380 is
   to be installed on a desk top, proceed as follows.

3. Remove the top cover of each chassis (refer to paragraphs 4.7 and
   4.21).

4. Interconnect your fabricated RS232 serial I/O cable between
   25-pin Connector J9 (located on the rear panel of the Processor
   Chassis) and the user-supplied ASCII CRT/Keyboard terminal (refer
   to paragraph 2.7 for cable fabrication instructions). Set the
   baud rate selection switches on the user-supplied ASCII terminal
   for 9600 baud, full-duplex mode and disable generation and
   checking of parity bits (set parity switches to OFF).

   If a peripheral device requiring a standard Centronics-compatible
   interface is to be connected to the Processor Chassis, refer to
   paragraph 2.8.

5. During shipment, the head-locking restraint on the Winchester drive is placed into the LOCKED position, locking the heads from loading and preventing damage to the heads and storage media. Before applying power to the System 86/380, ensure that the head-locking restraint is in the UNLOCKED position. Unlocking the restraint is performed in four steps, as follows:

⟨CAUTION⟩

Failure to unlock the Winchester shipping restraint before applying power may cause damage to the drive components.

a. Remove the front panel from the Peripheral Chassis by pulling out on the front panel (see paragraph 4.6).

b. Remove two screws securing the center bay filler panel to the front of the Peripheral Chassis and remove the filler panel. The head-locking restraint lever is located directly behind the panel above a label indicating LOCK/UNLOCK. See Figure 2-1 for the approximate location of the lever.

c. Move the lever on the Winchester drive slightly to the left, up, and right, to the UNLOCK position.
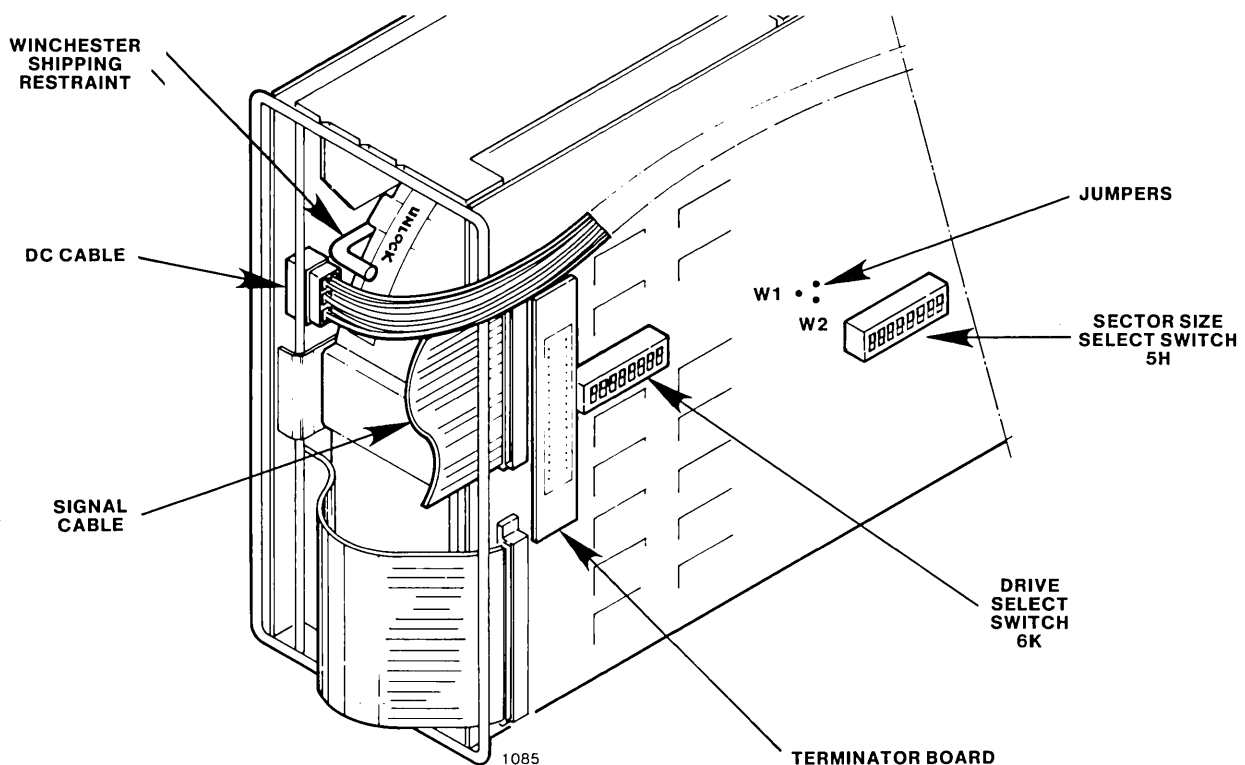
Figure 2-1. Winchester Shipping Restraint Location (PRIAM 3450)

NOTE

When locking the shipping restraint on
the Winchester drive, move the lever in
the opposite directions; left, down,
and right, in that order.

   d. Reassemble the front of the Peripheral Chassis; this includes
      reinstalling the filler panel and the front panel onto the
      chassis.

6. Remove the cardboard door restraint and cardboard diskette from
   the floppy disk drive in the Peripheral Chassis.

7. If an additional Winchester drive is to be added to the
   Peripheral Chassis, refer to the installation procedure in
   Appendix A of this manual.

8. If an additional floppy disk drive is to be added to the
   Peripheral Chassis, refer to Appendix B of this manual for the
   installation procedure.

9. Install any additional boards (as required by the application)
   into the Processor Chassis and ensure that the connectors on all
   boards are seated securely (this includes checking the seating of
   the Multimodule boards that are installed onto the iSBC 215 board
   and onto the iSBC 86/30 board).

10. Re-seat all printed circuit boards, check the cable connections,
    and replace the top cover onto each chassis.

11. Install the two 50-pin cables between the Peripheral Chassis and
    the Processor Chassis. The cables are completely interchangeable
    and installed as follows:

    • Connector J1 (Processor Chassis) to Connector J1 (Peripheral
      Chassis)

    • Connector J3 (Processor Chassis) to Connector J2 (Peripheral
      Chassis)

NOTE

Install tie-wraps onto both ends of each
cable to hold the connectors in place.
This is illustrated in Figure 2-2.

12. Ensure that the power switches on both chassis units are in the OFF
    position, and install the power cords onto the back of each chassis.
    Plug the other end of the cords into the power outlet. Notice that
    the power cords for each chassis are not interchangeable; the
    socket on each chassis requires a different type of connector.
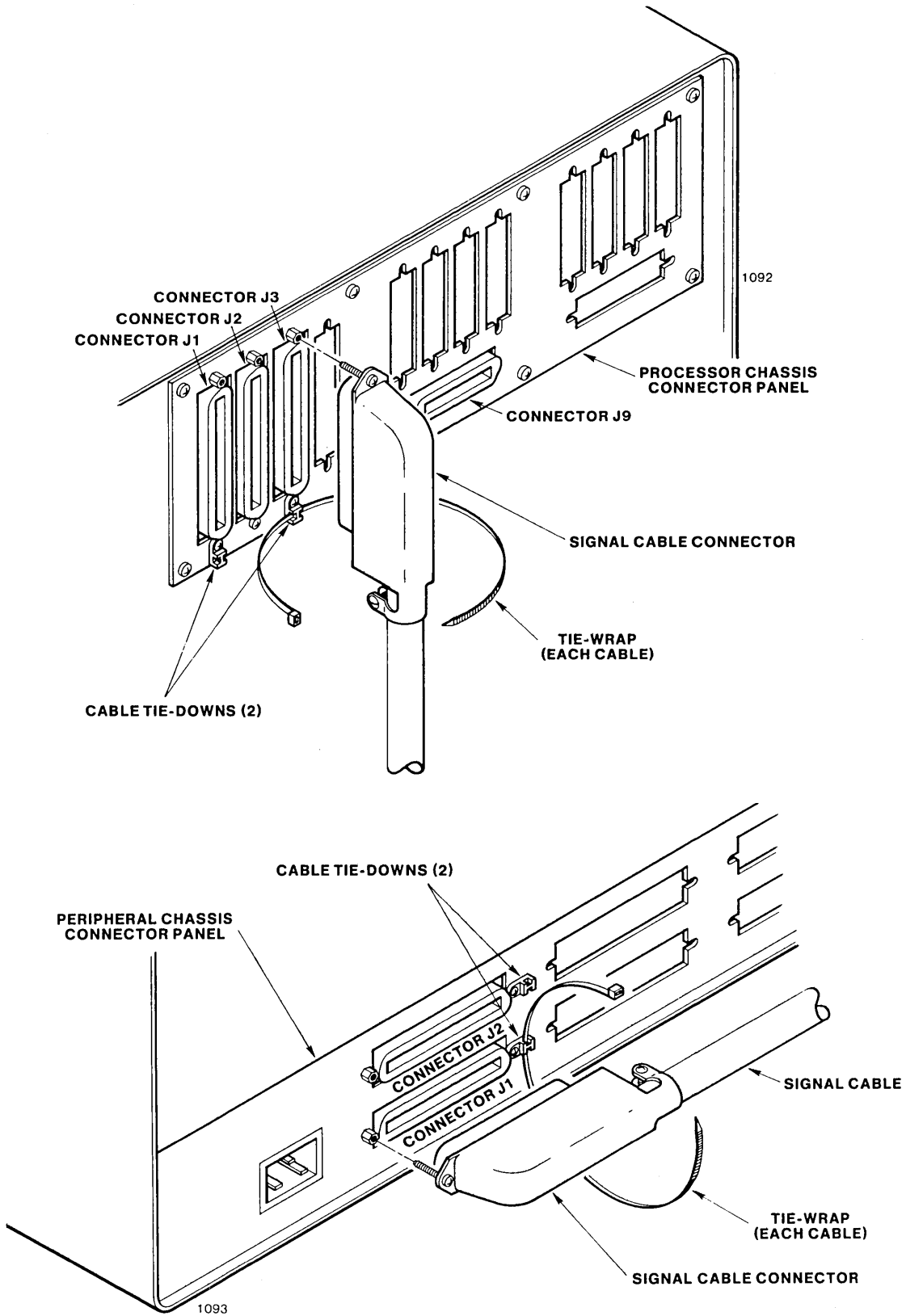
Figure 2-2. Tie-Wrap Installation On Cables

{ CAUTION }

The power-on sequence presented in the
next four steps is critical in obtain-
ing reliable system initialization and
operation. Read through the sequence
carefully before applying power to the
system.

13. Apply power to the user-supplied ASCII terminal.

14. Apply power to the Peripheral Chassis of the System 86/380; the
    power switch should illuminate. The Winchester drive requires
    about 30 seconds to reach operating speed and load the heads.

15. Apply power to the Processor Chassis of the System 86/380; the
    yellow LED power indicator should illuminate.

16. At this point, the system begins executing a short System
    Confidence Test (SCT). Your terminal should begin displaying a
    series of characters (asterisks, if it is set to 9600 baud).
    Enter the following character:

    U (uppercase)

    to continue the SCT and display status at your terminal. Refer
    to the SYSTEM 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL for
    information about the SCT. Following the successful completion
    of the SCT, the system attempts to bootstrap load the operating
    system. If you have not yet formatted the Winchester disk and
    loaded the operating system (either the Xenix 86 or iRMX 86
    Operating System) onto the Winchester disk, the system halts
    without bootstrap loading the operating system.

    If you are installing the iRMX 86 Operating System, refer to the
    GUIDE TO INSTALLING THE iRMX 86 OPERATING SYSTEM ON SYSTEM
    86/300 SERIES MICROCOMPUTER SYSTEMS for instructions on how to
    format the Winchester disk and on how to install the software.
    If you are installing the Xenix 86 Operating System, refer to
    installation instructions that accompany the Operating System or
    to the iSXM 101 MEMORY MANAGEMENT EXTENSION MODULE INSTALLATION
    GUIDE for instructions on how to install the software.

NOTE

If you have purchased the Xenix 86
Operating System, your system must have
the iSBC 309 board and a communications
expansion board installed for proper
operation. Refer to the installation
instructions that accompany the Opera-
ting System or to the iSXM 101 MEMORY
MANAGEMENT EXTENSION MODULE INSTALLA-
TION GUIDE for more information.

2.6   SERIAL I/O CABLE FABRICATION DATA

The System 86/380 provides one female, 25-pin, RS232C-compatible
interface at Connector J9 on the back of the Processor Chassis. A
user-supplied male connector is required for interfacing to J9. The
RS232C pin assignments for Connector J9 are listed in Table 2-1.

2.7   PARALLEL I/O CABLE FABRICATION

The System 86/380 provides three 50-pin parallel I/O cable connectors on
the rear panel of the Processor Chassis. Cables for two of the
connectors (J1 for the floppy disk and J3 for the Winchester disk) are
provided in the cable set that is shipped with the System 86/380. You
must provide a cable to interface from connector J2 on the rear of the
Processor Chassis to the line printer connector. Table 2-2 identifies
some of the manufacturers of connectors that are compatible with the
50-pin connectors at the connector panel on each chassis.

Table 2-1. Serial I/O Connector Pin Assignment

Pin Number	Function
1	Chassis ground
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Request To Send (RTS)
5	Clear To Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground (GND)
8	n/c
9	n/c
10	+5V DC
11	+12V DC
12	n/c
13	Sec CTS *
14	n/c
15	n/c
16	Sec Rec Signal *
17	Rec Sig Ele Timing (RXC)
18	n/c
19	n/c
20	Data Terminal Ready (DTR)
21	n/c
22	n/c
23	-12V DC
24	Transmit Signal *
25	+5V DC

Note: The * identifies those pins that are jumper configurable on the
      iSBC 86/30 board. Refer to the iSBC 86/30 SINGLE BOARD COMPUTER
      HARDWARE REFERENCE MANUAL for jumper configuration data.

Table 2-2. Compatible 50-Pin Cable Connectors

Connector Type	Part Number	Manufacturer
50-pin male	609-50M	TB Ansley
50-pin female	609-50F	TB Ansley
50-pin male	3565-1000	3M
50-pin female	3565-1002	3M

Table 2-3 contains the pin assignment information for the existing 50-pin connector J2 and the standard Centronics interface pin assignment. With some reconfiguration, you can install a 36-pin connector at J4 on the connector panel and convert the interface to a standard pin-out for a Centronics printer interface. Refer to Appendix G for more information on the configuration of a standard Centronics interface.

Table 2-3. Parallel I/O Cable Fabrication Data

50 Pin (J2)[1] Pin Number	36 Pin[2] Pin Number	Function
12	1	Character Strobe
14	12	Printer Ready (ON-LINE)
13	13	Printer Ready (Paper Error)
15	10	Character Acknowledge
17	9	Data bit 7
18	8	Data bit 6
19	7	Data bit 5
20	6	Data bit 4
21	5	Data bit 3
22	4	Data bit 2
23	3	Data bit 1
24	2	Data bit 0

Notes: 1. Pins 26 through 50 are tied to Chassis Ground.

2. Pins 19 through 27 must be tied to Chassis Ground on the Processor Chassis. All unlisted pin numbers must not be connected to the Processor Chassis.

CAUTION

The printer connector (J2) on the
Processor Chassis does not have a
standard Centronics interface pin
assignment. Failure to modify the
connector pin-out before interfacing to
a printer using a standard Centronics
interface may damage the printer.

***

CHAPTER 3. OPERATION INFORMATION

3.1 INTRODUCTION

This chapter provides details on operation of the System 86/380,
including information on the power-on and power-off sequencing for the
system, on the function of each of the controls and indicators on the
operator's panel, and on the operation of the System Confidence Test
(SCT) diagnostic within the System 86/380.

3.2 SYSTEM POWER SEQUENCING

For the System 86/380, each chassis contains its own dc power supply and
power switch. The suggested power-on sequence for the System 86/380 is
as follows:

1) Apply power to your terminal.

2) Apply power to the Peripheral Chassis.

3) Apply power to the Processor Chassis.

When removing power from the System 86/380, the suggested sequence is as
follows:

1) Remove power from the Peripheral Chassis.

2) Remove power from the Processor Chassis.

3) Remove power from the terminal.

The AC power switch on the Peripheral Chassis is an illuminated rocker
type switch with a built in 10 amp circuit breaker; the switch is located
in the lower right corner of the front panel on the chassis. When the
switch is set to the ON position, filtered AC is routed from the input
terminals on the line filter 1, through filter 2, to the input of the
power supply. The power supply then initiates a power-on sequence and
lights the lamp within the power switch when the +5 volt supply is
active. The power sequencing for the Peripheral Chassis power supply is
shown in Figure 3-1.

The AC power switch on the Processor Chassis is a toggle-type switch with
a built in 10 amp circuit breaker; the switch is located in the lower
right corner of the front panel of the chassis. When the switch is in
the ON position, filtered AC is routed from the input terminals on the
line filter to the input of the power supply. The power supply then
initiates a power-on sequence. The power sequencing for the Processor
Chassis power supply is shown in Figure 3-1.

PERIPHERAL CHASSIS

A.C. POWER

PFIN/

|←————150 mS————→|

± 5VDC

|←————1.5 SEC————→|

± 12VDC

± 24VDC

|←————.2 SEC————→|

MPRO/

A.C. POWER

PROCESSOR CHASSIS

|←————2.73 mS————→|

± 5VDC

± 12VDC

1090
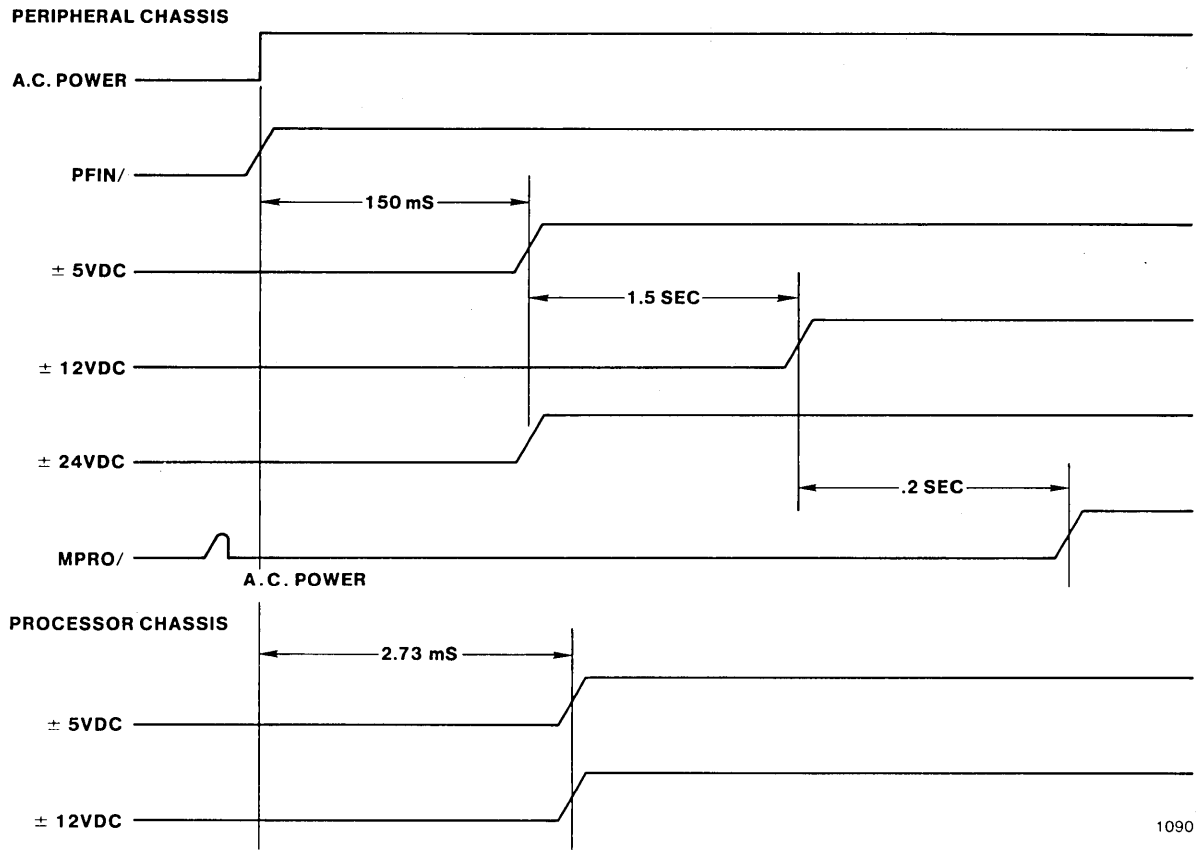
Figure 3-1.   System 86/380 Power on Sequence Timing Diagram

3.3   FRONT PANEL CONTROLS AND INDICATORS

The front panel controls and indicators are located on the left portion
of the front panel when facing the Processor Chassis.   Figure 3-2 shows
the front panel controls and indicators for the Processor Chassis, and
shows how each is labelled.
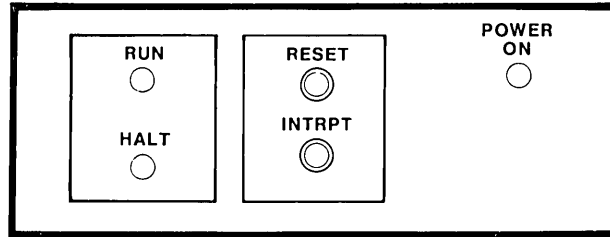
1013

Figure 3-2. System 86/380 Controls and Indicators (Processor Chassis)

3.3.1   RUN INDICATOR

The Processor Chassis contains a green "RUN" LED that is illuminated when
the CPU is executing an instruction. It is extinguished after a HALT
instruction is executed or during a power-on sequence. If the SCT
detects an error during the USART test, the RUN indicator flashes on and
off in conjunction with the HALT indicator.

3.3.2   HALT INDICATOR

The Processor Chassis contains a red "HALT" LED that is illuminated
whenever the processor executes a HALT instruction, or during a power-on
sequence. The LED is extinguished as soon as the CPU executes another
instruction.

3.3.3   POWER ON INDICATOR

The Processor Chassis contains a yellow "POWER ON" LED indicator that
illuminates whenever AC power is applied to the chassis. If the power
cord is connected, the switch is in the ON position, and the LED is not
illuminated, then the LED may be burned out, the +5 volt power supply may
not be operational, or the circuit breaker within the power switch may
have tripped.

3.3.4   RESET SWITCH

The RESET switch on the front of the Processor Chassis is a pushbutton switch wired to connector P2, pin-30 of cardslot J4 of the cardcage within the Processor Chassis. This cardslot normally holds the processor board for the System 86/380. When activated, the RESET switch generates a RESET/ signal to the processor board that forces the board to generate an INIT/ signal and begin execution of an initialization routine when the switch is released.

By activating the RESET switch, you cause the HALT indicator to remain ON. When the switch is released, the RUN indicator immediately goes ON, and a second later, the HALT indicator flashes. After HALT flashes, the RUN indicator stays ON.

3.3.5   INTERRUPT (INTRPT) SWITCH

The INTRPT (interrupt) switch on the front of the Processor Chassis is a pushbutton switch wired to connector P1, pin-42 of cardslot J3 of the cardcage within the Processor Chassis. This cardslot normally holds the processor board for the System 86/380. When activated, the INTRPT switch generates an interrupt signal (INT1/) to the processor board that forces the board to execute an interrupt routine beginning at memory location 00084H if under monitor control or beginning at memory location 000E4H if under control of the iRMX 86 Operating System.

By activating the INTRPT switch, you can generate a momentary interrupt to the iSBC 86/30 board, unless the system is halted. When running and the switch is activated, the RUN indicator immediately goes ON and stays ON.

3.4   SYSTEM CONFIDENCE TEST (SCT)

The SCT provides a level of diagnostics that determine when major components of the System 86/380 microcomputer system are operational. The SCT resides in ROM on the iSBC 86/30 board and is co-resident with the iRMX 86 Bootstrap Loader and the iSBC 957B Monitor.

The SCT interfaces with its co-resident software modules only on termination of the SCT. If, in any of the tests, the SCT determines that a malfunction occurred, it passes program control to the iSBC 957B Monitor on termination of the SCT. If the SCT does not detect a malfunction, it passes program control to the iRMX 86 Bootstrap Loader.

The SCT checks the ability of the iSBC 86/30 board in the System 86/380 to communicate with each of the components of the system. The following paragraphs provide a detailed description of initialization and operation of the SCT.

If any operational problems are encountered during the SCT, the system can report the errors on the CRT screen. Refer to the SYSTEM 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL. Some errors are fatal and some are not; refer to the information on the individual tests of the SCT that is contained in the SYSTEM 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL.

3.4.1   SCT COMPLETION

If the SCT test results are "GO", the system displays on the CRT screen the message:

        SCT SUCCESSFUL...NOW BOOTING SYSTEM

The operating system will load if it has been previously installed on the system disk. If you have not installed the operating system, refer to the appropriate manual:

    GUIDE TO INSTALLING THE iRMX 86 OPERATING SYSTEM ON SYSTEM 86/300
    SERIES MICROCOMPUTER SYSTEMS

    iSXM 101 MEMORY PROTECTION EXTENSION MODULE INSTALLATION GUIDE

Any "NO-GO" messages appearing in the status column during the SCT indicate that an error was detected on that test. As a result of detecting an error, the system provides a different message on the CRT screen:

        SCT COMPLETE, NO-GO...EXIT TO MONITOR

Abnormal test results are indicated by question marks that are positioned in specific columns of the CRT display. The CRT display also provides an indication of the type of error encountered and the probable failing subassembly.

After reporting an exit to the monitor program, the System 86/380 transfers program control to the iSBC 957B Monitor, co-resident in the iSBC 86/30 board's EPROM space and prompts you with a period (.) for a monitor command.

At this point, if you have a system "NO-GO" condition, you can either run the System Analysis Test (SAT) or the System Diagnostic Test (SDT) to help isolate any identified problem areas. Refer to the SYSTEM 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL for further instructions on determining the probable failing subassembly.

If your System 86/380 is running the Xenix Operating System, it will load automatically upon successful completion of the SCT.

3.5   PROGRAMMING INFORMATION

The System 86/380 is shipped with a set of floppy diskettes containing the iRMX 86 Operating System or the Xenix Operating System. As with any operating system, the preconfigured version of the iRMX 86 Operating System expects to find certain conditions within the hardware environment when loaded. Some of the configurations include interrupt vector tables and free access to certain memory and I/O addresses. Each of these is described in the following paragraphs.

3.5.1   SYSTEM INTERRUPT VECTORS

The System 86/380 is designed around the iSBC 86/30 Single Board Computer and, as such, conforms to the interrupt vectoring performed by the board. The interrupt vector addresses generated by the iSBC 86/30 board are listed in Table 3-1.

Table 3-1.   Interrupt Assignments

Int. Name	Description	Vector Address Generated	
		iRMX 86	957B Monitor
NMI	Power Fail	00008H	00008H
IR0	Floating point exception	00080H	000E0H
IR1	Operator Panel	00084H	000E4H
IR2	On-board Timer	00088H	000E8H
IR3	User selectable	0008CH	000ECH
IR4	Line printer	00090H	000F0H
IR5	Winchester or floppy disk	00094H	000F4H
IR6	Serial I/O receive	00098H	000F8H
IR7	Serial I/O transmit	0009CH	000FCH

3.5.2   SYSTEM MEMORY CONFIGURATION

The System 86/380 contains 384k bytes of memory in the as-shipped configuration. Figure 3-3 provides a memory map of the System 86/380 that shows the range of memory locations required by each of the software components of the system, including the System Confidence Test, the iSBC 957B Monitor, the iRMX 86 Operating System, the iSBC 215 board parameters, the interrupt vector tables, and non-existent memory.

Memory Addresses

Contents

FFFF:F

```
iSBC*  957B monitor,
bootstrap loader, and
SCT in ROM
```

F800:0

F7FF:F

```
Nonexistent memory
```

5FFF:F

```
Operating System
and Free Space
```

0104:0

0103:F

```
Interrupt vectors,
iSBC®  957B data,
iSBC®  215 data
```

0000:0

x-473

Figure 3-3.   System 86/380 Physical Address Space Allocation

3.5.3   SYSTEM I/O CONFIGURATION

The iSBC 86/30 board within the System 86/380 provides the system with
64k programmable I/O addresses when configured as-shipped.   Table 3-2
provides a list of the I/O port address assignments for the System 86/380
and lists the functions performed on the various I/O devices.   Included
in the table are the output connector numbers on the rear of the
Processor Chassis.

Table 3-2. I/O Port Address List

I/O Port Addresses	Device Selected	Function Performed	
C0 or C4	8259A PIC	Byte Read Byte Write	Status and Poll ICW1, OCW2, OCW3
C2 or C6	8259A PIC	Byte Read Byte Write	OCW1 ICW2, ICW3, ICW4, OCW1
C8	8255A PPI	Read Write	Port A Port A
CA	8255A PPI	Read Write	Port B Port B
CC	8255A PPI	Read Write	Port C Port C
CE	8255A PPI	Read Write	none Control Word
D0	8253-5 PIT	Read Write	Counter 0 Counter 0 (load count divide number)
D2	8253-5 PIT	Read Write	Counter 1 Counter 1 (load count divide number)
D4	8253-5 PIT	Read Write	Counter 2 Counter 2 (load count divide number)
D6	8253-5 PIT	Read Write	none Control Word
D8 or DC	8251A PCI	Read Write	Data (serial I/O) Data (serial I/O)
DA or DE	8251A PCI	Read Write	Status Mode or command Word
C0, C2, C4, or C6	Edge Interrupt Sense Register	Word Read Word Write	None Clear Register

Table 3-2. I/O Port Address List (continued)

I/O Port Addresses	Device Selected		Function Performed
00H	iSBC 056A Parity Port Access	Byte Read Byte Write	
100H	iSBC 215 and iSBX 218 Port Address	Read/Write	Refer to respective manual for functions.
C9,CB,CD, CF,D1,D3, D5,D7,D9, DB,DD,DF	Status Latch/ Megabyte Reg	Read Write	none Load upper 4-bit Address, Override, NMI mask, Multibus interrupts, gate control.
80,82,84, 86,88,8A, 8C,8E	iSBX Connector J4	Read/Write	Low byte transfer (both 8-bit and 16-bit boards), or word transfer (16-bit boards only). Activates MCS0/ for Multimodule boards.
81,83,85, 87,89,8B, 8D,8F	iSBX Connector J4	Read/Write	High byte transfer (16-bit boards only). Activates MCS1/ for Multimodule boards.
90,92,94, 96,98,9A, 9C,9E	iSBX Connector J4	Read/Write	Byte tranfer (8-bit boards only). Activates MCS1/ for Multimodule boards.
A0,A2,A4, A6,A8,AA, AC,AE	iSBX Connector J3	Read/Write	Low byte transfer (both 8-bit and 16-bit boards), or word transfer (16-bit boards only). Activates MCS0/ for Multimodule boards.
A1,A3,A5, A7,A9,AB, AD,AF	iSBX Connector J3	Read/Write	High byte transfer (16-bit boards only). Activates MCS1/ for Multimodule boards.
B0,B2,B4, B6,B8,BA, BC,BE	iSBX Connector J3	Read/Write	Byte transfer (8-bit boards only). Activates MCS1/ for Multimodule boards.

***

CHAPTER 4. MAINTENANCE INFORMATION

4.1 INTRODUCTION

This chapter provides preventive maintenance, problem isolation, and removal and replacement procedures for most of the major subassemblies within each chassis of the System 86/380.

4.2 PREVENTIVE MAINTENANCE

The intent of any preventive maintenance is to prevent major subassembly failures by providing maintenance to correct the minor problem areas before they cause major failures. Every preventive maintenance operation should assist in realizing the objective of providing maximum machine operation time.

The majority of the preventive maintenance procedures can be performed via a visual inspection of the problem areas within the system. A visual inspection should identify most problem areas related to corrosion, dirt build-up, excessive wear, binding parts, loose or missing screws, and loose or frayed wires. Noticing these types of items during preventive maintenance can eliminate system down-time.

Table 4-1 lists the important problem areas on the System 86/380 that must be checked and a time schedule for performing the preventive maintenance. Other preventive maintenance procedures are as follows:

WARNING

Do not service any subassembly of the Peripheral Chassis while AC power is applied to the chassis. Hazardous voltages are present within the chassis when the AC power cord is connected to a power source.

1. Remove the top cover of each chassis.

2. Visually inspect the interior of each chassis for evidence of:

    a. broken or loose wires

    b. improperly seated boards

    c. improperly seated connectors and cables

    d. broken or loose components.

Table 4-1. Preventive Maintenance Schedule

Recommended Interval	Operation
12 months	Inspect floppy disk drive belt for frayed or weakened areas. Replace, if necessary.
12 months	Inspect floppy disk drive actuator band, capstan, and motor shaft for excessive oil and dirt. Clean if dirty.
12 months or 1000 hours	Inspect the read/write heads on the floppy drive. Clean if dirty. Refer to Appendix F for a cleaning procedure.

4.3   TROUBLESHOOTING

Troubleshooting is defined as the systematic isolation of a failure to a defective subassembly. Troubleshooting a failing system should be preceded by performing a preventive maintenance check of the system as described in the previous section. The System 86/380 includes several troubleshooting aides, including the SCT, the SAT, and the SDT programs provided on floppy diskettes with the system.

When any abnormal conditions are recognized during the preventive maintenance, you should remove power from the system and correct them. If the preventive maintenance check fails to identify the problem in a semi-operational system, you can begin a corrective maintenance sequence by running the SCT. A "NO-GO" message from any of the SCT tests provides a starting point in tracking the failure to a specific subassembly. The results of the SCT are discussed in the iSBC 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL.

A failure area identified by the SCT may be further isolated within the system by running the SAT and the SDT. The operating instructions and error reporting methods for these software diagnostics are described in the iSBC 86/300 SERIES DIAGNOSTIC MAINTENANCE MANUAL.

Figure 4-1 provides a troubleshooting flowchart that will aid in isolating most problems that present themselves during the initial system power-up sequence.

When you experience initial power-up problems that will not allow running the SCT and SDT diagnostic tests. verify that the:

```
┌─────────────────────────┐
│ 1. AC power cord for     │
│    each chassis is       │
│    installed properly.   │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 2. AC power switch for   │
│    each chassis is in the│
│    ON position.          │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 3. AC power is available │
│    at the line filter    │
│    output lugs.          │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 4. DC power from the     │
│    power supply within   │
│    each chassis is within│
│    the required          │
│    specifications.       │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 5. DC power is available │
│    within the cardcage at│
│    the Processor Chassis.│
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 6. Disk drive signal     │
│    cables between        │
│    chassis units are     │
│    installed properly.   │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 7. Boards within the     │
│    Processor Chassis are │
│    seated properly.      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 8. Connectors within the │
│    Processor Chassis are │
│    seated properly.      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ 9. Connectors within the │
│    Peripheral Chassis are│
│    seated properly.      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│10. Winchester            │
│    head-loading restraint│
│    is in the UNLOCKED    │
│    position.             │
└─────────────────────────┘
             │
             ▼
```

When these initial checks are completed and you still experience operating problems. consult your local Intel Product Service Representative. If you correct the problem by performing these initial checks. operate the SCT and SDT to further isolate any other problem areas.

Figure 4-1.   System 86/380 Troubleshooting Flowchart

4.4   CORRECTIVE MAINTENANCE

Corrective maintenance for the System 86/380 consists of removing and replacing individual subassemblies that are identified by the SCT, SAT, or SDT as being faulty. The remainder of this manual describes disassembly procedures for removing each major subassembly within the Processor Chassis and within the Peripheral Chassis. Use the reverse order of the removal procedures for reassembling the chassis after correcting or replacing a problem in the system. Get into a habit of reading the complete procedure before starting, and of labeling both ends of a connection (whether wire or cable connector) when disassembling the system.

4.4.1   PERIPHERAL CHASSIS

The maintenance procedures for the Peripheral Chassis consist of removal and replacement procedures for all of the major subassemblies within the chassis. The procedures are presented in the next 14 sections and are found in this order:

4.4.1.1	Front Panel
4.4.1.2	Top Cover
4.4.1.3	Filler Panels
4.4.1.4	Side Panels
4.4.1.5	Bottom Cover
4.4.1.6	Winchester Drive
4.4.1.7	Floppy Drive
4.4.1.8	Fan Assembly
4.4.1.9	Power Supply
4.4.1.10	AC Power Switch
4.4.1.11	AC Power Lamp
4.4.1.12	AC Filter 1
4.4.1.13	AC Filter 2

NOTE

Cut the tie-wrap and remove the two 50-pin signal cables from between the chassis units if moving or disassembling the system.

WARNING

Do not service any subassembly of the Peripheral Chassis while AC power is applied to the chassis. Hazardous voltages are present within the chassis when the AC power cord is connected to a power source.

CAUTION

Whenever moving or disassembling the
System 86/380, you must LOCK the
head-restraint on the Winchester drive
to eliminate the possibility of
damaging the drive. Refer to Figure
2-1 and associated text.

4.4.1.1   Front Panel Removal Procedure (Peripheral Chassis)

The front panel assembly is a snap-on, plastic molding mounted on the
front of the Peripheral Chassis. The front panel is attached by four
ball-stud fasteners, see Figure 4-2, and must be removed to gain access
to the filler panel, the Winchester drive, and the flexible disk drive.
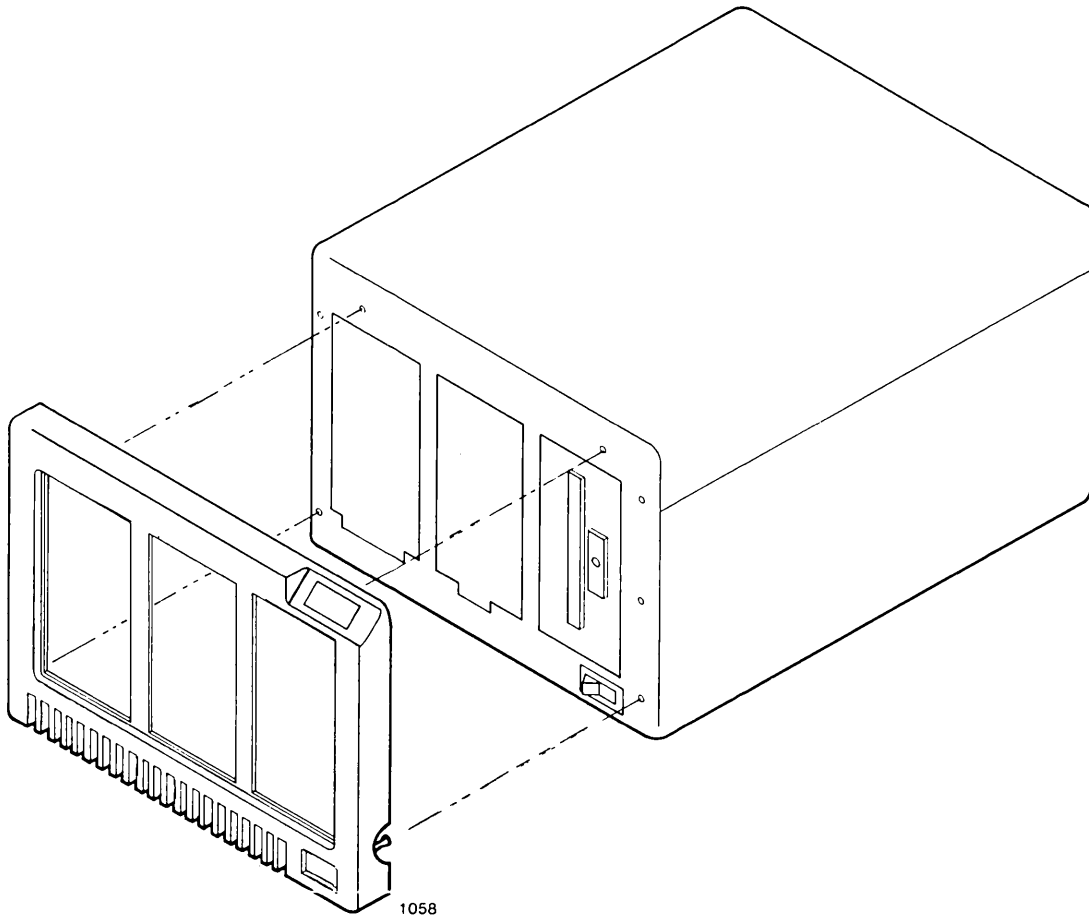To remove the front panel, pull sharply on the front panel assembly.

1058

Figure 4-2. Front Panel Retainer Locations

4.4.1.2   Top Cover Removal Procedure (Peripheral Chassis)

The top cover is a sheet metal panel on the top of the chassis and must
be removed to gain access to the Winchester drive, the floppy drive, the
power supply, the filter 1, and the fan assembly. To remove the top
cover, twist the 4 quarter-turn fasteners CCW (one at each corner) and
lift up the top cover. (Refer to Figure 4-3.)
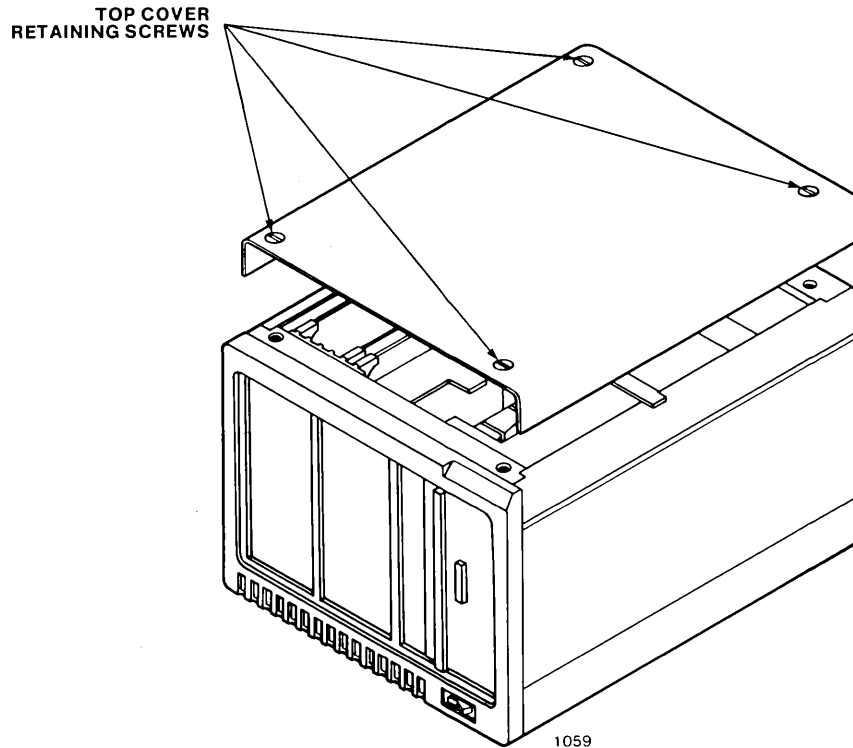

**TOP COVER
RETAINING SCREWS**

1059

Figure 4-3. Top Cover Retaining Screw Locations

4.4.1.3   Filler Panel Removal Procedure (Peripheral Chassis)

The Peripheral Chassis contains two black filler panels; one on the front of
the center bay containing the Winchester drive and one on the front of the
left-most (empty) bay. The center bay filler panel must be removed to gain
access to the Winchester drive. The panel removal procedure is as follows:

1.   Turn the AC power switch to OFF.

2.   Disconnect the AC power cord from the power source.

3.   Remove the top cover from the Peripheral Chassis (see section
     4.4.1.2).

4. Remove the front panel from the Peripheral Chassis (see section 4.4.2.1).

5. Remove the two screws (see Figure 4-4) securing the filler panel to the Peripheral Chassis and remove the filler panel.
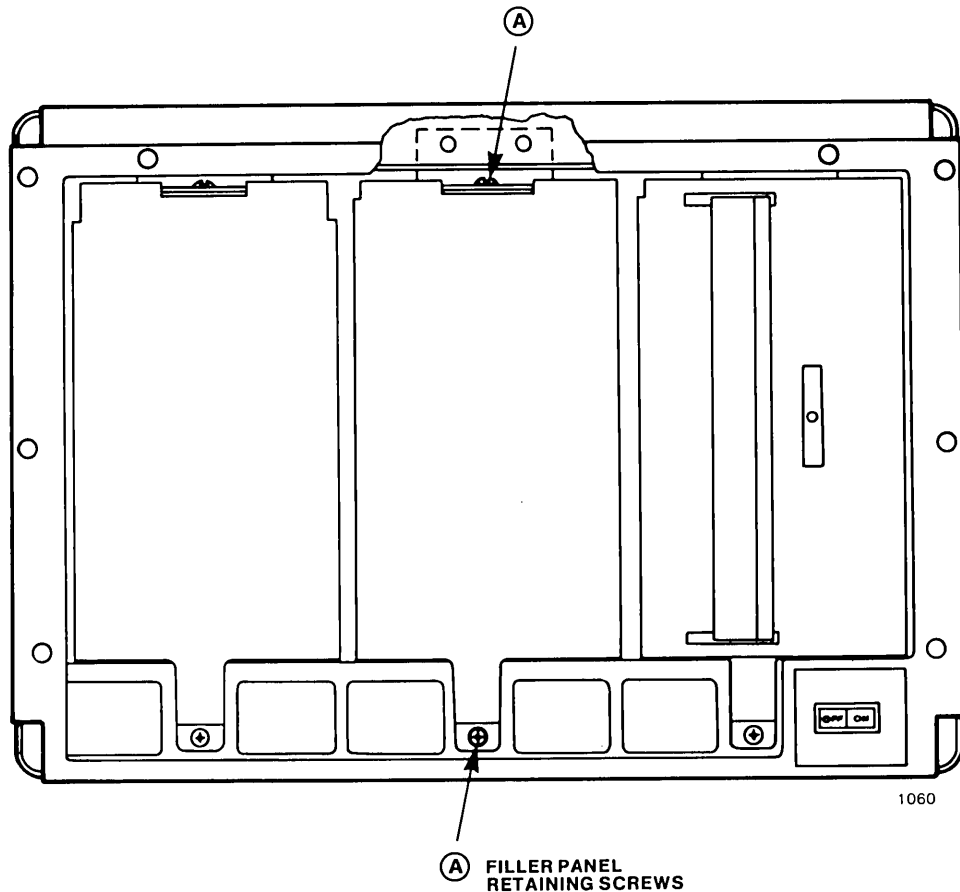

1060

(A) FILLER PANEL
RETAINING SCREWS

Figure 4-4. Filler Panel Retaining Screw Locations

4.4.1.4   Side Panel Removal Procedure (Peripheral Chassis)

The two sheet metal side panels on the Peripheral Chassis are removed only when rack mounting the System 86/380. Each side panel is secured to the Peripheral Chassis via four ball-stud fasteners (see Figure 4-5 for locations). To remove the side panels, pull sharply outward on each end of the side panels.

Removal of the side panels allows access to the rack mounting holes in either side of the chassis.
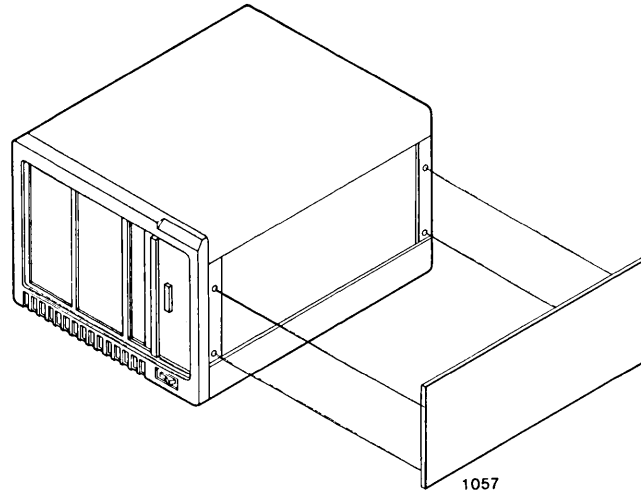
1057

Figure 4-5.   Side Panel Fastener Locations

4.4.1.5   Bottom Cover Removal Procedure (Peripheral Chassis)

The bottom cover on the Peripheral Chassis is a sheet metal panel providing access to the mounting screws for filter 1 and to the inside of the connector panel on the rear cover of the chassis. To remove the bottom cover, proceed as follows:

1.   Turn the AC power switch to OFF.

2.   Disconnect the AC power cord from the power source.

3.   Remove the front panel from the Peripheral Chassis (see section 4.4.2.1).

4.   Remove the filler panel from the front (center bay) of the chassis (see section 4.4.1.3).

5.   Place the head-locking lever on the Winchester drive into the LOCK position so that you can turn the chassis on its side without damaging the drive (see Figure 2-5 and associated text).

      You will find the head-locking lever directly behind the center filler panel, on the front of the drive.

4-8

{ CAUTION }

Exercise care when turning the chassis
over to gain access to the four screws
securing the bottom cover to the
chassis. If the heads on the
Winchester drive are not LOCKED, the
storage media may be damaged.

NOTE

To avoid marring the paint on the
exterior panels on the Processor and
Peripheral Chassis, you may wish to
remove the panels before turning the
chassis onto its side or top.

6. Turn the chassis onto its top to gain access to the four screws
    securing the bottom cover to the chassis (see Figure 4-6). As
    Figure 4-6 shows, the four screws are at the four corners of the
    bottom cover; one is inside each of the four bumpers.

7. Remove the four screws securing the bottom cover to the chassis
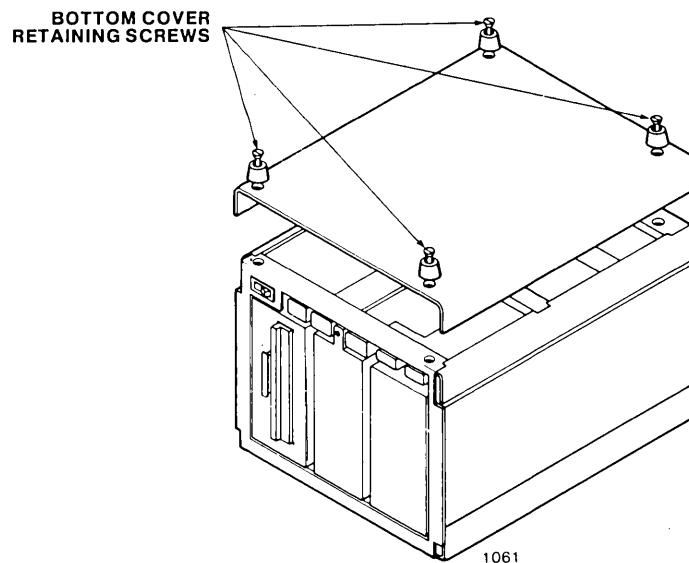   and lift off the cover.

BOTTOM COVER
RETAINING SCREWS

1061

Figure 4-6. Bottom Cover Retaining Screw Locations

4.4.1.6   Winchester Drive Removal and Replacement   Procedure (Peripheral
          Chassis)

The Winchester drive is located in the center bay of the Peripheral
Chassis and should be removed only when replacing the drive, when
replacing the Winchester drive, or when replacing filter 2 within the
chassis. To remove the Winchester drive, proceed as follows:

1.   Turn the AC power switch to OFF.

2.   Disconnect the AC power cord from the power source.

3.   Remove the top cover from the Peripheral Chassis (see section
     4.4.1.2).

4.   Remove the front panel (see section 4.4.2.1).

5.   From the front, remove the filler panel from the front of the
     chassis (refer to section 4.4.1.3) and LOCK the shipping
     restraint on the Winchester drive (see Figure 2-5).

6.   Remove the three screws (see Figure 4-7) securing the Winchester
     drive to the chassis. Two screws are accessed from the top of
     the chassis; the other is accessed from the front.

7.   At the drive, disconnect the power cable and the signal cable
     from the Winchester drive.

8.   Slide the drive forward until the two cable connectors plugged
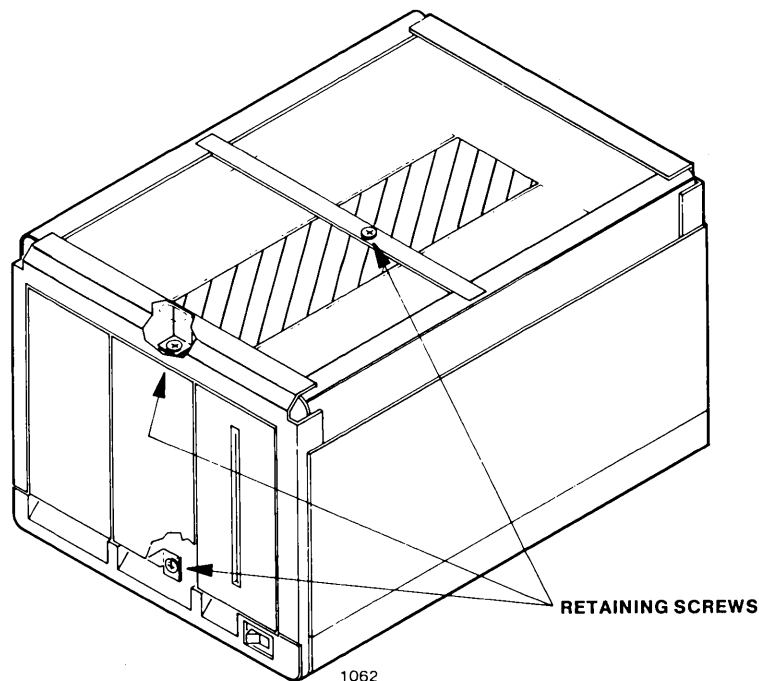   into the front of the drive are accessible.

RETAINING SCREWS

1062

Figure 4-7. Winchester And Floppy Drive Retaining Screw Locations (Typical)

9. From the front of the chassis, pull the Winchester drive out of the chassis.

10. Remove the two screws from the slide bracket (see Figure 4-8) on the bottom of the old drive, remove the slide bracket, and install it onto the bottom of the replacement drive.

11. Slide the replacement drive half way into the chassis and reconnect the cables to the drive in this order:

   a. Connect the 50-pin signal cable from J2 on the Peripheral Chassis connector panel to J1 on the Winchester drive.

   b. Connect the 6-pin DC power cable from J4 on the power supply to J3 on the Winchester drive.

12. Reassemble the remaining pieces of the Peripheral Chassis.

4.4.1.7   Floppy Drive Removal and Replacement Procedure (Peripheral Chassis)

The floppy drive is removed when found to be defective or when replacing filter 2 within the chassis. To remove the floppy drive, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top panel (see section 4.4.1.2).

4. Remove the front panel (see section 4.4.2.1).

5. Remove the three screws (see Figure 4-7) securing the drive to the chassis. Two screws are accessed from the top of the chassis; the other is accessed from the front.

6. Slide the drive forward until the three connectors on the back of the floppy drive are accessible from the top of the chassis.

7. Disconnect the 50-pin signal cable, the 3-pin AC cable, and the 6-pin DC cable from the floppy drive.

8. From the front of the chassis, pull the floppy drive out of the chassis.

9. Configure the jumper options on the floppy disk drive to a mode of operation that is compatible with the iSBX 218 board. Refer to Appendix H for jumper configuration details for Shugart 850 drive jumpers.

10. Remove the two screws from the slide bracket on the bottom of the drive, remove the slide bracket (see Figure 4-8) from the drive, and install it onto the bottom of the replacement drive.

11. Slide the replacement drive half way into the chassis and
    reconnect the cables to the drive in this order:

    a. Connect the 6-pin DC power cable from J4 on the power supply
        to J5 on the floppy drive.

    b. Connect the 3-pin AC power cable from J2 on the power supply
        to the floppy drive AC power connection.

    c. Connect the 50-pin signal cable from J1 on the Peripheral
        Chassis connector panel to J1 on the floppy drive.

12. Reassemble the remainder of the Peripheral Chassis.
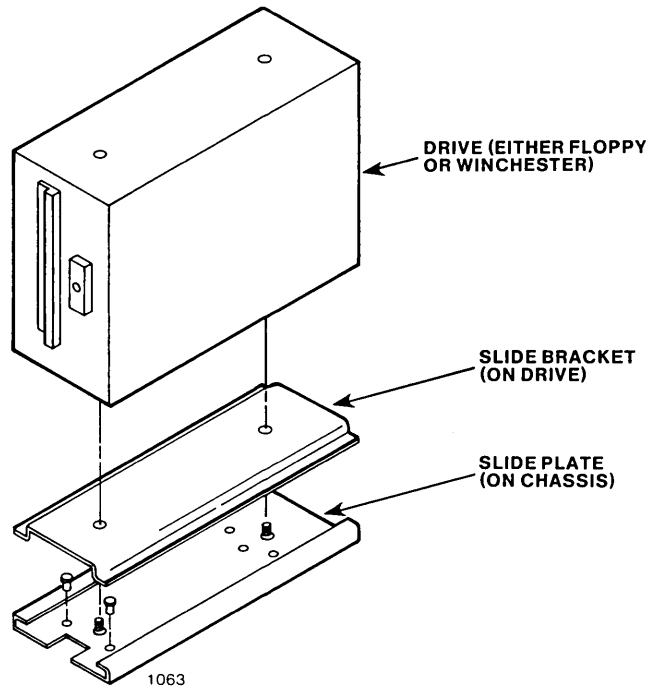
Figure 4-8. Slide Bracket Removal From Drives

4.4.1.8 Fan Assembly Removal and Replacement Procedure (Peripheral
         Chassis)

The fan assembly within the Peripheral Chassis is part of the power
supply assembly and must be removed and replaced with the power supply.
Refer to the power supply removal instructions for further details. Note
that the fans require +12 volts DC power from the power supply.

4-12

4.4.1.9   Power Supply Removal and Replacement Procedure (Peripheral
          Chassis)

The power supply in the Peripheral Chassis is mounted onto the rear panel
of the chassis and is removed only for replacement. To remove the power
supply, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover (section 4.4.1.2).

4. Remove the front panel (section 4.4.2.1).

5. Remove the filler panel (section 4.4.1.3) and LOCK the Winchester
    shipping restraint.

6. Remove the three screws securing the Winchester drive to the
    chassis. The screws are shown in Figure 4-7.

7. Slide the Winchester drive forward until the three wires attached
    to filter 2 are accessible (refer to Figure 4-9).

8. Label and disconnect the three wires connected to the filter 2.

9. Label and unplug all connectors (P5, P4, P9, and P2) from the
    front of the power supply.

10. From the rear of the chassis, remove the six screws securing the
    power supply to the Peripheral Chassis. Refer to Figure 4-10 for
    the screw locations.

11. From the rear of the chassis, pull the power supply out from the
    back of the chassis until the power cable for the AC filter stops
    the movement. Tilt the power supply back and lay it down on the
    bench.

{ CAUTION }

          The power supply weighs approximately
          15 pounds. Failing to use the proper
          lifting techniques when removing the
          supply from the chassis could cause you
          physical injuries. Obtain help from
          another person when possible.

12. Replace the faulty power supply and reassemble the chassis.

CAUTION

Do not replace power supply fuses.
Replacing a blown fuse may result in
additional damage to the power supply
circuitry unless a component failure is
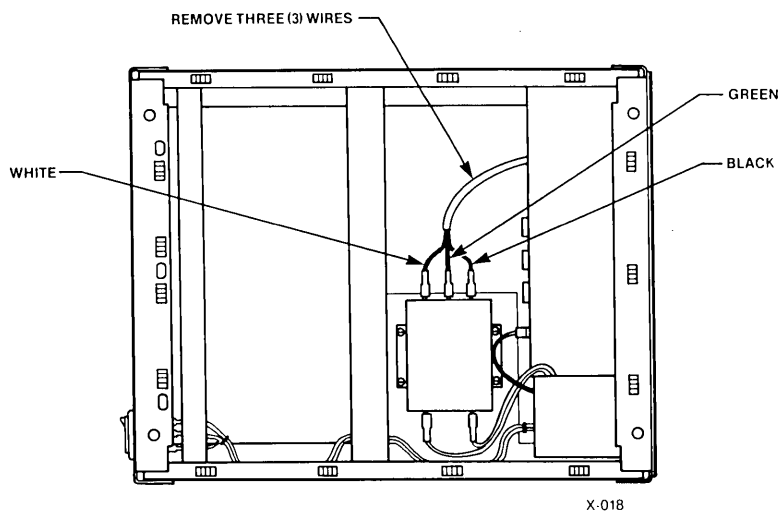first isolated and repaired.

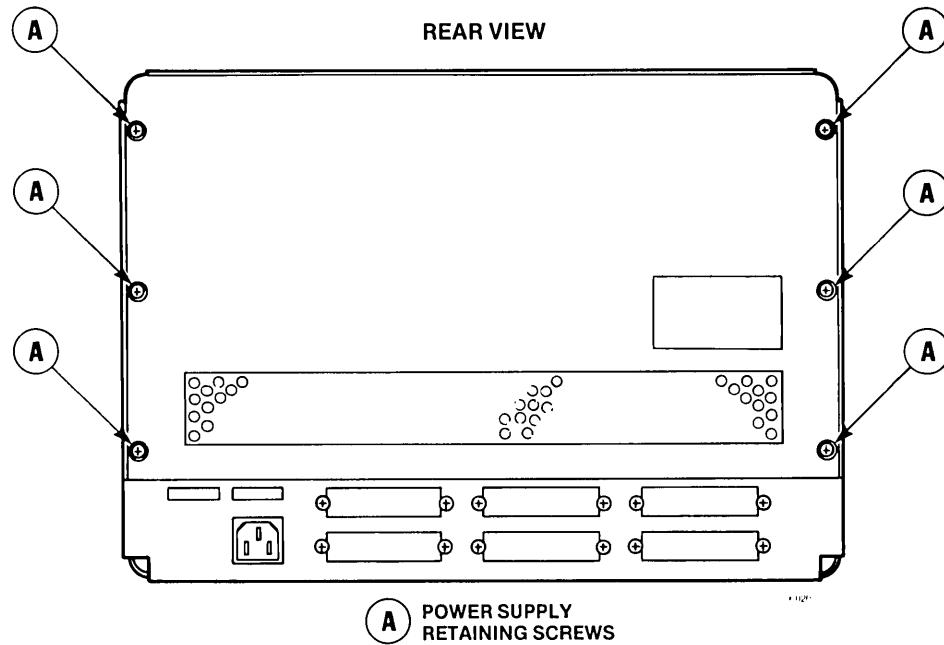Figure 4-9. Filter 2 Location

Figure 4-10. Power Supply Retaining Screw Locations

4.4.1.10   AC Power Switch Removal and Replacement Procedure (Peripheral Chassis)

The AC power switch on the Peripheral Chassis is located in the lower right corner of the front panel. To replace the power switch, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover (section 4.4.1.2).

4. Remove the front panel (section 4.4.1.1).

5. Remove the floppy drive (section 4.4.1.7).

6. Reaching inside the chassis from the front, compress the retaining clips on each side of the power switch (see Figure 4-11) and pull the switch out through the front of the chassis.
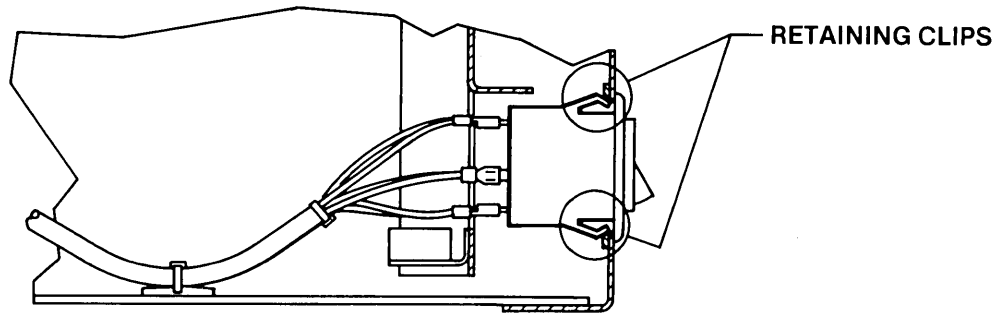
x-024

Figure 4-11. AC Switch Retaining Clips

7. Label and remove the six terminal lugs on the switch.

8. Place the replacement switch in the proper position and reconnect the six terminal lugs to the replacement switch. Viewing the back of the switch, connect the terminal lugs to the switch as shown in Figure 4-12.

9. From the front of the chassis, compress the retaining clips and push the replacement switch back into the chassis.
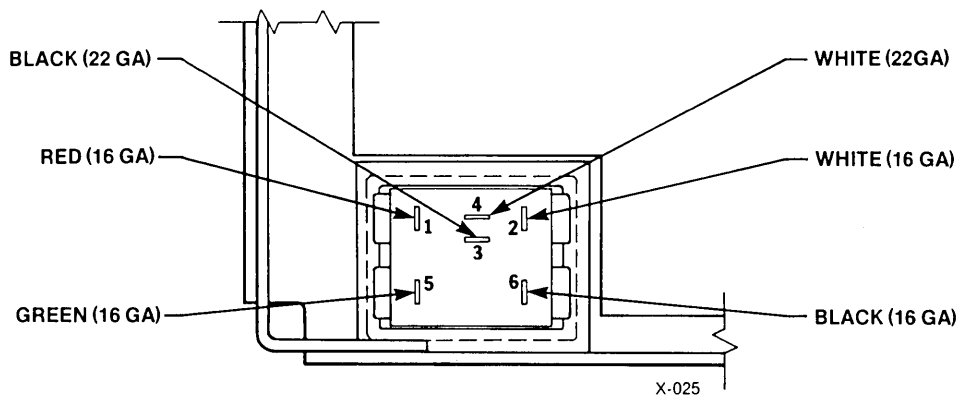

X-025

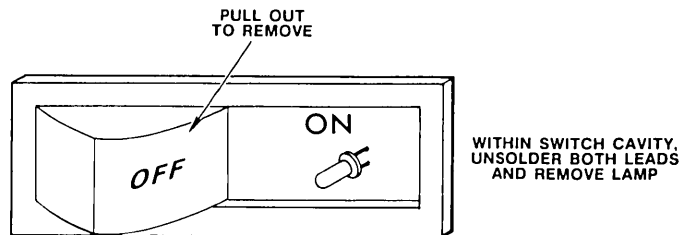Figure 4-12. Rear View of AC Power Switch

4.4.1.11   AC Power Switch Lamp Removal and Replacement Procedure
            (Peripheral Chassis)

The AC power switch on the front panel of the Peripheral Chassis contains
an AC lamp inside the switch cover; refer to item 44 in Figure 6-6, sheet
2.
The lamp is illuminated whenever +5 volts DC power from the power supply
is available within the Peripheral Chassis. If the lamp should burn out,
replace it as follows:

  1. Turn the AC power switch to OFF.

  2. Disconnect the AC power cord from the power source.

  3. From the front of the chassis, remove the white plastic switch
      cover from the power switch by pulling out on the switch cover
      (see Figure 4-13). The lamp is mounted inside the switch cover.

  4. Unsolder the two leads from the lamp and replace it with an
      equivalent type of DC voltage lamp.

  5. Resolder the lamp and reassemble the switch and chassis.

Figure 4-13. AC Power Switch Lamp Location

4.4.1.12   Filter 1 Removal and Replacement Procedure   (Peripheral
Chassis)

Filter 1 is the primary AC power filter located nearest to the rear wall
in the bottom of the Peripheral Chassis; refer to item 38 of Figure 6-6,
sheet 2. To remove filter 1, proceed as follows:

  1. Turn the AC power switch to OFF.

  2. Disconnect the AC power cord from the power source.

  3. Remove the bottom cover (section 4.4.1.5).

  4. Disconnect and label the four leads to filter 1 (see Figure 4-14).

5. Remove the two screws securing filter 1 to the chassis and remove filter 1.

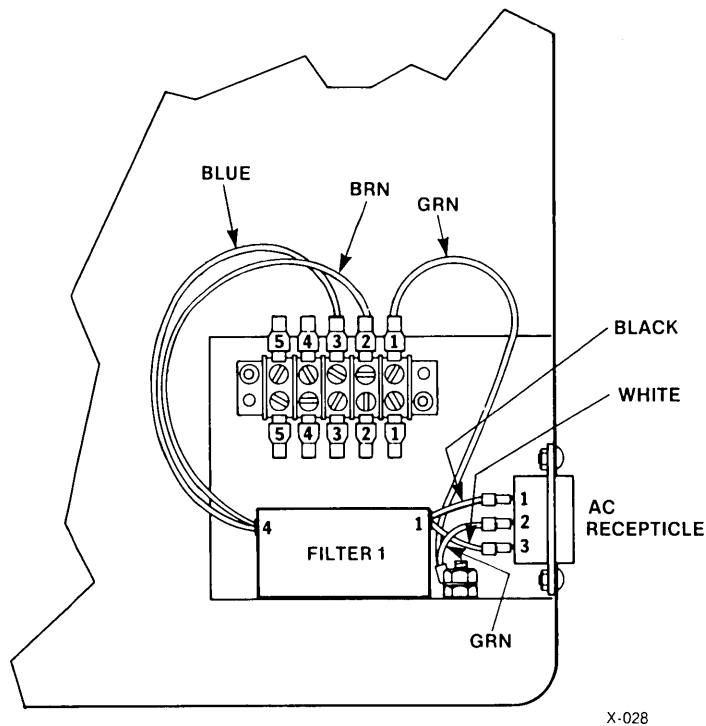6. Reassemble the chassis with the new filter.

Figure 4-14. Filter 1 Connections

4.4.1.13   Filter 2 Removal and Replacement Procedure (Peripheral Chassis)

Filter 2 is a secondary AC power filter located at the bottom center of the Peripheral Chassis; refer to item 39 of Figure 6-6, sheet 2. To remove Filter 2, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover (section 4.4.1.2).

4. Remove the front panel (section 4.4.2.1).

5. Remove the filler panel (see section 4.4.1.3) from the front of the right-most and center bays.

6. Remove the Winchester drive (see section 4.4.1.6). Ensure that you LOCK the head-restraint on the drive.

7. Remove the floppy disk drive (see section 4.4.1.7).

8. Remove the five screws securing the drive-base slide (for the Winchester drive) to the chassis (labelled A in Figure 4-15) and remove the drive-base slide.

9. Disconnect and label the three wires leading from filter 2 to the power supply (refer to Figure 4-15).

10. Disconnect and label the two wires from filter 2 leading to the terminal strip.

11. Remove the four nuts (labeled B in Figure 4-15) securing filter 2 to the chassis and remove filter 2.

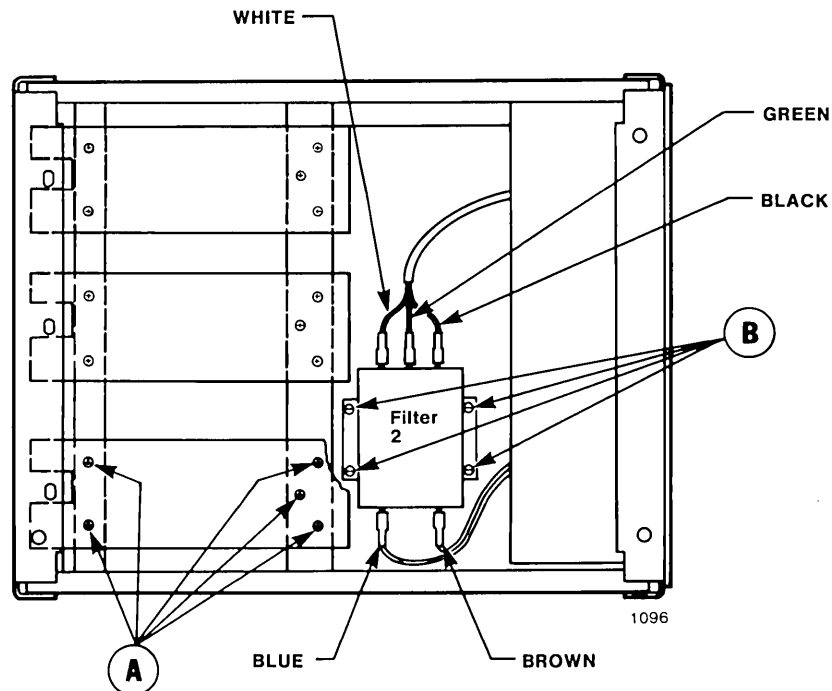12. Reassemble the chassis with the new filter.

Figure 4-15. Filter 2 Terminal Locations

4.4.2 PROCESSOR CHASSIS

The maintenance procedures for the Processor Chassis consist of removal and replacement procedures for all of the major subassemblies within the chassis. The procedures are presented in the next 12 sections and may be found in this order:

4.4.2.1	Front Panel
4.4.2.2	Top Cover
4.4.2.3	Side Panels
4.4.2.4	Bottom Cover
4.4.2.5	Rear Connector Panel

4.4.2.6	Switch and Light Board
4.4.2.7	Fan Assembly
4.4.2.8	AC Power Switch
4.4.2.9	115 VAC Line Filter
4.4.2.10	220 VAC Line Filter
4.4.2.11	Pin Adapter Board Assembly
4.4.2.12	Power Supply
4.4.2.13	Cardcage
4.4.2.14	Cardcage Connector Priority

WARNING

Do not service any subassembly of the
Processor Chassis while AC power is
applied to the chassis. Hazardous
voltages are present within the chassis
when the AC power cord is connected to
a power source.

4.4.2.1   Front Panel Removal Procedure (Processor Chassis)

The front panel assembly on the front of the Processor Chassis is a
snap-on, plastic molding. The front panel is attached to the chassis
with four ball-stud fasteners, see Figure 4-16, and must be removed to
gain access to the front cover and the power switch. To remove the front
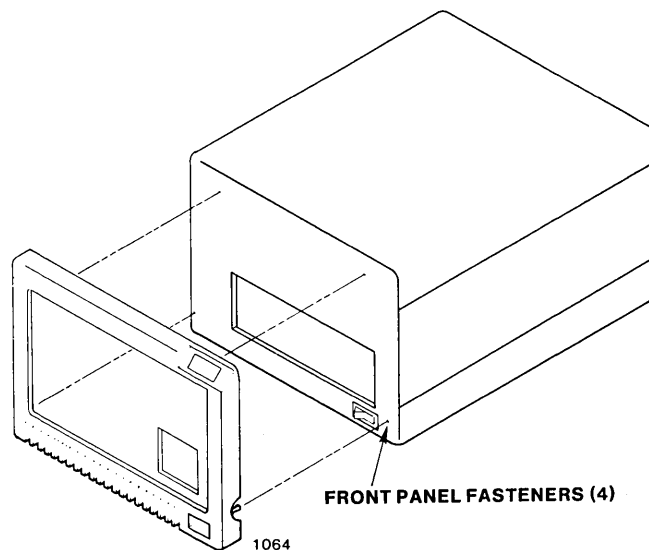panel assembly on the Processor Chassis, pull out sharply.

FRONT PANEL FASTENERS (4)

1064

Figure 4-16.   Front Panel Fastener Locations

4.4.2.2   Top Cover Removal Procedure (Processor Chassis)

The top cover is a sheet metal panel on the top of the chassis and must
be removed to gain access to the power supply, the cardcage, the pin
adapter board, the AC line filter, and the internal cable connectors. To
remove the top cover, twist the 4 quarter-turn fasteners CCW (one at each
corner), loosen the screws on the side panels, and lift up the top cover
(refer to Figure 4-17).

NOTE

The top cover contains flanges slide
under the side panels to provide
ESD/EMI/RFI reduction for the system.
When reassembling the chassis, loosen
the top four screws securing the side
panels to the chassis, and tighten them
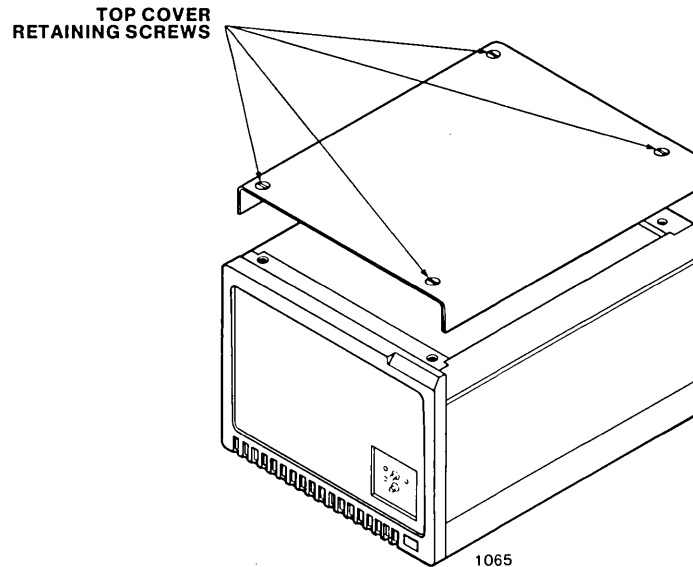after the top is reinstalled.

Figure 4-17. Top Cover Retaining Screw Location

4.4.2.3   Side Panel Removal Procedure (Processor Chassis)

The side panels on the Processor Chassis are sheet metal panels that must
be removed when rack mounting the System 86/380, when replacing the fan
assembly, and when removing the power supply from the chassis. To remove
the side panels, remove the eight screws (see Figure 4-18 for locations)
from each side panel.

NOTE

To avoid marring the paint on the
exterior panels on the Processor and
Peripheral Chassis, you may wish to
remove the panels before turning the
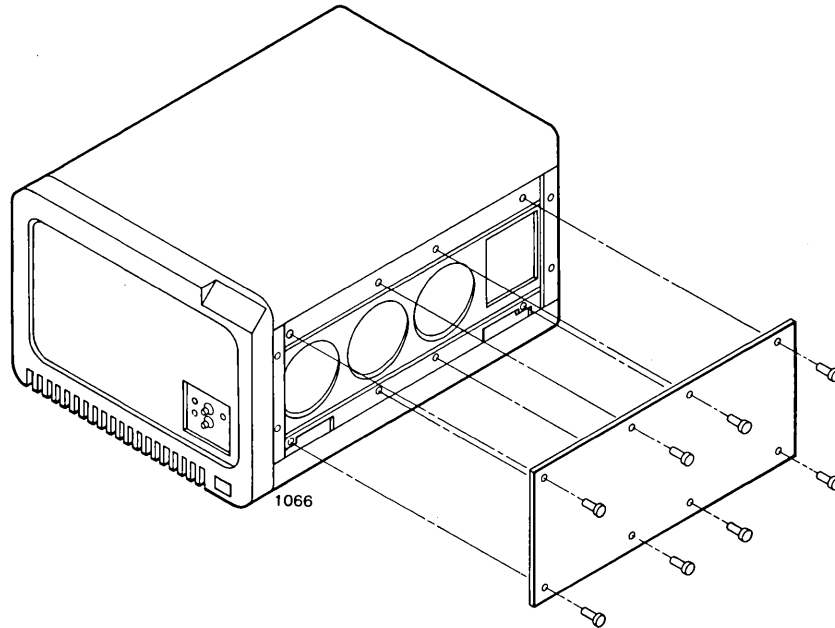chassis onto its side or top.

Figure 4-18. Side Panel Retaining Screw Locations

4.4.2.4   Bottom Cover Removal Procedure (Processor Chassis)

The bottom cover on the Processor Chassis is a sheet metal panel
providing access to the wires for the front panel power switch, to the
cardcage retaining screws, and to the cables and connectors on the bottom
of the cardcage. To remove the bottom cover, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Turn the chassis onto its top to gain access to the four screws
    securing the bottom cover to the chassis. As Figure 4-19 shows,
    the screws are at the four corners of the bottom cover and
    located inside the bumpers.

5. Remove the four screws securing the bottom cover to the chassis
    and lift off the cover.

6. While reassembling the chassis, you may have to loosen the screws
    on the side panels to ensure that the flanges on the bottom cover
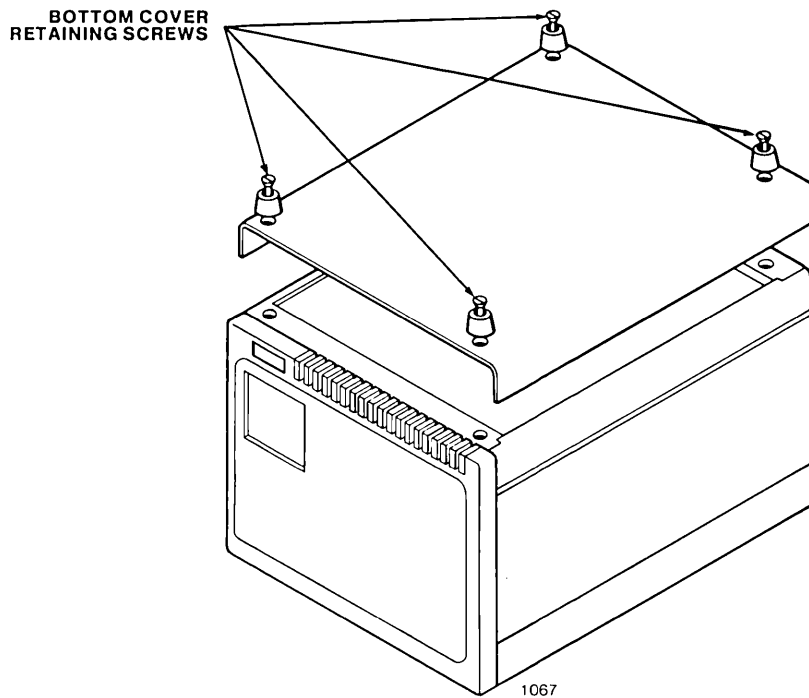   slide under the ends of the side panels.

4-22

Figure 4-19. Bottom Cover Retaining Screw Locations

4.4.2.5   Connector Panel Removal and Replacement Procedure (Processor Chassis)

On the rear of the Processor Chassis is a connector panel to which the cables for the Winchester drive, the floppy drive, the printer, and the serial I/O interface are connected. The panel should be removed whenever adding or replacing connectors on the rear of the chassis, and whenever removing the power supply from the chassis. The procedure for removing the panel is as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. From the rear of the chassis, remove the eight screws and washers securing the connector panel to the rear of the chassis; refer to Figure 6-13, sheet 3.

5. At the board-end of each cable, label and disconnect the cables in the chassis that interface the boards to the connector panel.

6. Remove the pin adapter assembly as described in section 4.4.2.11.

7. From the rear of the chassis, pull the connector panel with associated cables out through the connector knock-out holes in the rear of the chassis.

NOTE

When removing the cables through the connector knock-out holes (as in step 6), ensure that the insulation on the cables is not damaged by scraping the edges of the connector holes.

Pin 1 of each 50-pin cable on connectors J1 and J3 are connected to chassis ground via a spade-lug connector. Ensure that this connection is secure when reassembling the system.

8. Install any additional connectors onto the connector panel and replace the connector panel onto the chassis. The proper cable connections within the Processor Chassis are shown in Figure 4-23.

4.4.2.6   Switch and Light Board Removal and Replacement Procedure (Processor Chassis)

The Switch and Light (S/L) printed circuit board is mounted behind a black, sheet metal faceplate on the front of the Processor Chassis. The S/L board must be removed to replace a IC component failure on the board, to replace a faulty switch, and to replace a faulty LED indicator. The S/L board can be removed from the front of the chassis as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the front cover from the chassis (see section 4.4.2.1).

4. Remove the five screws holding the metal faceplate onto the front of the chassis; refer to Figure 6-13, sheet 1, item 77.

5. From the front of the chassis, pull the face plate and the S/L board out. Notice that the screws holding the plate to the front of the chassis are the same screws that secure the board to the plate.

6. Disconnect both cables (P3 an P6) to the S/L board from the cardcage; refer to Figure 6-17.

7. Unscrew the chrome switch covers from the switches and pull the switch caps off both the RESET and INTRPT switches; refer to Figure 6-13, sheet 1, item 65.

8. Lift the board off the stand-offs on the faceplate.

9. Perform the required board repairs and reassemble the chassis.

4.4.2.7   AC Fan Assembly Removal and Replacement Procedure (Processor Chassis)

The fan assembly is mounted behind a perforated, sheet metal side cover on the left side of the Processor Chassis. The assembly consists of three AC fans, three wire fan guards, and a mounting bracket onto which the components are secured. The fan assembly may require removal if one or more of the fans requires servicing or replacing.

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the perforated side panel from the left side of the Processor Chassis (see section 4.4.2.3).

4. Locate and remove the four screws that secure the fan bracket (holding the three fans) onto the side of the chassis; refer to Figure 6-13, sheet 1, item 75.

5. Through the opening on the left side of the chassis, push the back end of the fan bracket into the chassis, slide the assembly toward the rear of the chassis, pull the front end of the assembly out, and remove the assembly from the chassis.

6. If required, remove the wires from the fans by pulling on the connectors with a needle-nose plier. Label each wire as it is disconnected.

7. Perform the required fan repairs or replacement and reassemble the chassis.

CAUTION

The fans operate with AC power. Do not replace them with DC powered fans or with AC fans of a different line voltage. Doing so can damage the system.

NOTE

Ensure that the fans are installed so that they are pulling air into the chassis through the left side and exhausting it through the right side.

4.4.2.8   AC Power Switch Removal and Replacement Procedure (Processor
           Chassis)

The AC power switch on the Processor Chassis is located in the lower right
corner of the front panel. To replace the power switch, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the front panel from the chassis (see section 4.4.2.1).

4. Turn the chassis on its right side and remove the bottom cover (see
    section 4.4.2.4).

NOTE

You may wish to remove the side panels
and top cover to prevent damage to the
paint on the side panels on the chassis.

5. In the lower right front corner of the chassis, remove the two
    screws holding the power switch to the front of the chassis.
    Refer to Figure 4-20 for the location of the screws.

6. Reaching inside the chassis from the bottom, pull the switch out
    of the weldment.

7. Label and remove the two wires from the terminals on the power
    switch.

8. Replace the switch from the front of the chassis, and reassemble
    the chassis.

NOTE

When installing a new AC power switch,
ensure that the physical operation of
the switch is consistent with the
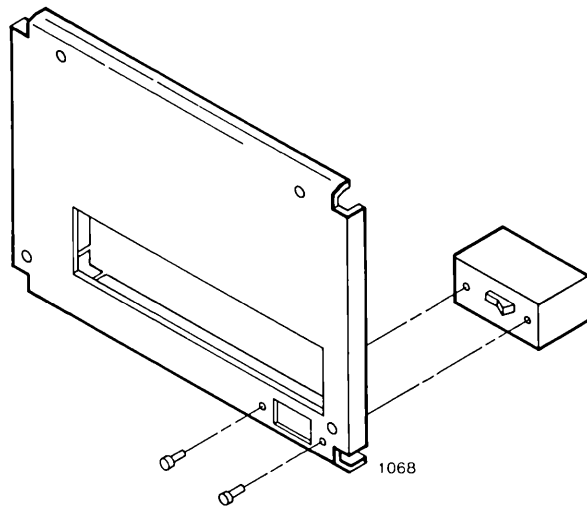markings on the front of the chassis.

Figure 4-20. Switch Retaining Screws

4.4.2.9   115 VAC Line Filter Assembly Removal and Replacement Procedure
          (Processor Chassis)

The AC line filter assembly is located in the upper right corner in the
rear of the Processor Chassis. The line filter assembly consists of an AC
power socket, an AC line filter, an externally installed capacitor, and a
sheet metal protection cover. You can replace the AC line filter assembly
via access from the rear and the top of the chassis as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source and from the
    chassis.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. The power supply contains two handles on the top of the unit.
    Remove the handle that is closest to the line filter. Refer to
    Figure 6-13, sheet 1, items 83 and 92.

{ CAUTION }

Do not drop the screws for the handle
into the power supply. Doing so could
damage the power supply.

5. From the rear of the chassis, remove the two screws securing the AC line filter assembly to the back of the chassis weldment. Refer to Figure 4-21 for the location of the screws.

6. From the top of the chassis, remove the AC line filter assembly from the chassis and remove the sheet metal cover from the filter.

7. Label and remove the two AC power cord wires (connected with spade lugs) from the filter connections.

8. If the replacement line filter does not contain a filter capacitor, unsolder the 1.0 microfarad, 400 volt, ceramic capacitor from the spade-lugs on the old filter, verify that the device is functional, and install it into the same position on the new line filter. Refer to Figure 6-13, sheet 1, items 29, 30.

NOTE

The capacitor that is installed across the terminals of the line filter is a type that is VDE-approved. If the capacitor must be replaced, ensure that a capacitor of the same vendor-type is used. Failure to do so will render the chassis non-compliant with the VDE conducted emissions limits.

9. Connect the two wires to the same terminals on the new AC filter, reassemble the AC line filter assembly and reassemble the chassis.
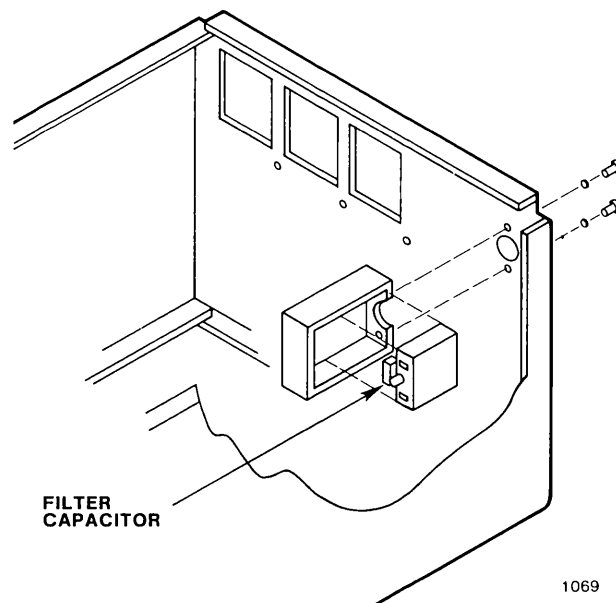

FILTER
CAPACITOR

1069

Figure 4-21. Filter Assembly Securing Screws

4.4.2.10   220 VAC Line Filter Assembly Removal and Replacement Procedure
            (Processor Chassis)

The 220 VAC line filter assembly is located in the upper right corner in
the rear of the Processor Chassis. The line filter assembly consists of
an AC line filter, and sheet metal protection covers. You can replace
the AC line filter assembly via access from the top of the chassis as
follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source and from the
    chassis.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. Refer to Figure 6-13, sheet 2. Remove the four screws on the top
    of the line filter enclosure plate.

5. Remove the plate. The AC line and load terminals are visible
    here and plugged into the filter.

6. Unplug the line and load wires.

7. Remove the two screws holding the lower plate onto the power
    supply. The rear hole is accessed through the hole in the top of
    the chassis.

8. Remove the bottom plate and the filter. If replacing the filter,
    remove it from the bottom plate by removing the two remaining
    screws on the plate.

9. Replace the filter and plates by following this procedure in
    reverse order.

4.4.2.11   Pin Adapter Board Assembly Removal and Replacement Procedure
            (Processor Chassis)

The Processor Chassis contains a pin adaptor board assembly that consists
of a printed circuit board, a plastic mounting bracket, a metal mounting
bracket, and three cable assemblies. Refer to Figure 4-22 for the
approximate location of the assembly. The procedure for removing the
assembly from the Processor Chassis is as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. From the top, label and disconnect the cables from the boards
    within the cardcage, and lay them over the rear edge of the
    chassis. This will allow easier access to the screws that secure
    the pin adapter assembly to the cardcage.

In the as-shipped configuration of the Processor Chassis, you will find the following cable connections in the cardcage (refer to Figure 4-23):

- 26-pin cable from J2 of the iSBC 86/30 board to J4 on the rear connector panel.

- 50-pin cable from J1 of the iSBC 86/30 board to J2 on the rear connector panel.

- 50-pin cable from J1 of the iSBX 218 board to J1 on the rear connector panel.

- 50-pin cable from J1 of the iSBC 215 board to J4 on the pin adapter board.

- 20-pin cable from J2 of the iSBC 215 board to J6 on the pin adapter board.

5. From the top, loosen the two screws from the back wall of the cardcage that secure the pin adapter assembly to the upper rear of the cardcage; refer to item A of Figure 4-22.

6. From the top, slide the pin adapter assembly free from the two screws and pull the assembly up from between the cardcage and the power supply.

7. Label and disconnect (at the pin adapter board) the 50-pin cable between the J2 connector on the pin adapter board and the J3 connector on the rear connector panel.

8. Remove the four screws connecting the printed circuit board to the plastic mounting bracket; refer to item B of Figure 4-23.

9. Using the same hardware in the same locations, fasten the replacement pin adapter board to the plastic mounting bracket.

CAUTION

Failure to orient the connectors properly
may result in damage to either the iSBC
215 board or the Winchester drive.

NOTE

The pin-1 markings for connector J2 on
the pin adapter board are not consistent
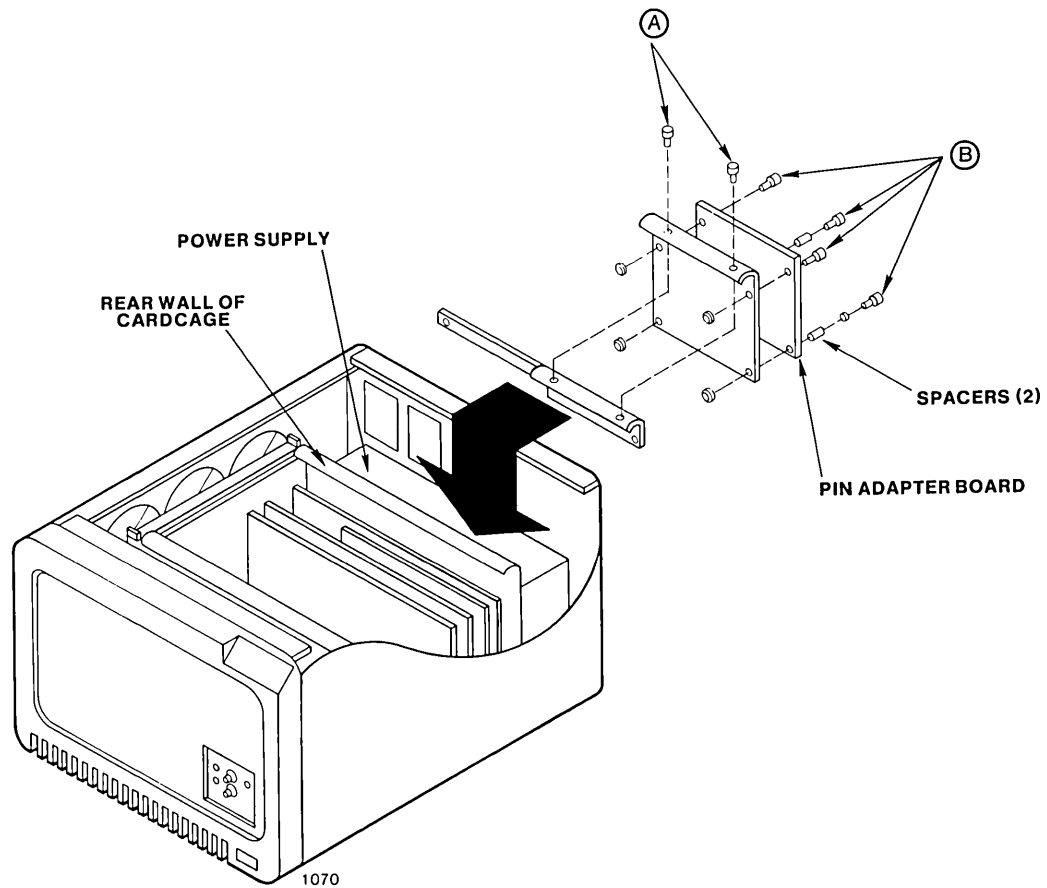with that of the other connectors on the
board.

Figure 4-22. Winchester Pin Adapter Board Location

10. Reconnect the three cables onto the pin adapter board as shown in Figure 4-23.

11. Reinstall the pin adapter assembly between the power supply and cardcage, secure the assembly with two screws removed in step 5.

12. Reconnect the 5 cable connectors to the boards in the cardcage as shown in Figure 4-23.

13. Reassemble the remaining parts of the chassis.
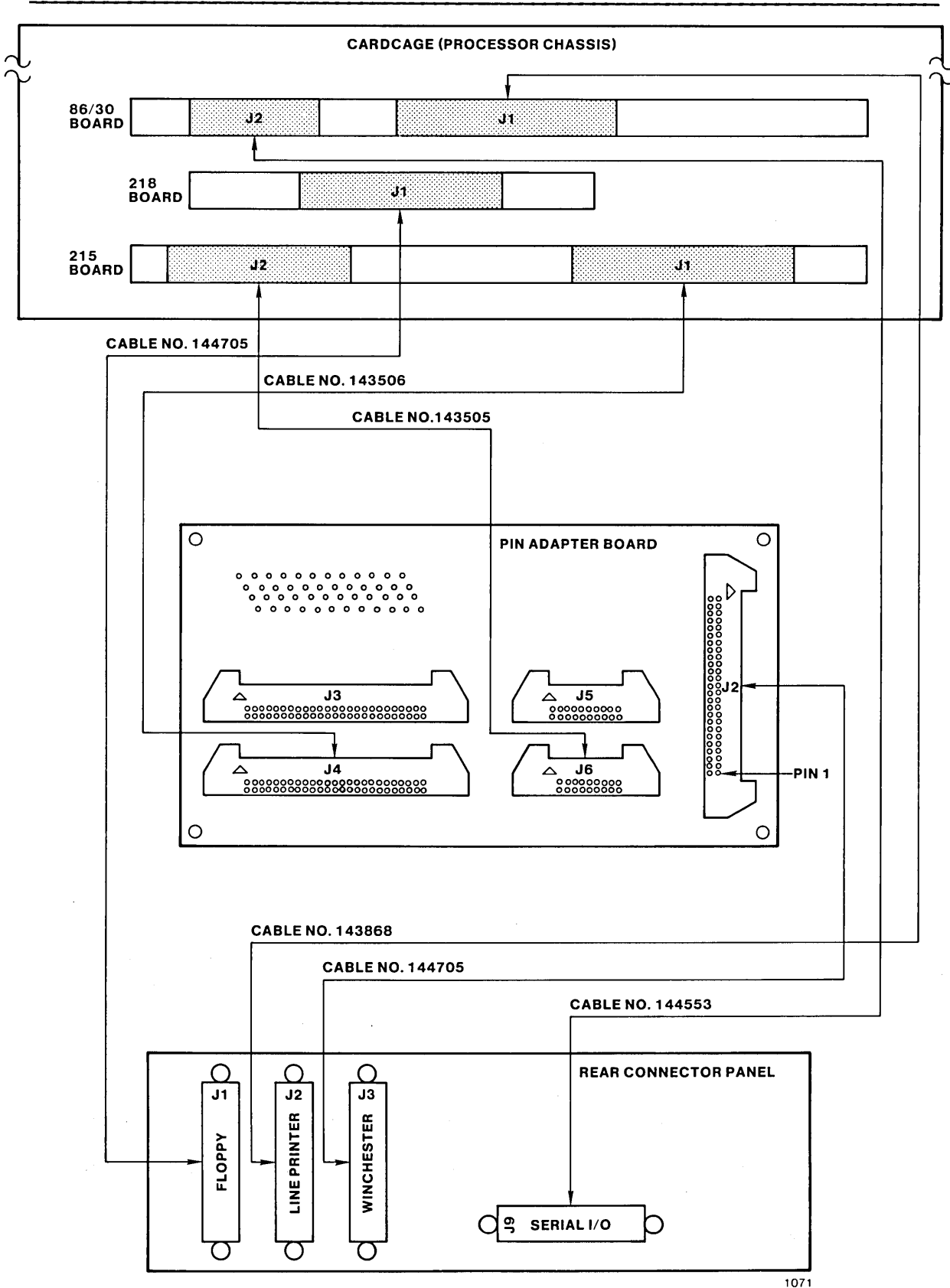
Figure 4-23.   Pin Adapter Board Cable Connections

4.4.2.12   Power Supply Removal and Replacement Procedure (Processor
           Chassis)

The power supply within the Processor Chassis must be removed through the
top of the chassis after removing the following items: top cover, line
filter, cable tray, pin adapter assembly, and cable connector panel (on
rear of chassis). The procedure for removing the power supply is as
follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. Remove the side panel from the left side of the chassis (see
    section 4.4.2.3).

5. Remove the pin adapter assembly and cables; refer to section
    4.4.2.11.

6. Remove the rear connector panel and cables through the rear of
    the chassis (refer to section 4.4.2.5).

7. Remove the AC line filter assembly from the chassis (see section
    4.4.2.9 or 4.4.2.10).

8. Remove the cable tray (Item 18, Figure 6-13, Sheet 2) by first
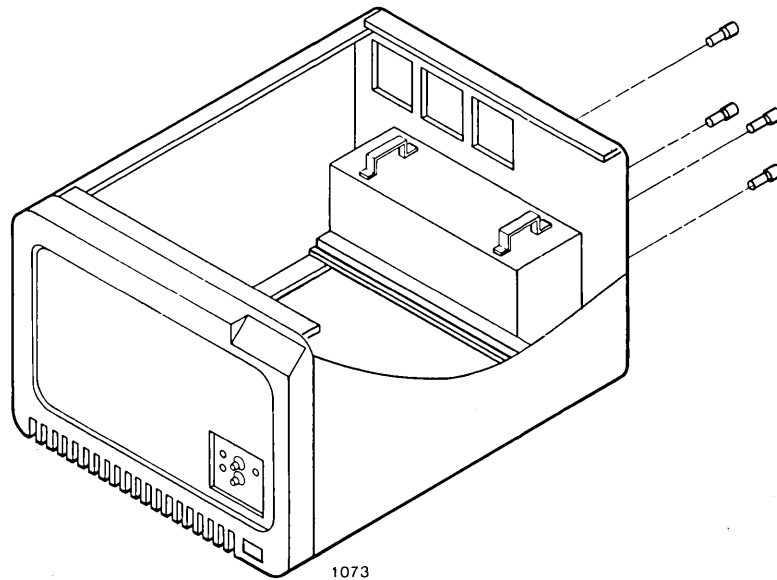   removing its four securing screws, as shown in the figure.

Figure 4-24.   Power Supply Securing Screws

9. From the back of the chassis, remove the four screws securing the power supply to the rear panel of the chassis weldment. Refer to Figure 4-24 for the approximate location of the screws.

10. From the left side of the chassis, carefully label and remove the wires from the terminal strips, disconnect connectors J1 and J2, and remove the cables from the power bolts on the power supply. At this point the power supply should move freely within the chassis.

11. From the top of the chassis, lift the power supply by the two handles (one for 220 VAC version) and pull it out the top of the chassis through the opening between the cardcage and the rear of the chassis frame. Ensure that all wires and connectors between the cable harness and the power supply are loose.

NOTE

The handle(s) on the top of the power supply is (are) intended for lifting the power supply.

CAUTION

The power supply weighs approximately 15 pounds and must be lifted from a rather awkward position. Failing to use the proper lifting techniques when removing the supply from the chassis could cause physical strain. Obtain help from another person when possible.

12. If the replacement power supply does not contain two handles, (or one for the 220 VAC version) remove those from the faulty power supply and install them onto the replacement.

13. Put the replacement power supply into the chassis in the same manner as the other was removed and slide it to the rear wall of the chassis.

14. Loosely secure the power supply to the rear of the chassis using the four screws removed in step 9. Refer to Figure 4-24 for screw locations.

15. Loosely connect the cable harness and connectors onto the power supply (refer to Figure 6-17); ensure that all wires are reconnected to the power supply.

16. Tighten the screw connections on the power supply and install connector P1 onto J1 of the power supply.

17. Reinstall the pin adapter board, the rear connector panel, and the AC line filter (in that order) into the chassis.

18. Ensure that all boards are out of the cardcage, disconnect 6-wire cable connector J6 from P6 at the Switch-and-Light board, and momentarily apply power to the chassis; refer to section 4.4.2.6.

[CAUTION]

The Switch and Light board contains components that can be damaged if incorrect power is applied to the board. Remove the power connector (P6) to the Switch and Light board whenever testing or replacing the power supply.

19. If no problems arise, reapply power and, using a voltmeter, check for the proper voltages AT THE P1 CARDCAGE CONNECTORS. The voltages should be available as follows:

    ground at pins 1, 2, 11, 12, 75, 76, 85, and 86
    +5 volts at pins 3, 4, 5, 6, 81, 82, 83, and 84
    -5 volts at pins 9 and 10
    +12 volts at pins 7 and 8
    -12 volts at pins 79 and 80

20. If all voltages are present and at the proper voltage levels, then remove power from the chassis, install the boards into the cardcage, install the card retainers, reconnect the cables, and complete the chassis reassembly. If the power supply voltages within the Processor Chassis are not adjusted properly, refer to Chapter 5 of this manual for an adjustment procedure.

4.4.2.13   Cardcage Removal and Replacement Procedure (Processor Chassis)

The cardcage within the Processor Chassis must be removed through the top of the chassis. To remove the cardcage, proceed as follows:

1. Turn the AC power switch to OFF.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover from the chassis (see section 4.4.2.2).

4. To avoid scratching the side panels on the chassis, you should remove them (see section 4.4.2.3) and then remove the bottom cover from the chassis (see section 4.4.2.4).

5. Disconnect the cables, remove the printed circuit board retainers, and remove the printed circuit boards from the cardcage; refer to Figure 6-13, sheet 2, item 20.

6. Remove the four screws securing the cable tray to the left side of the cardcage and remove the cable tray through the top of the chassis; refer to Figure 6-13, sheet 2, items 78 and 88.

7. From the top, remove the pin adapter board assembly from between the cardcage and the power supply; refer to the procedure as listed in section 4.4.2.11.

8. From the top of the chassis, remove the four screws securing the cardcage to the front of the chassis weldment; refer to Figure 6-13, sheet 2, items 78 and 79.

9. From the bottom of the chassis, note the polarity of the connectors on the cardcage and then disconnect the 2-wire cable at J32, the 5-wire power cable at J21, and the 10-wire cable at J24. Note that you need not disconnect the 10-wire cable at J29 to remove the cardcage.

10. From the bottom of the chassis, disconnect the power supply cables from the cardcage by removing the nuts and washers from the connection screws.

11. From the bottom of the chassis, remove the three screws that secure the cardcage to the crossbrace on the bottom of the chassis weldment; refer to Figure 6-13, sheet 2, items 78 and 91. At this point, the cardcage should be loose within the chassis.

12. From the top of the chassis, pull the cardcage out through the top of the chassis weldment.

13. Configure the priority jumpers on the bottom of the replacement chassis to match that of the removed chassis. Refer to section 4.4.2.13 for more information on configuring the priority jumpers.

14. Remove the 10-wire cable from J29. Notice that 5 wires from this cable are attached to a 60-pin P2 Connector at J4.

15. Remove P2 connector J4 from the old cardcage and install it into the replacement cardcage. Reconnect the other end of the cable to J29 on the new cardcage.

16. From the top of the chassis, place the new cardcage into the chassis.

17. Install the pin adapter assembly onto the new cardcage (see section 4.4.2.11).

18. Reconnect the cables and reassemble the chassis.

4.4.2.14 Bus Access Priority Configuration

The priority (for accessing the Multibus interface) that is assigned to each slot of the cardcage in the Processor Chassis is configured via jumpers E1 through E46 on the bottom of the cardcage. The format of the jumpers for the as-shipped configuration of the cardcage is shown in Figure 4-25. This configuration provides a connector priority sequence as follows:

Priority	Cardcage Connector Number
1 (Highest)	J1
2	J3
3	J5
8	J15
9	J17
13	J27
14 (Lowest)	J30

This priority scheme limits the system expansion to four bus masters (plus the iSBC 215 board and the iSBC 86/30 board already in the system).
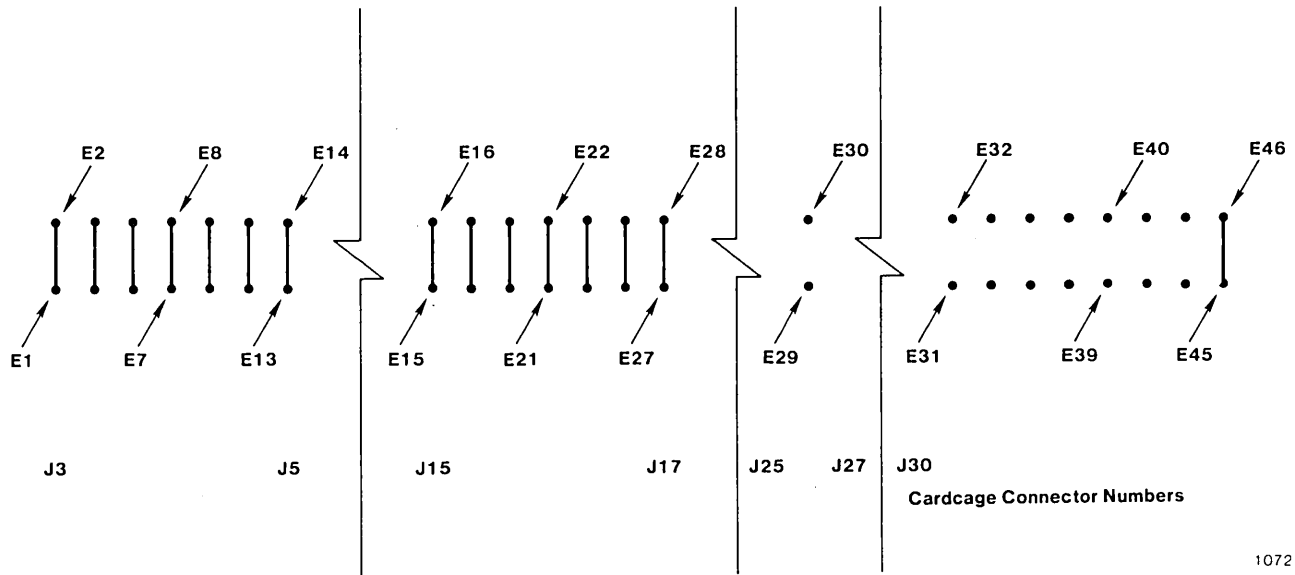
Figure 4-25. Cardcage Priority Jumper Configuration (as shipped)

Notice that not all cardcage connectors are provided with the ability to configure their bus access priority. Connectors J7, J9, J11, J13, J19, J22, and J25 may not be prioritized. In addition, the cardcage connectors that may be prioritized (listed above) may not be changed indiscriminately to any other priority.

Table 4-2 shows all possible bus access priority levels that may be assigned to each connector within the cardcage; presence of jumper numbers in the matrix indicates that the priority level is configurable for that connector number. As an example, the priority level for connector J1 may be changed from 1 to 9 or 14, nothing else; the priority level for connector J3 may be changed from 2 to 13 or 14; the priority level for connector J5 may be changed from 3 to 8 only. Table 4-2 lists all of the priority options available for each cardcage connector and provides the jumper configuration required to perform the configuration.

In a typical configuration, you may wish to change the bus access priority of connector J1 from 1 to priority 9. To do so, you must first remove the jumpers configuring J1 to priority 1 and configuring J17 to priority 9. Then install the jumpers listed in Table 4-2 that configure connector J17 to priority 1 and configure connector J1 to priority 9.

Table 4-2. Priority Jumper Configuration

Priority Level	Cardcage Connector Number						
	J1	J3	J5	J15	J17	J27	J30
1	E11-12* E25-26*	– –	– –	– –	E11-E13 E25-E27	– –	E9-11 E23-25
2	– –	E7-8* E21-22*	– –	– –	– –	E5-7 E19-21	E7-E9 E21-E23
3	– –	– –	E1-2* E15-16*	E2-E4 E16-E18	– –	– –	– –
4 5 6 7	not available						
8	– –	– –	E1-3 E15-17	E3-4* E17-18*	– –	E3-E5 E17-E19	– –
9	E12-14 E26-28	– –	– –	– –	E13-14* E27-28*	– –	– –
10 11 12	not available						
13	– –	E6-8 E20-22	– –	E4-6 E18-20	– –	E5-6* E19-20*	– –
14	E10-12 E24-26	E8-10 E22-24	– –	– –	– –	– –	E9-10* E23-24*
Note: The * identifies the as-shipped configuration of the jumpers.							

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CHAPTER 5. SERVICE INFORMATION

5.1 INTRODUCTION

This chapter provides service and repair assistance information for the
System 86/380. For personnel safety and system component protection,
refer all servicing to qualified personnel only.

5.2 SERVICE AND REPAIR ASSISTANCE

The best service for your Intel product is provided by an Intel Customer
Engineer. These trained professionals provide prompt, efficient, on-site
installation, preventive maintenance, and corrective maintenance services
required to keep your equipment in the best possible operating condition.

Your Intel Customer Engineer can provide the service you need through a
prepaid service contract or on an hourly charge basis. For further
information, contact your local Intel sales office.

When an Intel Customer Engineer is not available in your local area, you
may contact the Intel Product Service Center directly at one of the
following telephone numbers:

        Western Region call   602 - 869 - 4951
        Midwest Region call   602 - 869 - 4392
        Eastern Region call   602 - 869 - 4045
        International call   602 - 869 - 4391

Before calling the Product Service Center, you should have the following
information on hand:

    a. the date you received the product.

    b. the complete part number of the product (including dash number).
        On Intel system products, the part number is usually stamped on a
        label.

    c. the serial number of the product. On Intel system products, the
        serial number is usually stamped on a label mounted onto the
        outside of the chassis.

    d. your complete shipping and billing address.

    e. a purchase order number for billing purposes (required only if
        your Intel product warranty has expired).

    f. information on any extended warranty agreements through Intel.

    g. information on Product Service Maintenance Agreements, available
        through the local Product Service Sales Office.

Do not return equipment to Intel for service or repair unless you have contacted your local Product Service office or Product Service Center and have been instructed to do so.

If the Intel Product Service group determines that you must return your equipment, you will be given shipping instructions and other important information that will help Intel provide you with fast, efficient service. If the product is being returned because of damage sustained during shipment, or if the product is out of warranty, a purchase order is necessary in order for the Intel Product Service Center to make the repair.

When preparing a product for shipment to the Intel Product Service Center, use the original factory packaging material, if available. If the original packaging material is not available, wrap the product in a cushioning material such as Air Cap SD-240, manufactured by the Sealed Air Corporation, Hawthorne, N.J. (or equivalent), securely enclose it in a heavy-duty corrugated shipping carton, mark it "FRAGILE" to ensure careful handling, and ship it to the address specified by the Intel Product Service Center.

NOTE

Customers outside of the United States should contact their sales source (Intel Sales Office or Authorized Intel Distributor) for directions on obtaining service or repair assistance.

5.3   POWER SUPPLY ADJUSTMENT PROCEDURE

The power output for the System 86/380 is adjusted at the factory before shipment. If you modify the as-shipped configuration significantly, you should check the voltage levels at the cardcage within the Processor Chassis and readjust the power supply if necessary.

The only power supply adjustments that are available for user modification are for the voltage level for the +5 volt, -5 volt, +12 volt, -12 volt and the DC VALID signal level for the +5 volt supply in the Processor Chassis. There are no user-performed adjustments on the Peripheral Chassis power supply.

The location of the adjustment screws for each supply voltage on the Processor Chassis power supply are identified in Figure 5-1. All adjustments except the DC VALID adjustment are performed with power applied to the system. The sequence of adjustment is as follows:

- +5 volt level on channel 1
- +12 volt level on channel 2
- -5 volt level on channel 3
- -12 volt level on channel 4
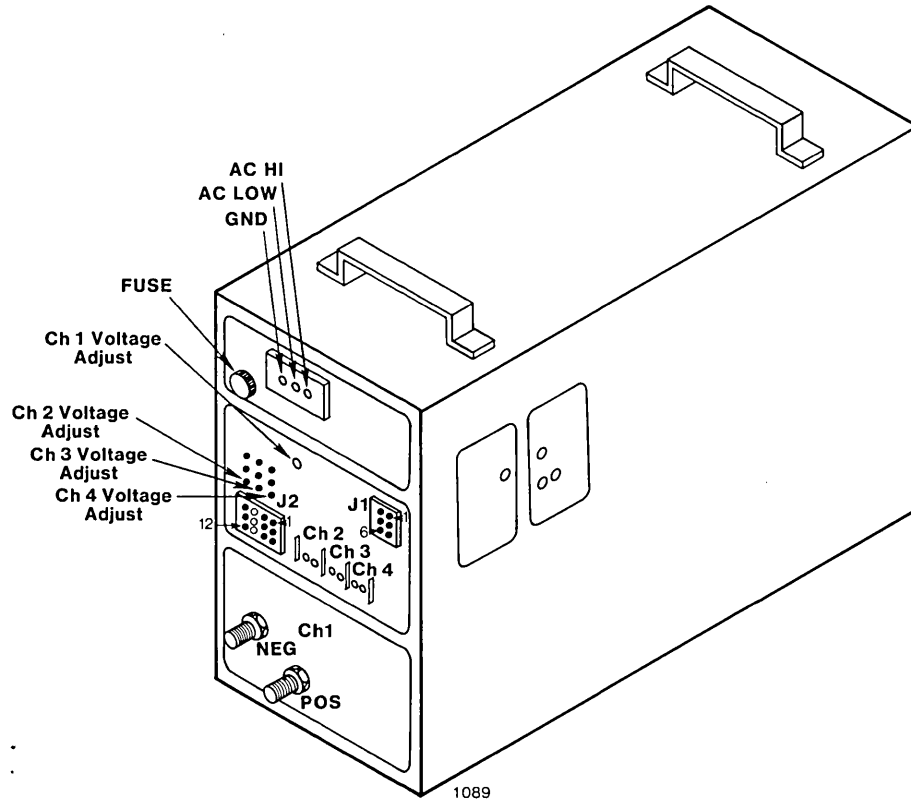- DC VALID adjust for +5 volt supply (read on)

Figure 5-1. Voltage Level Adjustment Locations

5.3.1 DC VALID ADJUSTMENT PROCEDURE

The DC VALID adjustment controls the voltage level (+5 volts) that the power supply maintains at its output terminals. You can verify the adjustment by checking the level of the +5 volt power at the cardcage connectors. If the +5 volt supply is out of the specified range, the DC VALID adjustment procedure should be performed.

An example in which the setting for the DC VALID adjustment may change is when the current load on the power supply is changed significantly. This could be the result of either adding or removing several user-provided boards in the cardcage within the Processor Chassis. The adjustment should also be checked whenever the power supply in a Processor Chassis is replaced.

The adjustment must be performed at the power supply with power removed from the Processor Chassis and checked at the cardcage when power is reapplied to the system. The procedure is as follows:

1. Turn the ac power switch on the Processor Chassis to OFF.

2. Disconnect the ac power cord from the power source.

3. Remove the side panel from the left side of the Processor Chassis (see paragraph 4-6).

4. Locate the DC VALID adjustment hole on the inner face of the power supply box, as shown in Figure 5-2. A warning label is placed over the top of the adjustment; read and heed.

5. Insert a screwdriver into the DC VALID adjustment hole and make a small adjustment to the voltage setting. A clockwise turn increases the voltage level; a counterclockwise turn decreases the voltage level.

6. Reassemble the chassis, power-up the Processor Chassis, and check the voltage level at the cardcage. If not satisfactory, repeat the procedure. Ensure that power is removed from the power supply whenever performing the adjustment.
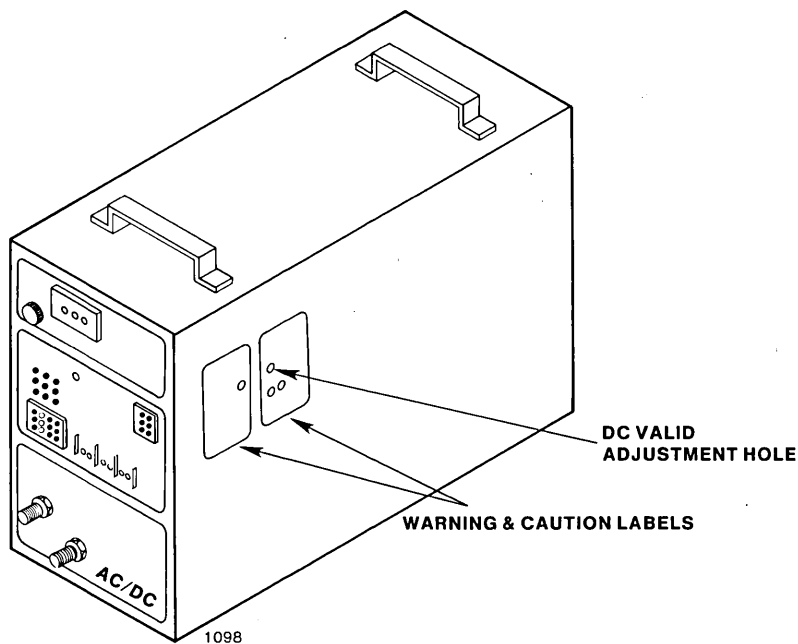
Figure 5-2. DC Valid Adjustment Location On Processor Chassis Power Supply

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CHAPTER 6. MAINTENANCE DIAGRAMS

6.1 INTRODUCTION

This Chapter provides a replacement parts list (refer to Table 6-1) and maintenance diagrams for each of the board-level components of the System 86/380. Figures 6-1 through 6-5 provide an overview of the System 86/380. Figures 6-6 through 6-12 provide an exploded view and interconnect diagrams of the various portions of the Peripheral Chassis within the System 86/380. Figures 6-13 through 6-25 provide an exploded view and interconnect diagrams of the various portions of the Processor Chassis within the System 86/380, and provide a board-level overview of the jumper connections within the as-shipped configuration of the System 86/380. The remaining figures in this chapter provide cable routing information for both AC and DC cables within the chassis assemblies.

Table 6-1. Peripheral Chassis Replacement Parts List

Ref. Des. Fig. 6-6	Description	Intel Part No.	Qty/ Assy.
Peripheral Chassis			
	Chassis Weldment	144602	1
	Panel, Filler	144103	2
	Cover, Top	144507	1
	Cover, Side	144189	2
	Cover, Bottom	144510	1
	Cover, Connector	162282	1
	Slide, Drive Mount	162121	3
	Base, Drive Mount	144036	3
	Panel, Desk (front)	162139	1
	Angle, Top Support	162266	1
	Bracket, Top Support	144035	1
A2	115 VAC Power Supply	162491-029	1
A2	220 VAC Power Supply	162491-030	1
A3	115 VAC Floppy Disk Drive	143496-003	1
A3	220 VAC Floppy Disk Drive	143496-002	1
A4	Winchester Drive	125260	1
W10	Cable Assy, AC for Floppy drive	143492	1
W3	Cable Assy, Peripheral "Y"	144730	1
W2	Cable Assy, Floppy Daisy Chain	144715	1
W1	Cable Assy, Winchester Signal	144716	1
W4	Cable Assy, Circuit Breaker	162114	1

Table 6-1. Peripheral Chassis Replacement Parts List (continued)

Ref. Des. Fig. 6-6	Description	Intel Part No.	Qty/ Assy.
A1	AC Receptacle Assy	162560	1
FL1	10 amp Line Filter	101823	1
FL2	10 amp Line Filter	107522	1
TB1	Terminal Block Assy	162573	1
	125 Volt Power Cord Set	102196	1
CB1	Circuit Breaker	104257	1
W6, W7	BRN Wire Assy	162378	1
W5, W8	BLU Wire Assy	162378	1
W9	GRN Wire Assy	162378	1

Table 6-2. Processor Chassis Replacement Parts List

Ref. Des. Fig. 6-13	Description	Intel Part No.	Qty/ Assy.
10	Chassis Weldment	172498	1
11	Panel, Front	172496	1
12	Cover, Top	172373	1
14	Cover, Right Side	172378	1
15	Cover, Left Side	172377	1
13	Cover, Bottom	172375	1
16	Support Bracket, Fan	172605	1
17	Plate, Connector Panel	172510	1
18	Tray, Cable	172292	1
19	Cover, Line Filter	172228	1
20	Card Retainer	172332	2
22	Cardcage Assembly	172493	1
23	Bracket, Support	172494	1
24	Support, Circuit Board	172495	1
26	Handle, Power Supply	172211	2
28	115 VAC Line Filter and AC Receptacle Assy	107558	1
29	Capacitor, Line Filter	104039	1

Table 6-2. Processor Chassis Replacement Parts List (continued)

Ref. Fig.	Des. 6-13	Description	Intel Part No.	Qty/ Assy.
01	A1	PBA, Disk Controller Assy	143489	1
		iSBC 215 Winchester Disk Controller	162037	1
		iSBX 218 Floppy Disk Controller	162057	1
02	A2	PBA, iSBC 056A RAM Board	144170	1
03	A3	PBA, Processor Assy	144548	1
		iSBC 337 Multimodule Board	142696	1
04		PBA, Switch and Light Assy	172230	1
05	A5	PBA, Pin Adapter Board	143502	1
31		Cable Assy, ac power 115 VAC	172499	1
32		Cable Assy, ac distribution 115 VAC	172056	1
33		Cable Assy, ac fans	172194	1
34		Cable Assy, dc power and ground	172500	1
35		Cable Assy, dc distribution	172501	1
36		Cable Assy, Power Supply Sense	172504	1
37		Cable Assy, Multibus interface (P2)	172502	1
38		Cable Assy, Multibus interface (P2)	172503	1
40	W1,W2	Cable Assy, Floppy Drive Interconnect	144705	1
42		Cable Assy, Radial	143505	1
43		Cable Assy, Command	143506	1
44		Cable Assy, Serial I/O	144553	1
45		Cable Assy, Line Printer Connector	143868	1
56	A4	115 VAC Power Supply, 750 Watt	104496-001	1
57	CB1	Circuit Breaker, 10 amp	107782	1
58		Fan, Axial, 115 volt ac	102953-001	3
101		Fan, Axial, 220 volt ac	102953-002	3
59		Guard, Fan	102995	3
65		Switch Nut and Cap, Dress	104017	2

For 220 VAC Systems, substitute the following parts:

Ref. Fig.	Des. 6-13	Description	Intel Part No.	Qty/ Assy.
103		220 VAC Line Filter and AC Receptacle Assy	107695	1
108		Cable Assy, ac distribution 220 VAC	172392	1
109		Cable Assy, ac power 220 VAC	172386	1
114	A4	220 VAC Power Supply, 750 Watt	104496-002	1
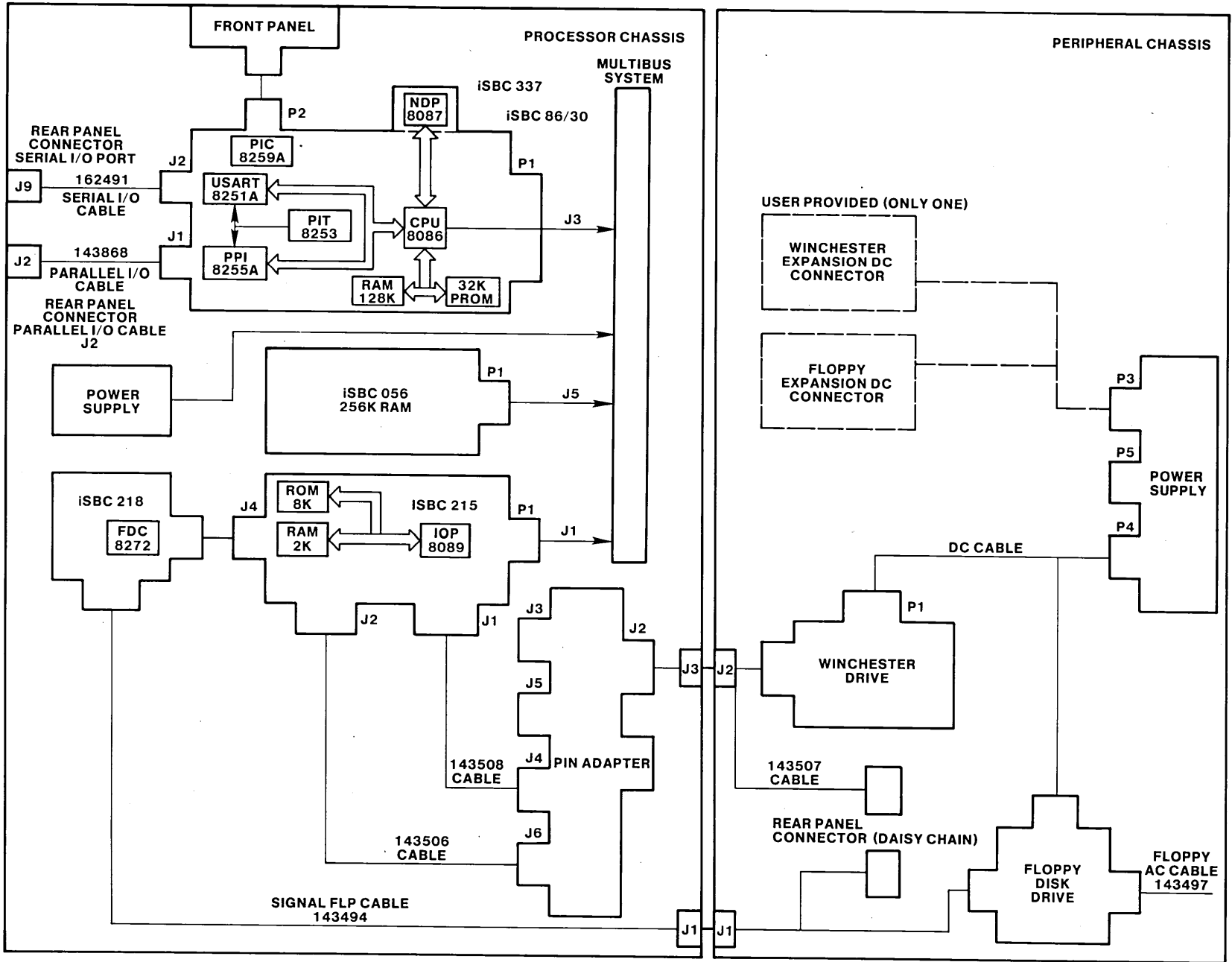
Figure 6-1. System 86/380 Cabling Interconnect Diagram

1075
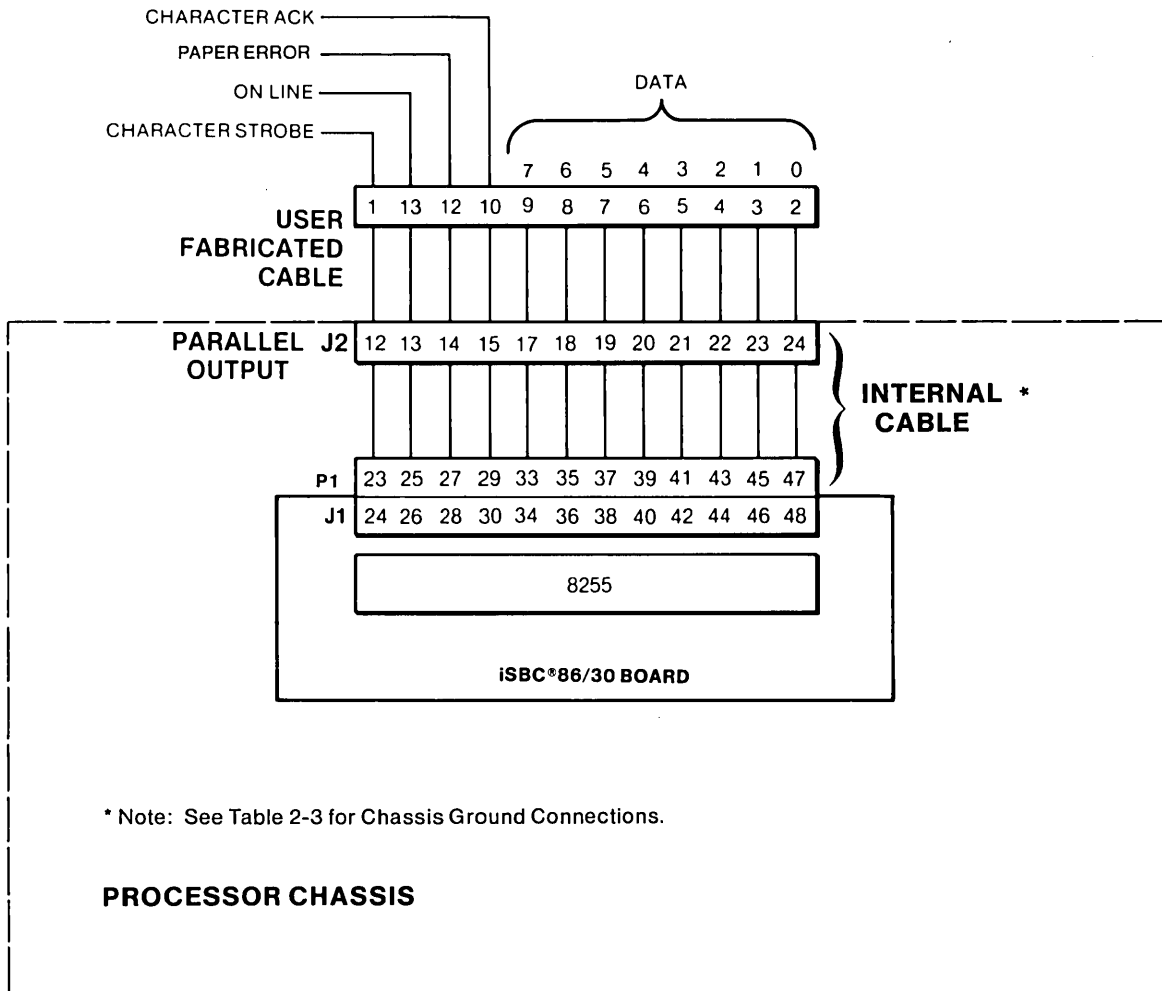
Figure 6-2. System 86/380 Parallel I/O Connector Pin Assignment
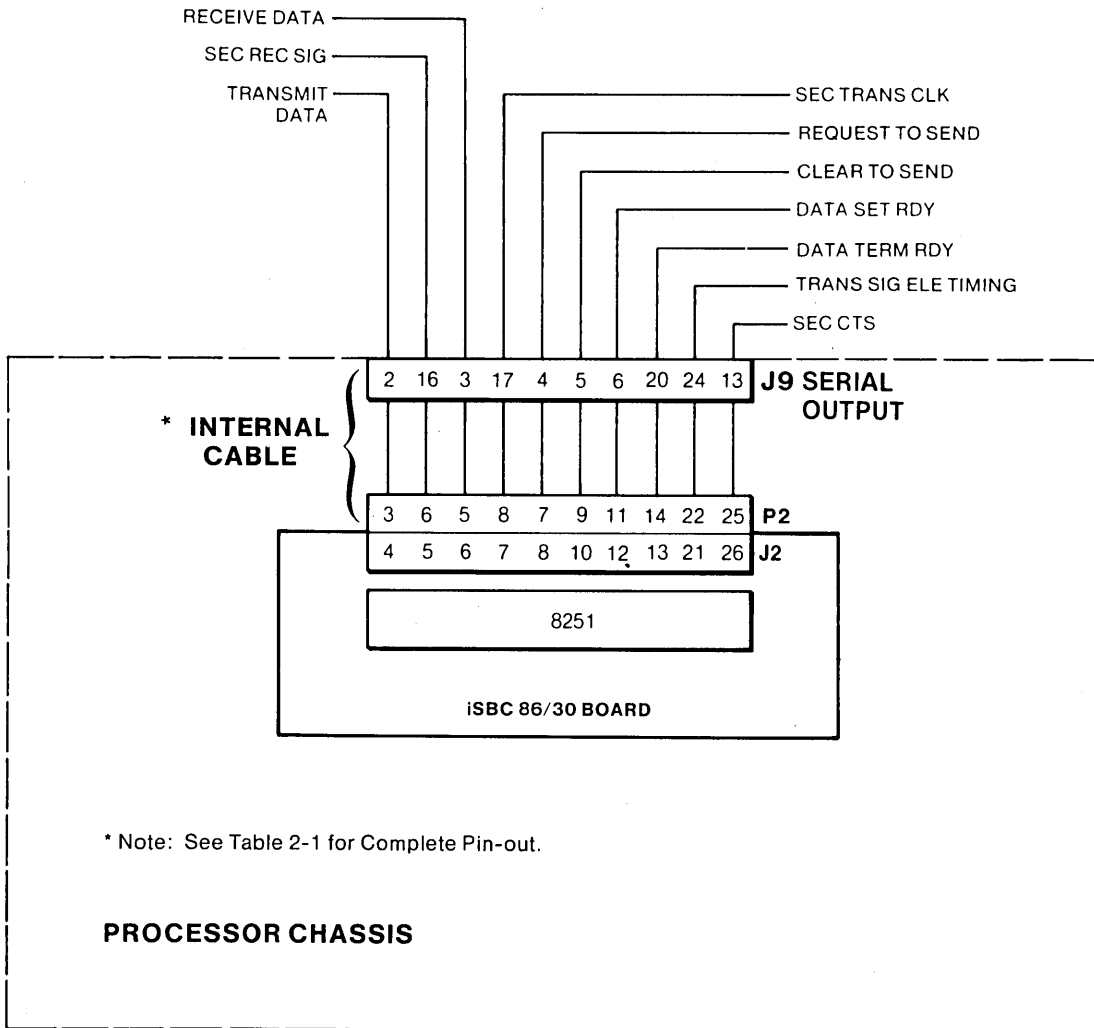
Figure 6-3. System 86/380 Serial I/O Connector Pin Assignment
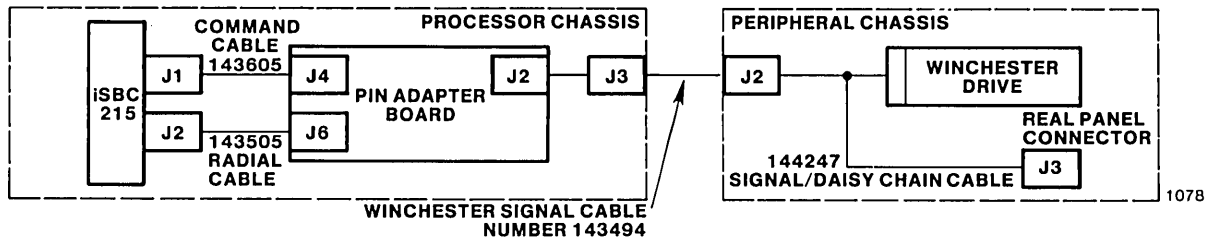
PERIPHERAL CHASSIS CONNECTOR J2 PIN NUMBER	SIGNAL NAME	PROCESSOR CHASSIS CONNECTOR J3 PIN NUMBER
1	+DEBUS 0 (BUS 0/)	1
2	+DEBUS 1 (BUS 1/)	2
3	+DEBUS 2 (BUS 2/)	3
4	+DEBUS 3 (BUS 3/)	4
5	+DEBUS 4 (BUS 4/)	5
6	+DEBUS 5 (BUS 5/)	6
7	+DEBUS 6 (BUS 6/)	7
8	+DEBUS 7 (BUS 7/)	8
9	Ground (GND)	9
10	-READ GATE	10
11	Ground (GND)	11
12		12
13	Ground (GND)	13
14	-WRITE GATE	14
15	Ground (GND)	15
16	-RD	16
17	-WR	17
18	+AD1	18
19	+AD0	19
20	Ground (GND)	20
21	-DRIVE SELECT 1	21
22	-DRIVE SELECT 2	22
23	-DRIVE SELECT 3	23
24	-DRIVE SELECT 4	24
25	Ground (GND)	25
26	Ground (GND)	26
27		27
28		28
29	-HEAD SELECT 3	29
30	-HEAD SELECT 2	30
31	-HEAD SELECT 1	31
32	Ground (GND)	32
33	-INDEX	33
34	Ground (GND)	34
35	-READY	35
36	-SECTOR MARK	36
37	-SECTOR MARK	37
38	Ground (GND)	38
39	+WRITE DATA	39
40	-WRITE DATA	40
41	Ground (GND)	41
42	+WRITE CLOCK	42
43	-WRITE CLOCK	43
44	Ground (GND)	44
45	+READ/REFERENCE CLOCK	45
46	-READ/REFERENCE CLOCK	46
47	Ground (GND)	47
48	+READ DATA	48
49	-READ DATA	49
50	Ground (GND)	50

Figure 6-4. System 86/380 Chassis-to-Chassis Interconnect Cable Pin Assignment (Winchester Drive)
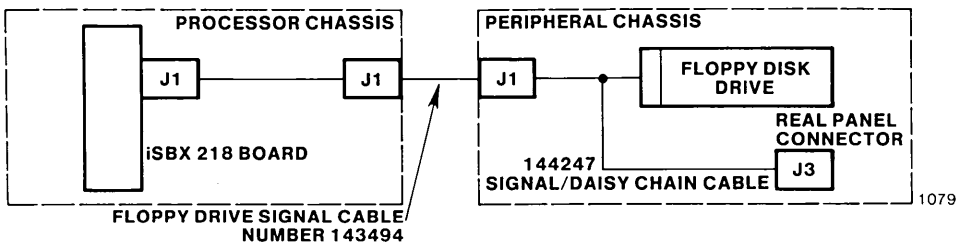
Figure 6-5. System 86/380 Chassis-to-Chassis Interconnect Cable Pin Assignment (Floppy Drive)

PERIPHERAL CHASSIS CONNECTOR J1 PIN NUMBER	SIGNAL NAME	PROCESSOR CHASSIS CONNECTOR J1 PIN NUMBER	iSBX 218 BOARD CONNECTOR J1 PIN NUMBER	SIGNAL NAME
1-49 odd	Ground	1-49	1-49	Ground
2	Write Current Switch	2	2	Low Current/
4	NC	4	4	Fault Reset/
6	NC	6	6	Fault/
8	NC	8	8	Reserved
10	Two-Sided	10	10	Two-Sided/
12	Disk Change	12	12	Reserved
14	Side Select	14	14	Side Select
16	In Use	16	16	Reserved
18	Head Load	18	18	Head Load/
20	Index	20	20	Index/
22	Ready	22	22	Ready/
24	Sector	24	24	Reserved
26	Drive Select 1	26	26	Drive 0 Sel/
28	Drive Select 2	28	28	Drive 1 Sel/
30	Drive Select 3	30	30	Drive 2 Sel/
32	Drive Select 4	32	32	Drive 3 Sel/
34	Direction Select	34	34	Direction
36	Step	36	36	Step/
38	Write Data	38	38	Write Data/
40	Write Gate	40	40	Write Enable/
42	Track 00	42	42	Track 00/
44	Write Protect	44	44	Write Protect/
46	Read Data	46	46	Read Data/
48	FM Sep Data	48	48	Reserved
50	FM Sep Clock	50	50	Reserved

Figure 6-6. Peripheral Chassis Exploded View Drawing (Sheet 1 of 3)

REVISIONS

REV	DESCRIPTION	OFF	DATE	CHK	DATE	APVD	DATE
E	ECO 39-0051						
F	ECO 39-0108						
G	ECO 39-0211						
H	ECO 39-0274						
J	ECO 39-0282 A						

JUMPER REMOVAL AND INSTALLATION TABLE II

SHUGART SA 850

STAKE PINS FROM	TO	REMOVE	INSTALL ITEM 72 OR 46	REMARKS
55I	COMMON	I		JUMPER PLUG
550	COMMON		I	
2S	COMMON		I	
-I	C		I	
DL	DL		I	
Y	Y			JUMPER PLUG

REMEX RFD 4000

4001	COMMON			JUMPER PLUG
4000			I	
-15V			I	
-5V			I	
U			I	
C	COMMON		I	
BB	CC	I		JUMPER PLUG

SWITCH TABLE I

SWITCH	POSITION							
	1	2	3	4	5	6	7	8
6K	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
5H	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF

DASH NO	PRODUCT CODE
005	SYP 86383 AA
006	SYP 86383 AB
007	SYP 86383 AC

NOTES: UNLESS OTHERWISE SPECIFIED

1. PART NUMBER IS 144690-XXX.

2. ASSEMBLY DRAWING, PARTS LIST AND WIRE LIST ARE TRACKING DOCUMENTS.

3. TERMINAL IDENTIFICATION IS FOR REFERENCE ONLY AND DOES NOT APPEAR ON THE PARTS.

4. REMOVE JUMPER FROM WI AND INSTALL AT LOCATION W2 AND SET SWITCHES PER TABLE I.

5. CUT SHORTING PLUG TRACES Z, HL, X ON BOTH UNITS AND ADD JUMPERS PER TABLE II.

6. WORKMANSHIP PER 99-0007-001

7. SECURE FLOPPY SIGNAL CABLE TO FLOPPY DRIVE PBA WITH 2 TIE WRAPS (ITEM 51).

8. ADD JUMPER (ITEM 72) TO WINI DRIVE (ITEM 13) AT LOCATION TP22 NEAR DI.

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PARTS LIST

TITLE
ASSEMBLY, SYP 86383, CHASSIS

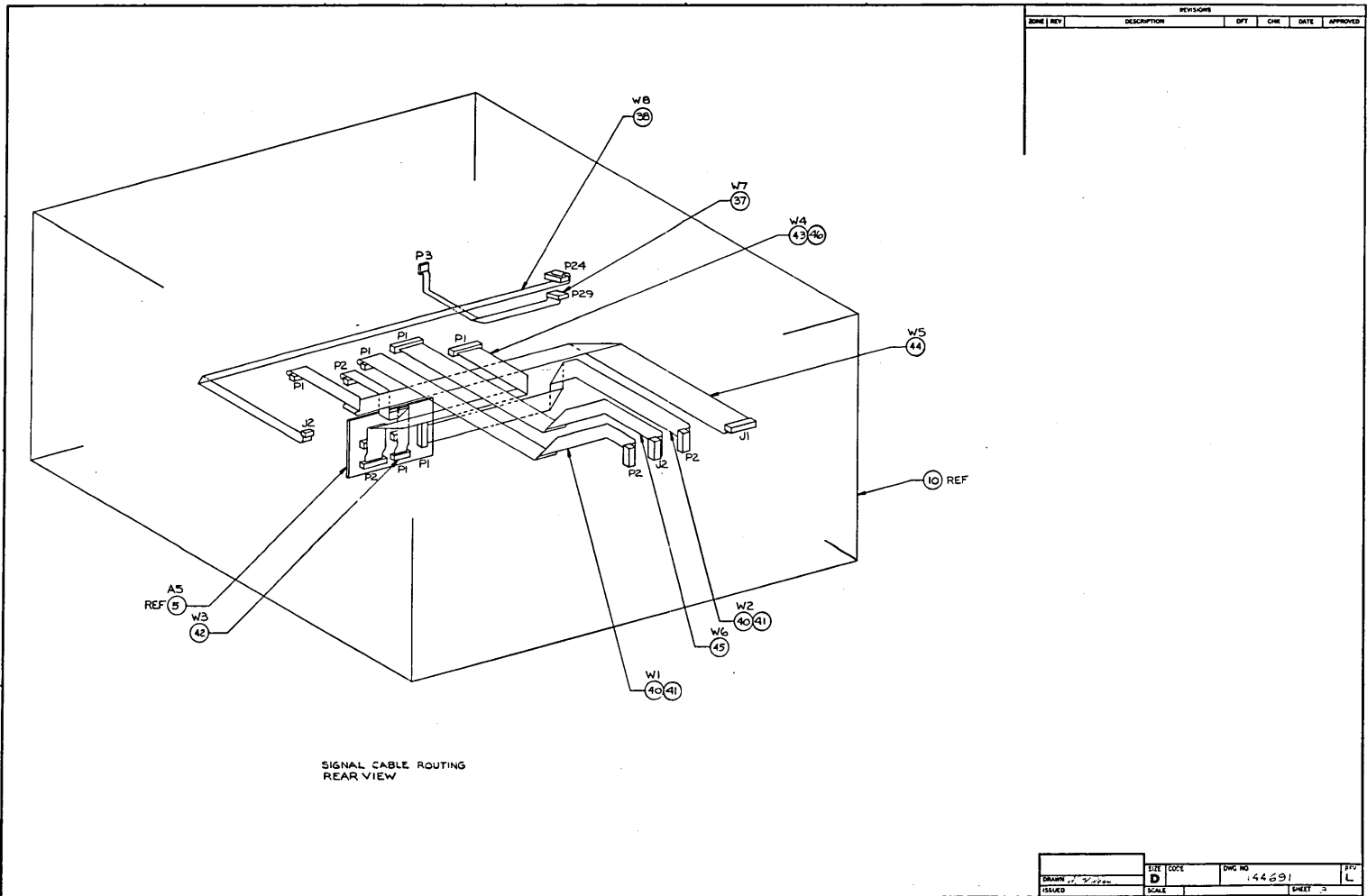| SIZE	CODE IDENT	DRAWING NUMBER	REV
D	39 1500	-	144690	J

SCALE NONE | SHEET 1 OF 4
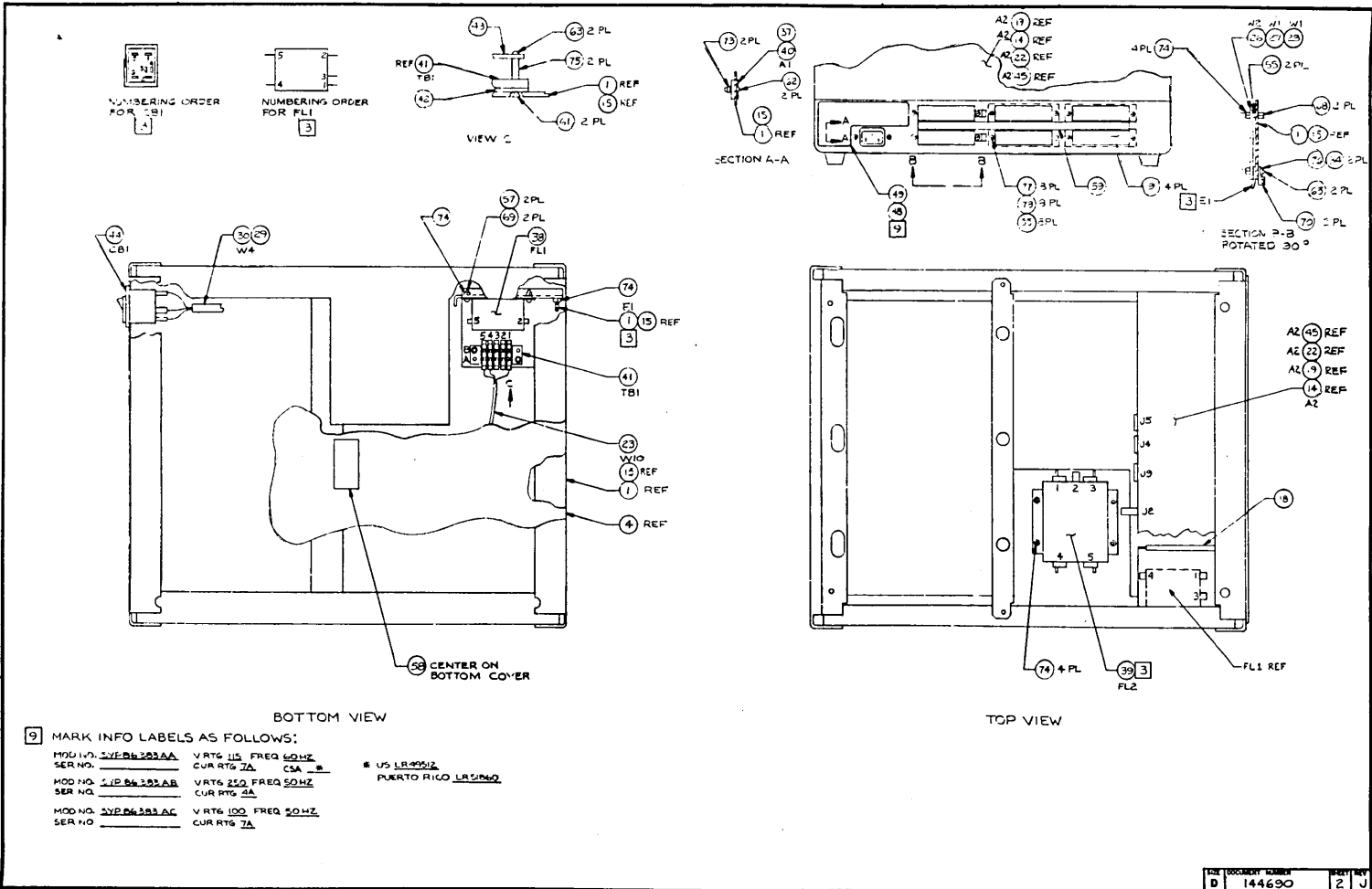
Figure 6-6. Peripheral Chassis Exploded View Drawing (Sheet 2 of 3)
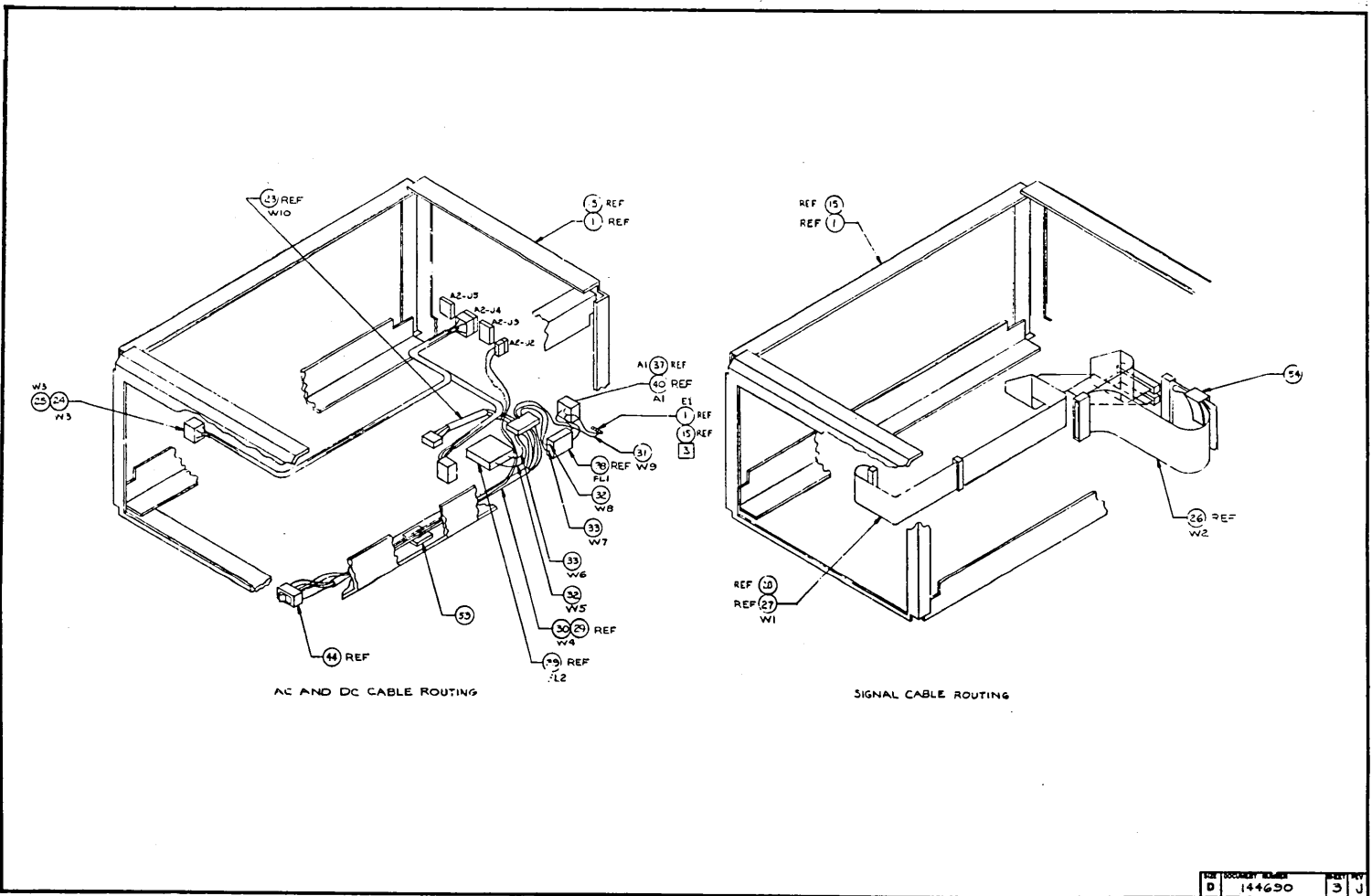
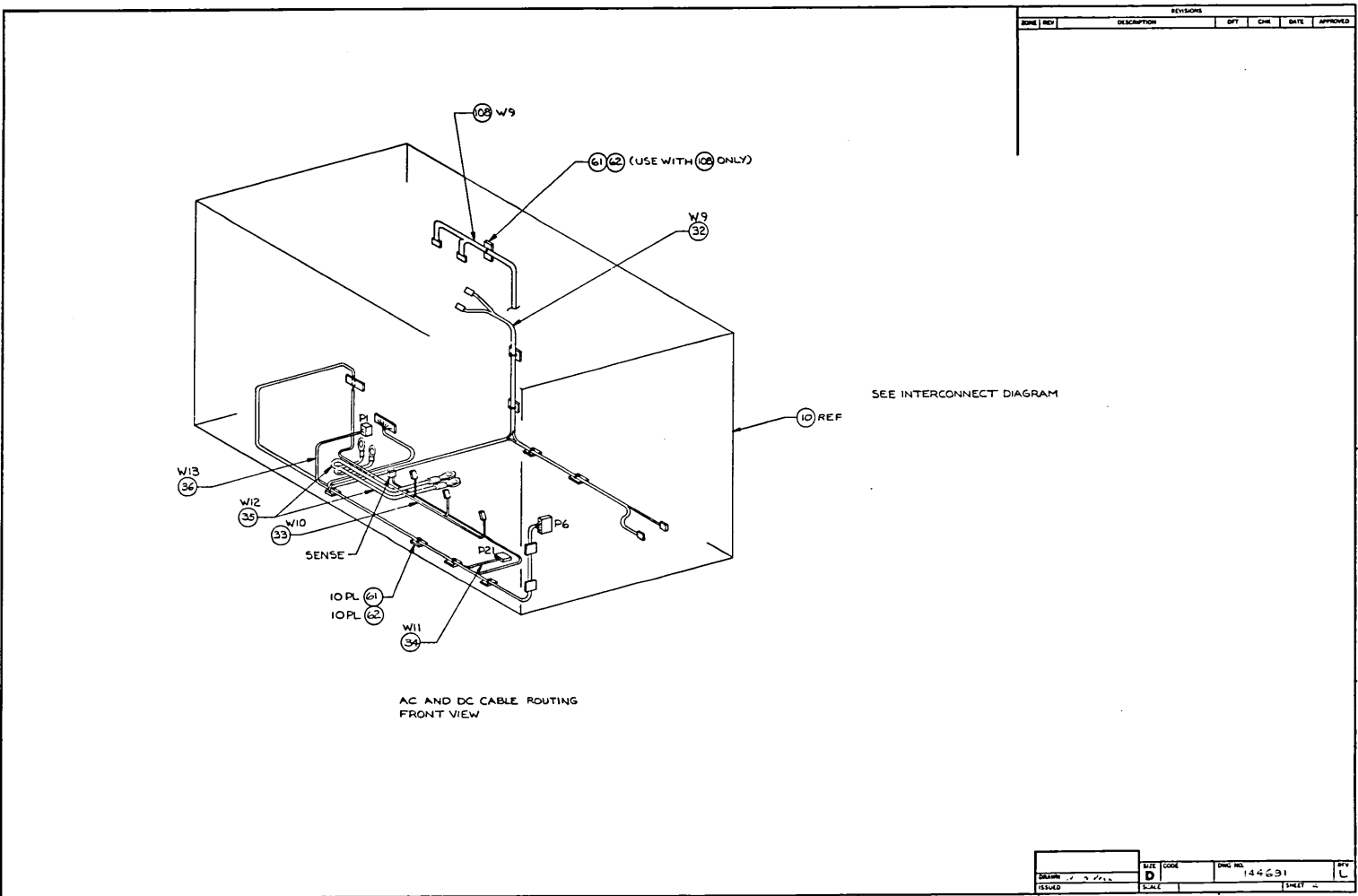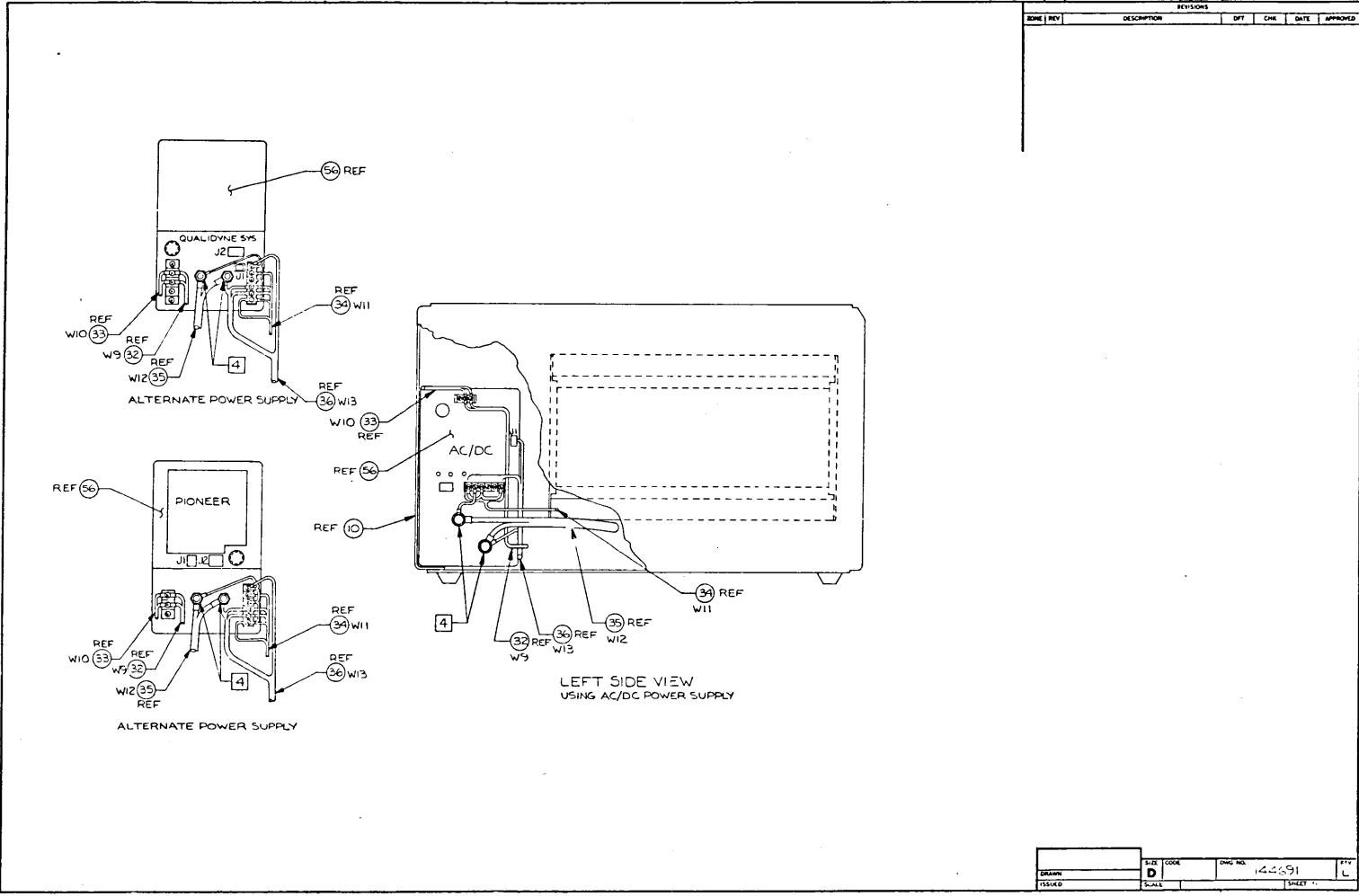Figure 6-6. Peripheral Chassis Exploded View Drawing (Sheet 3 of 3)

6-11

AC AND DC CABLE ROUTING

SIGNAL CABLE ROUTING

D 144690 3 J
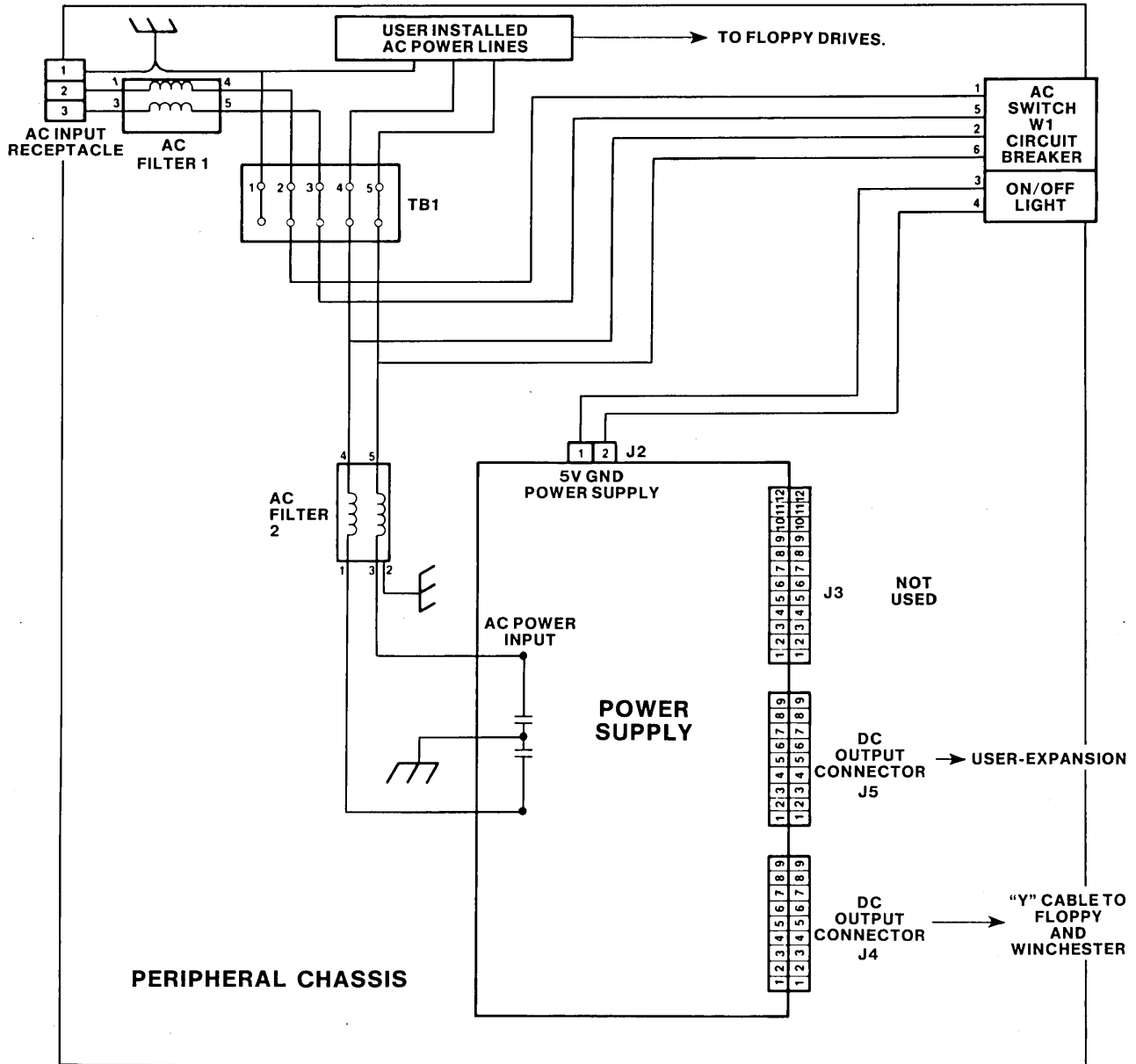
Figure 6-7. Peripheral Chassis Power Supply Schematic Diagram

X-036

J5, J4

```
   3   2   1
   O   O   O
   6   5   4
   O   O   O
   9   8   7
   O   O   O
       O   O
```

J3

```
   3   2   1
   O   O   O
   6   5   4
   O   O   O
   9   8   7
   O   O   O
   12  11  10
   O   O   O
       O   O   O
```

J2

```
   O   |  GND - BLACK
   O   |  + 5V - WHITE
```
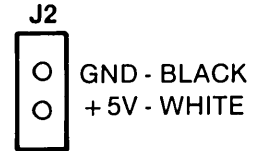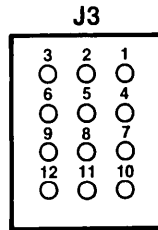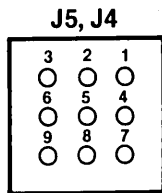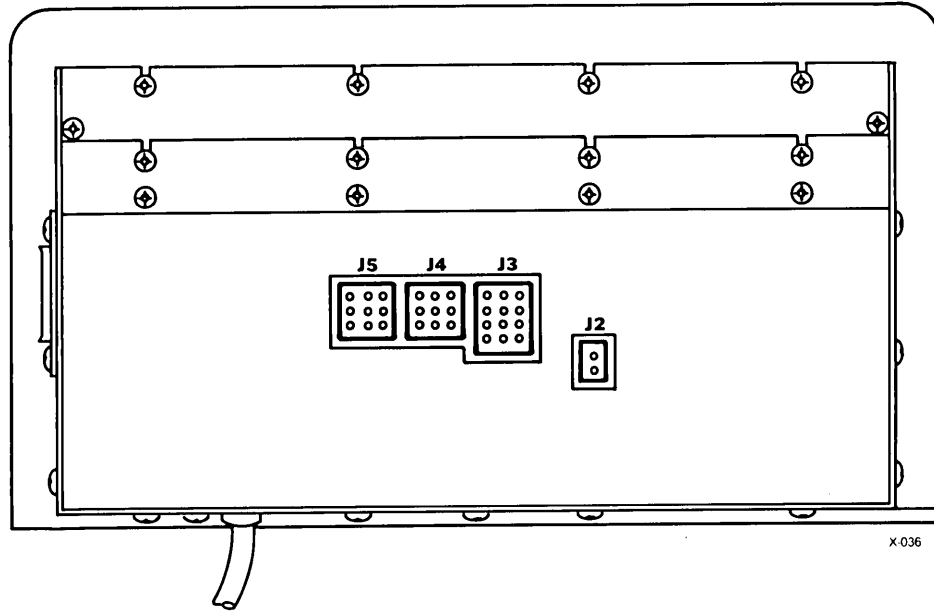
PIN	FUNCTION	PIN	FUNCTION
1	− 12V	1	MPRO/
2	+ 12V	2	− 12V
3	+ 24V	3	+ 12V
4	+ 5V	4	RTC
5	GND	5	+ 5V
6	− 24V	6	GND
7	+ 5V	7	PFIN/
8	GND	8	+ 5V
9	− 5V	9	GND
		10	− 5V
		11	+ 5V
		12	GND

Figure 6-8.   Peripheral Chassis Power Supply Connector Locations
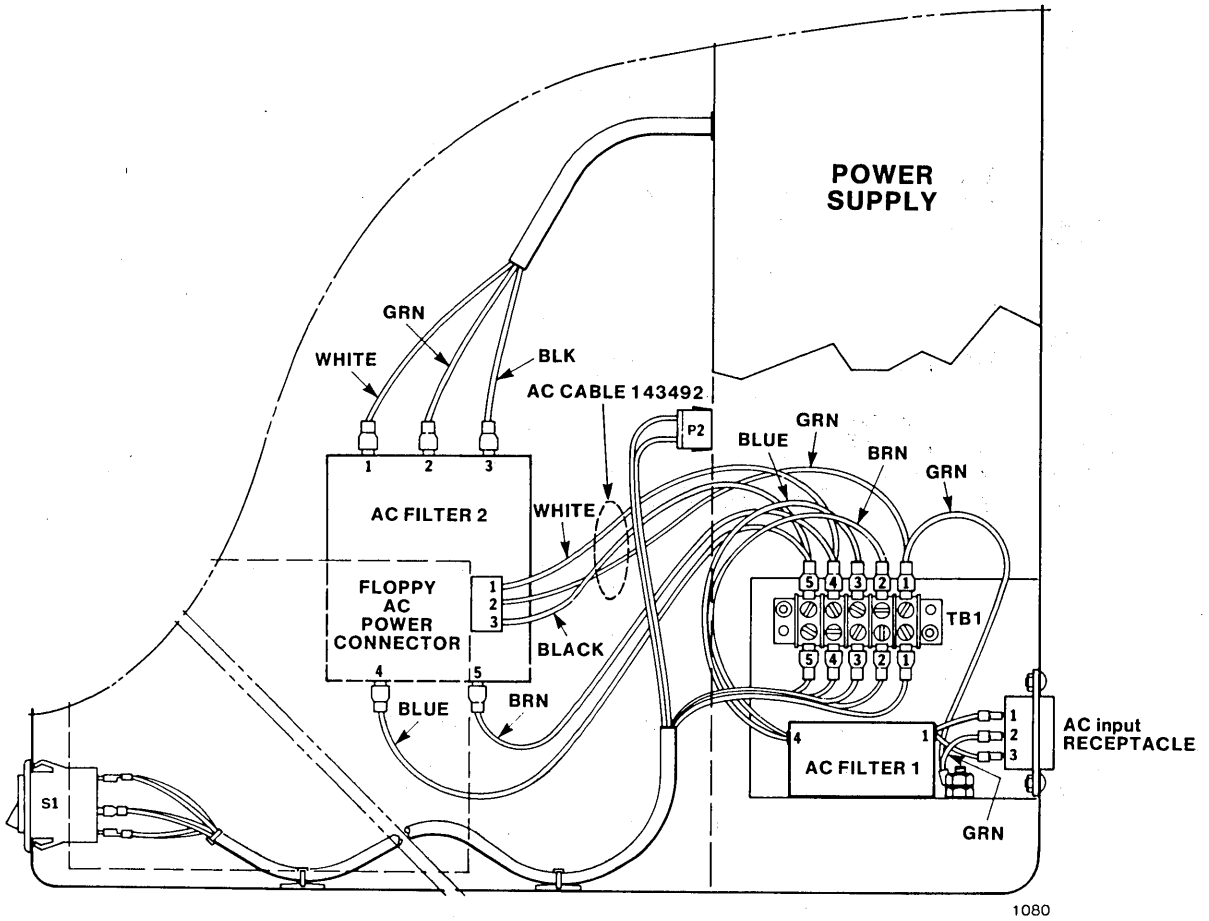
Figure 6-9. Peripheral Chassis AC Wiring Diagram
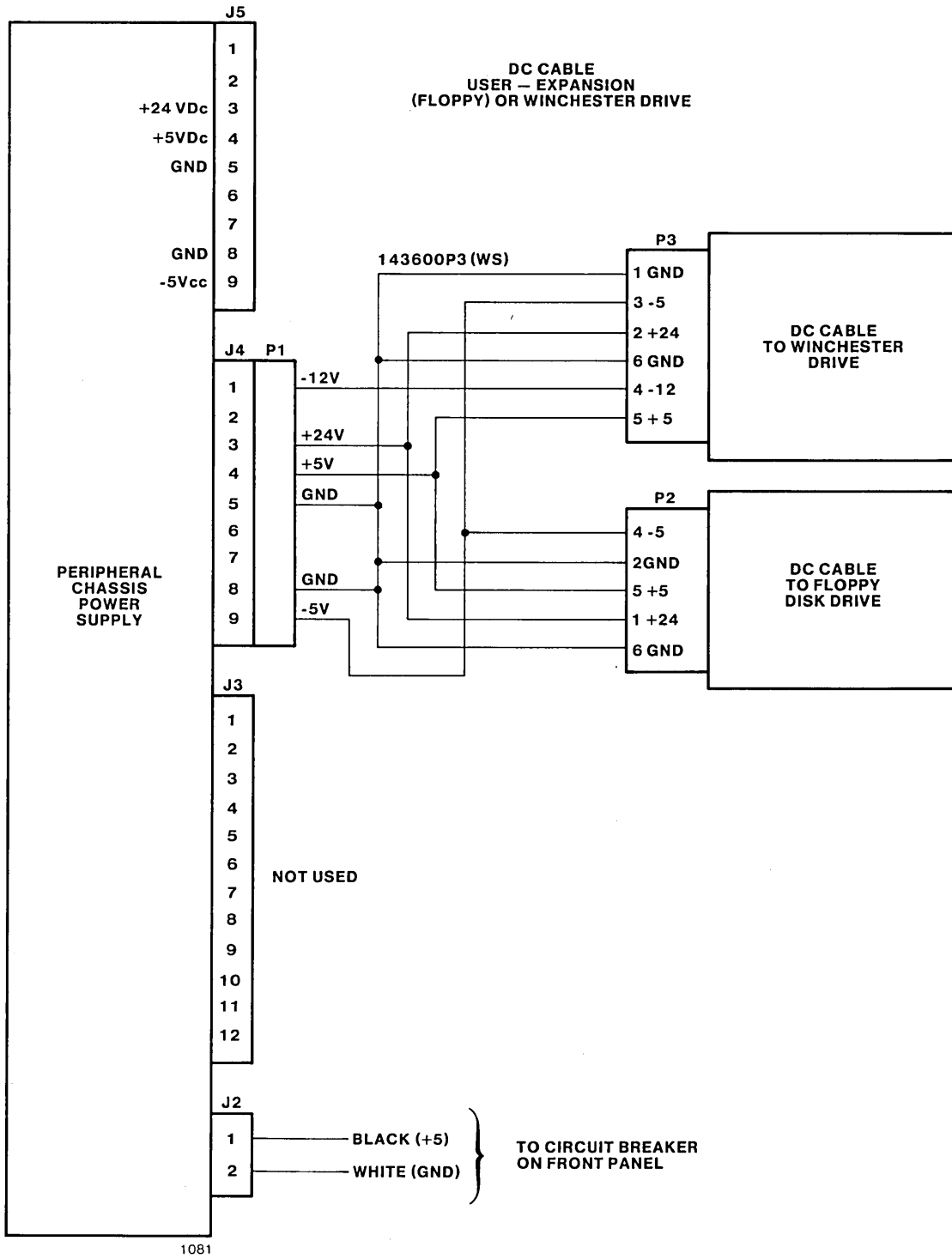
Figure 6-10. Peripheral Chassis DC Wiring Diagram

SIGNAL CABLE ROUTING

AC AND DC CABLE ROUTING
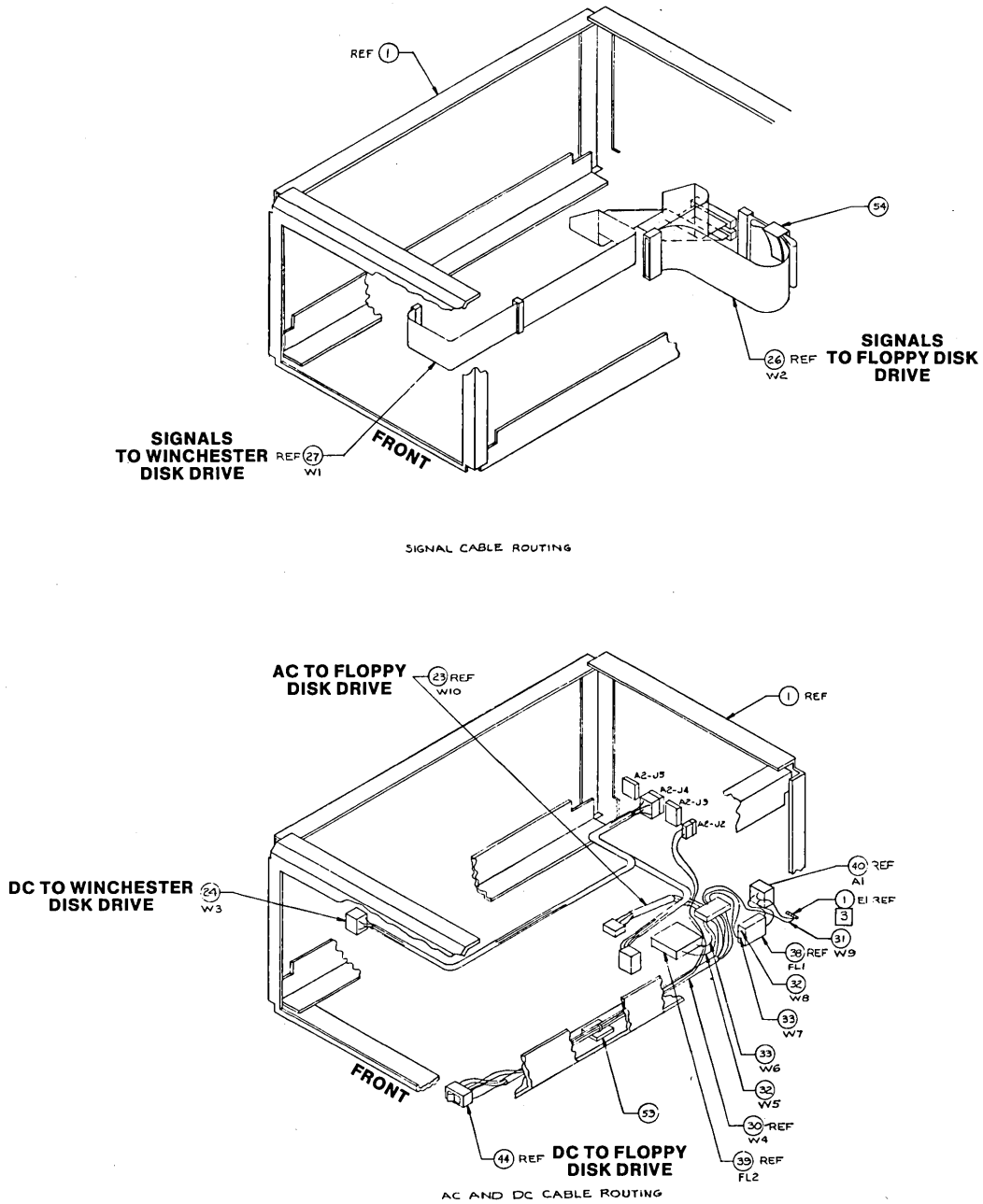
1082

Figure 6-11. Peripheral Chassis Cable Routing Diagram
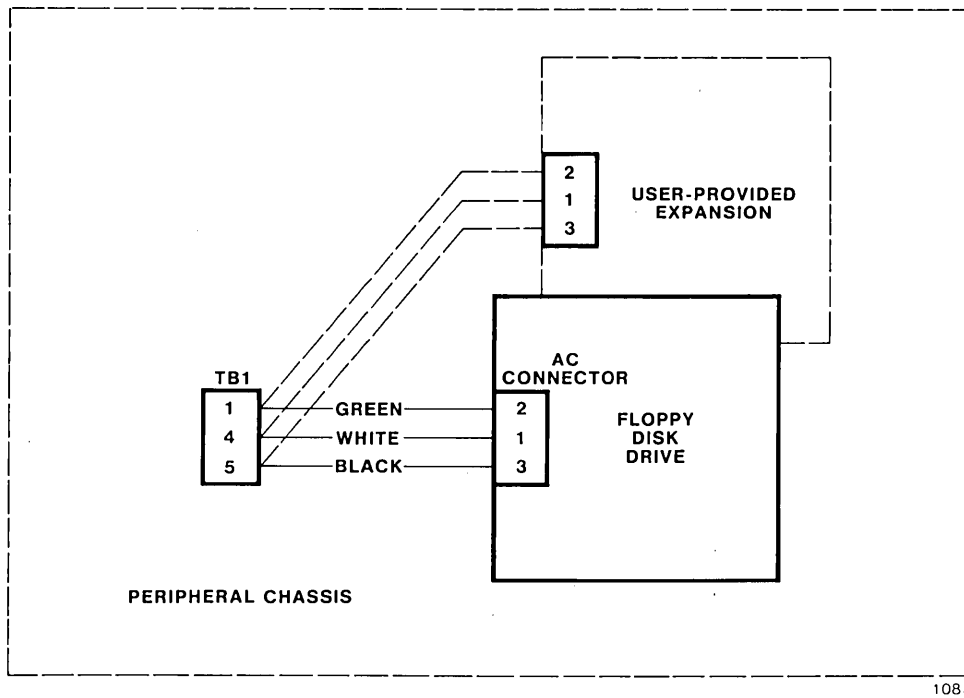
Figure 6-12. Floppy Disk Drive AC Cable Connector Pin Assignment

Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 1 of 6)

NOTE:
NOTES AND CARDCAGE ASSEMBLY ON PAGE 2.

Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 2 of 6)

6-19

7

12

8PL 88 78 93

66 4PL
67 4PL

63 64 5 2PL

84 93 2PL

24 89 90 2PL

76 89 97 85

24

55

94 95

18

5 53 A5

4 PL 91 78

69 4PL

2PL 20 54

78 91 2PL

23

1 6 8 47 A1 CONNECTS TO A7J1

3 7 A3 CONNECTS TO A7J3

2 A2 CONNECTS TO A7J5

22 A7

10

78 91 3PL

2PL 79

57 CB1

90 2PL

80 2PL
CONNECTS TO 10

102

5 64 63

70 2PL

103

83 92 2PL

105

2PL 80

92 83 26

14

VIEW A
220V POWER SUPPLY
(SYP 86384 AB)

NOTES: UNLESS OTHERWISE SPECIFIED

1. PART NUMBER IS 144691-XXX.

2. ASSEMBLY DRAWING AND PARTS LIST ARE TRACKING
   DOCUMENTS.

3. TERMINAL IDENTIFICATION IS FOR REFERENCE ONLY AND
   DOES NOT APPEAR ON THE PARTS.

4. TORQUE TOP NUT TO 25 IN-LBS.

5. BOND ITEM 63 TO ITEM 10, ITEM 63 TO ITEM 18, ITEM 63 TO
   ITEM 19 AND 63 TO ITEM 106, USING ITEM 64 AS REQUIRED.

6. WORKMANSHIP PER 99-0007-001.

7. ITEM 50 MOUNTS ON TOP OF ITEM 12, NEXT TO RIGHT REAR
   FASTENER.

8. PLACE LABELS APPROXIMATELY WHERE SHOWN.

9. REMOVED

10. MARK MODEL NUMBER, PART NUMBER, SERIAL NUMBER, VOLTS AND
    AMPS WITH CONTRASTING PERMANENT COLOR APPROXIMATELY
    .10 HIGH APPROXIMATELY WHERE SHOWN.

11. MARK FLOPPY, PRINTER, WINCHESTER AND SERIAL I/O, WITH
    CONTRASTING PERMANENT COLOR APPROXIMATELY .10 HIGH
    APPROXIMATELY WHERE SHOWN.

12. REMOVE THIS PORTION OF ITEM 51.

13. ITEMS SHOWN ARE TO BE USED ONLY IF SPECIFIED
    ON PARTS LIST.

intel

VIEW A

Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 3 of 6)

SIGNAL CABLE ROUTING
REAR VIEW

Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 4 of 6)

Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 5 of 6)
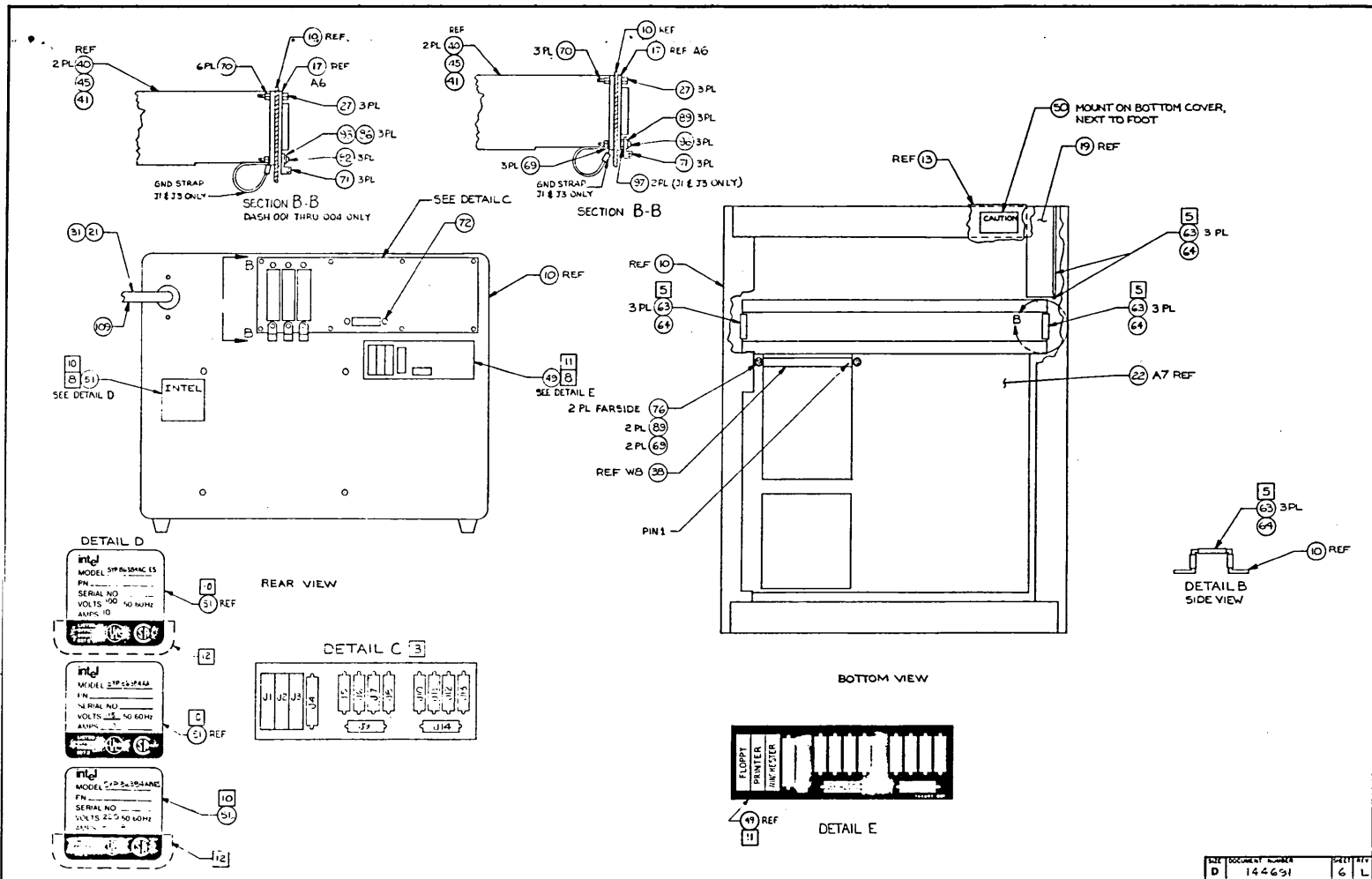
Figure 6-13. Processor Chassis Exploded View Drawing (Sheet 6 of 6)
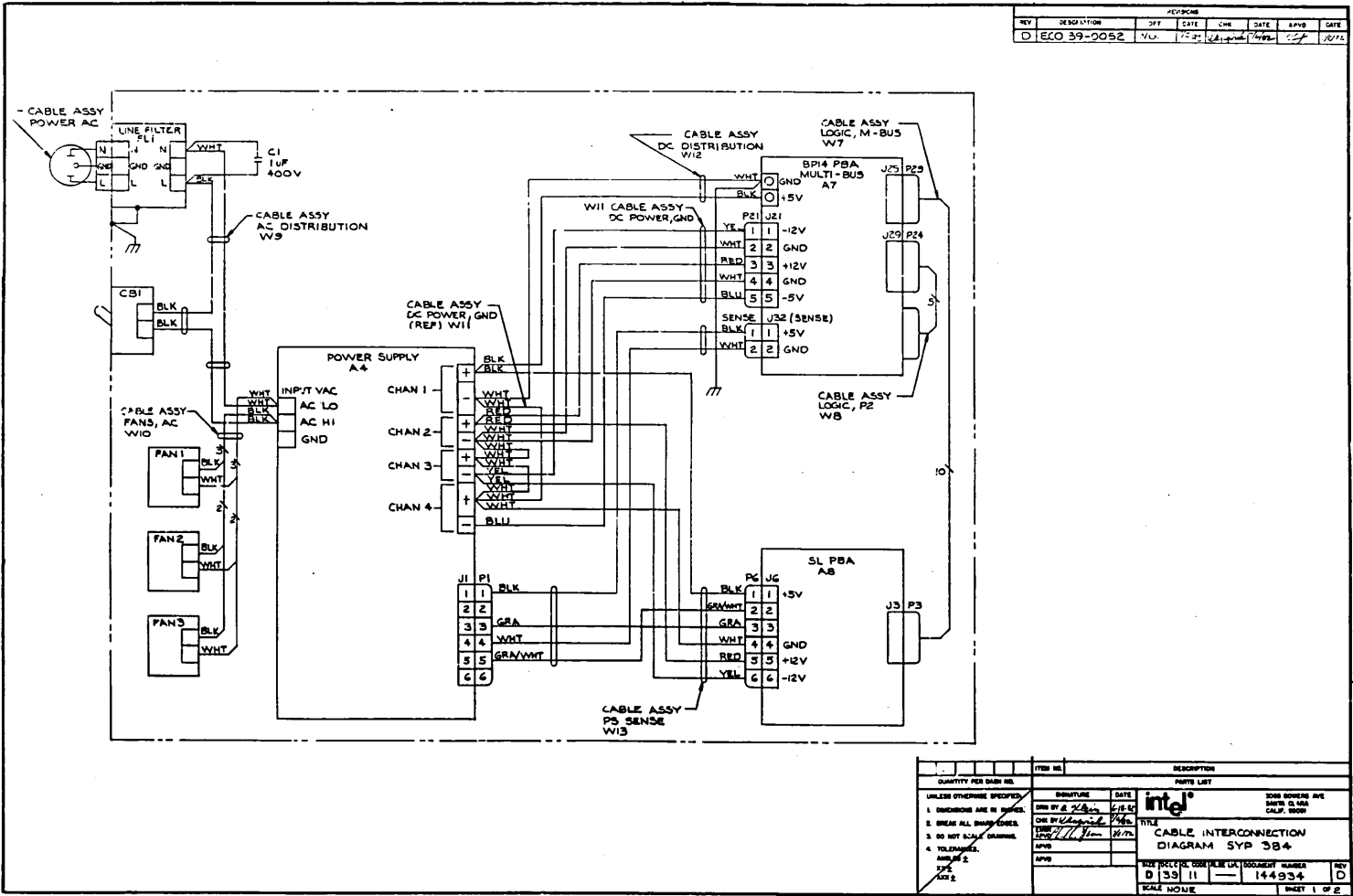
Figure 6-14. Processor Chassis AC and DC Wiring Diagram (115 VAC)
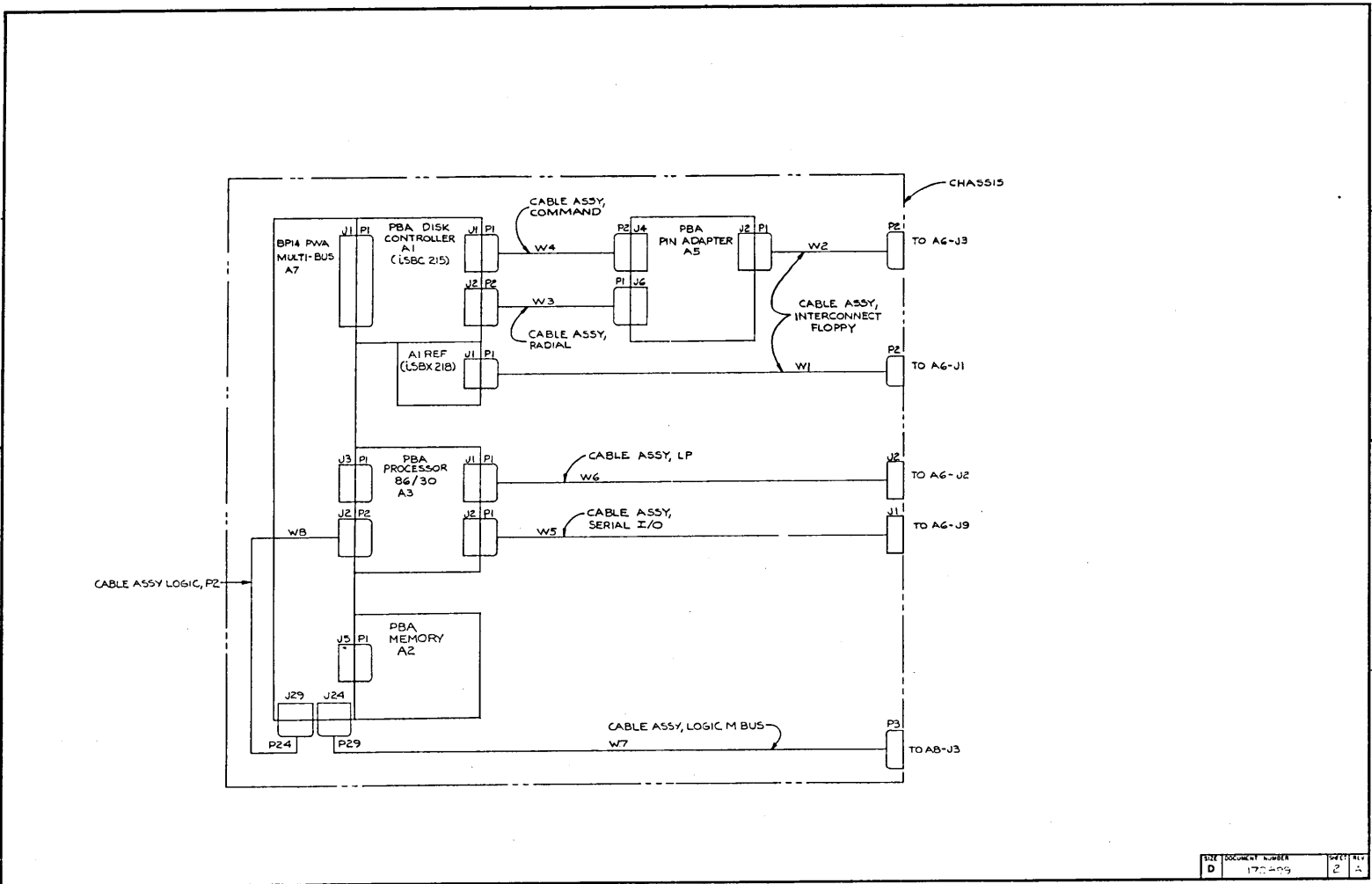
Figure 6-14A. Processor Chassis AC and DC Wiring Diagram (220 VAC)

Figure 6-15. Processor Chassis Cabling Diagram
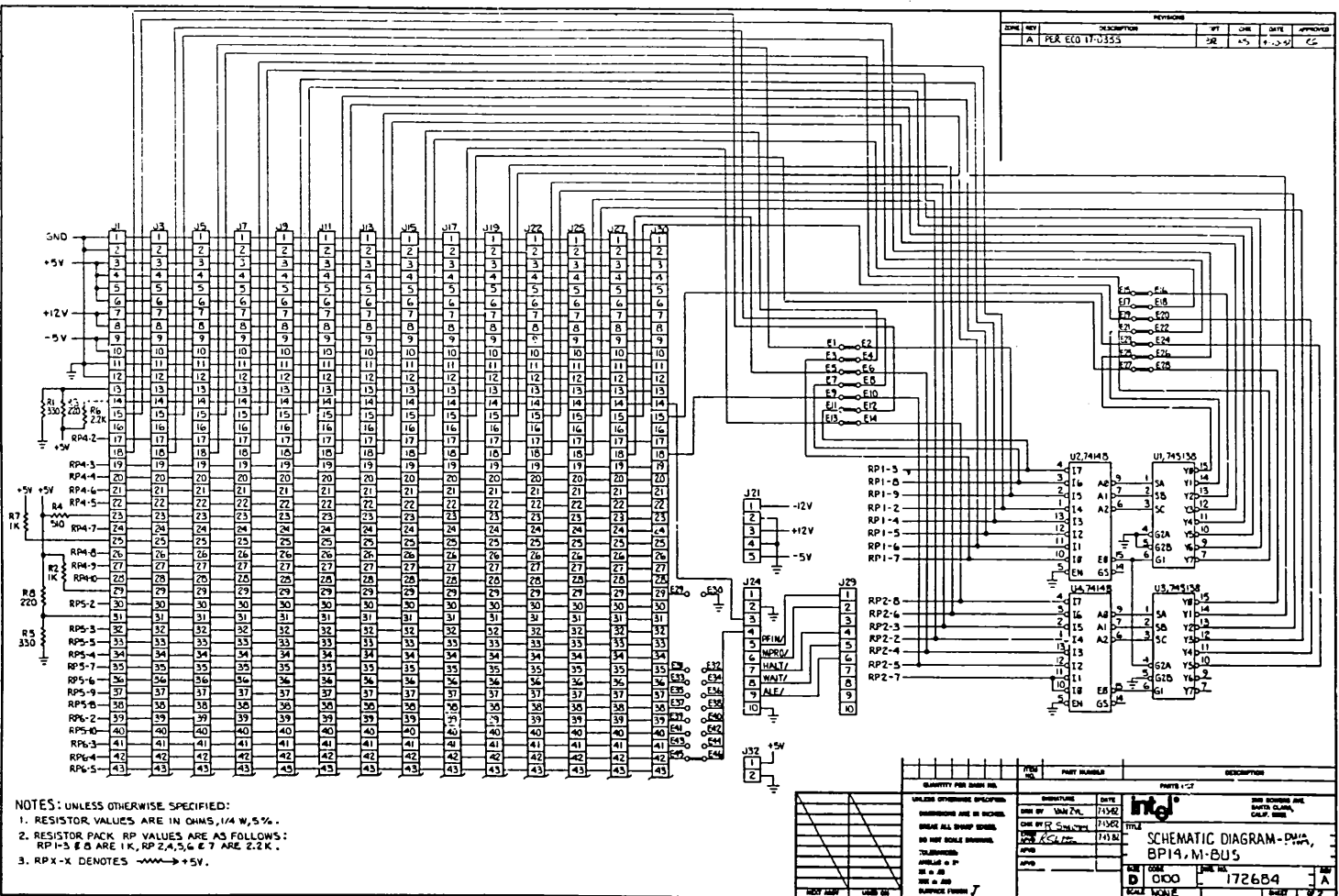
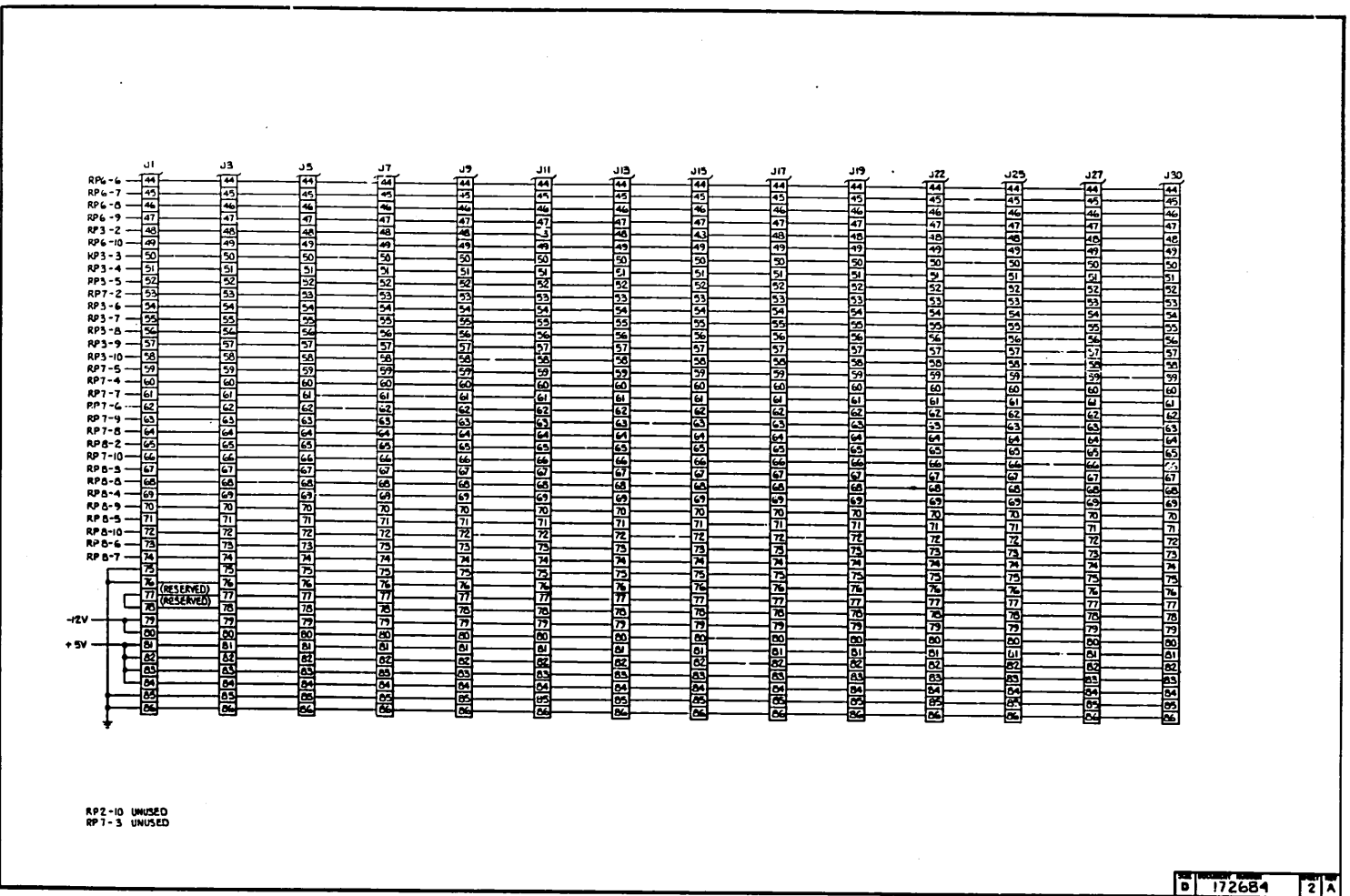Figure 6-16. Processor Chassis Cardcage Schematic Diagram (Sheet 1 of 2)

Figure 6-16. Processor Chassis Cardcage Schematic Diagram (Sheet 2 of 2)

J32

To P.S.
SENSE
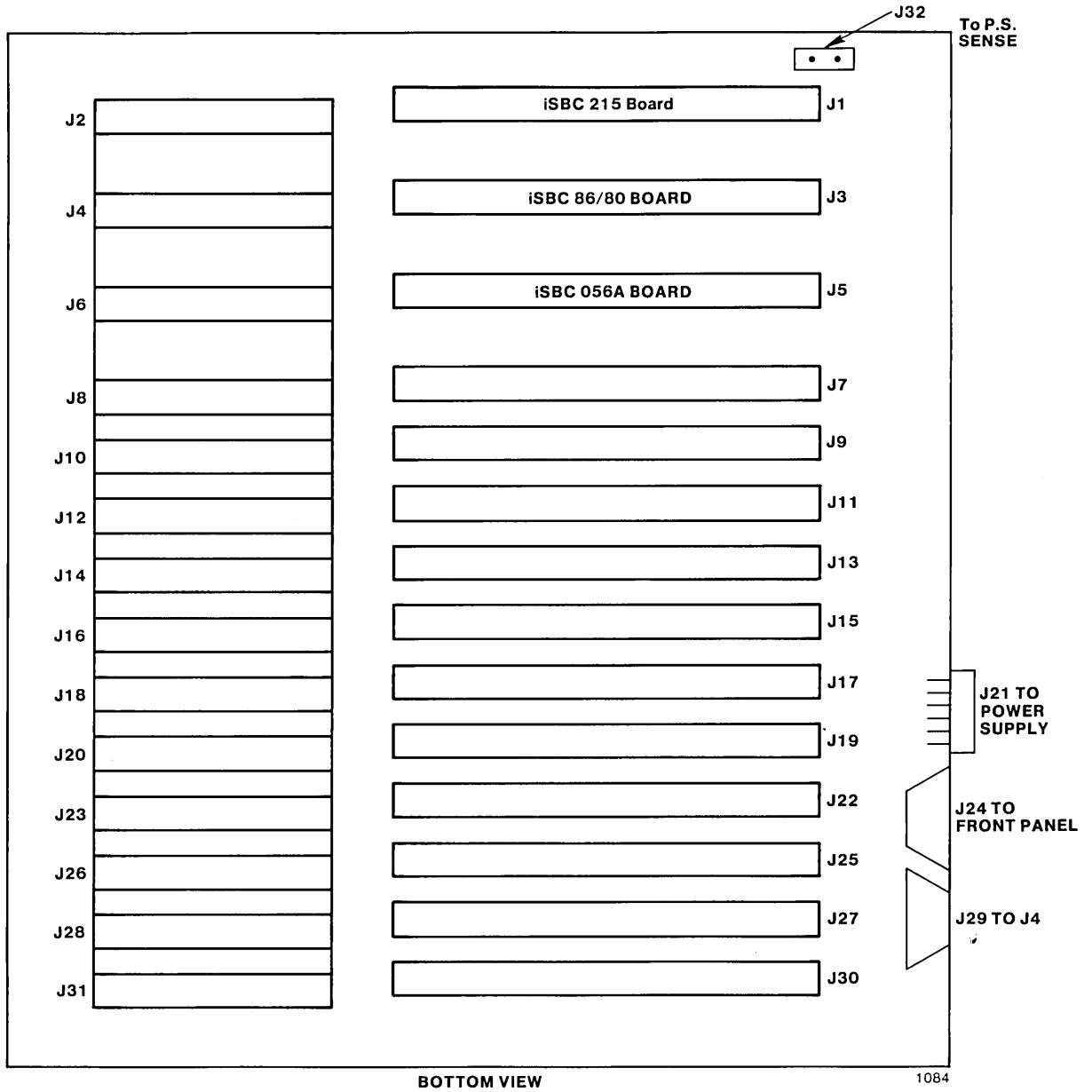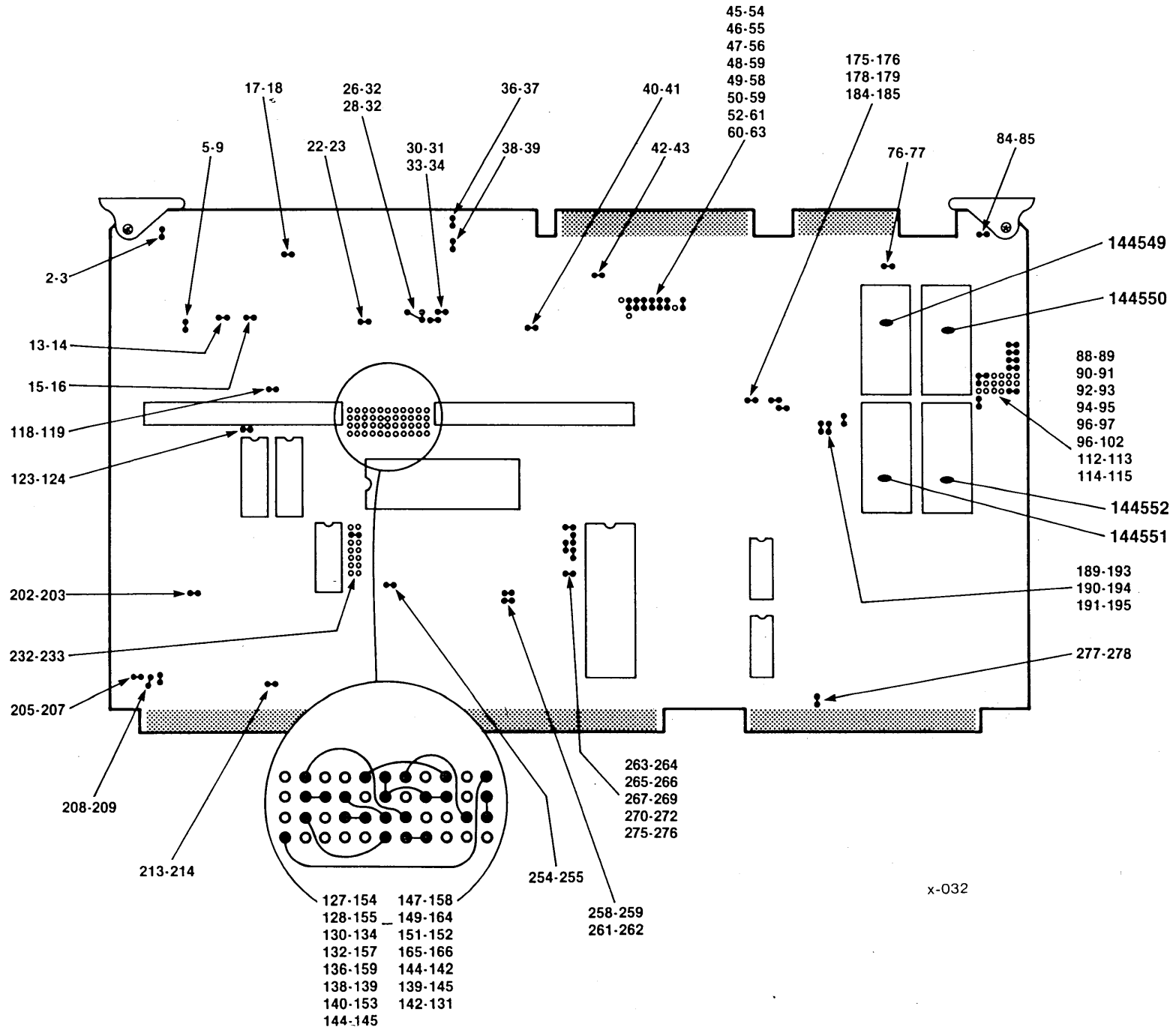
J2		iSBC 215 Board	J1
J4		iSBC 86/80 BOARD	J3
J6		iSBC 056A BOARD	J5
J8			J7
J10			J9
J12			J11
J14			J13
J16			J15
J18			J17
J20			J19
J23			J22
J26			J25
J28			J27
J31			J30

J21 TO
POWER
SUPPLY

J24 TO
FRONT PANEL

J29 TO J4

BOTTOM VIEW

1084

Figure 6-17.   Processor Chassis Cardcage Connector Diagram

Figure 6-18. iSBC® 86/30 Board Jumper Configuration
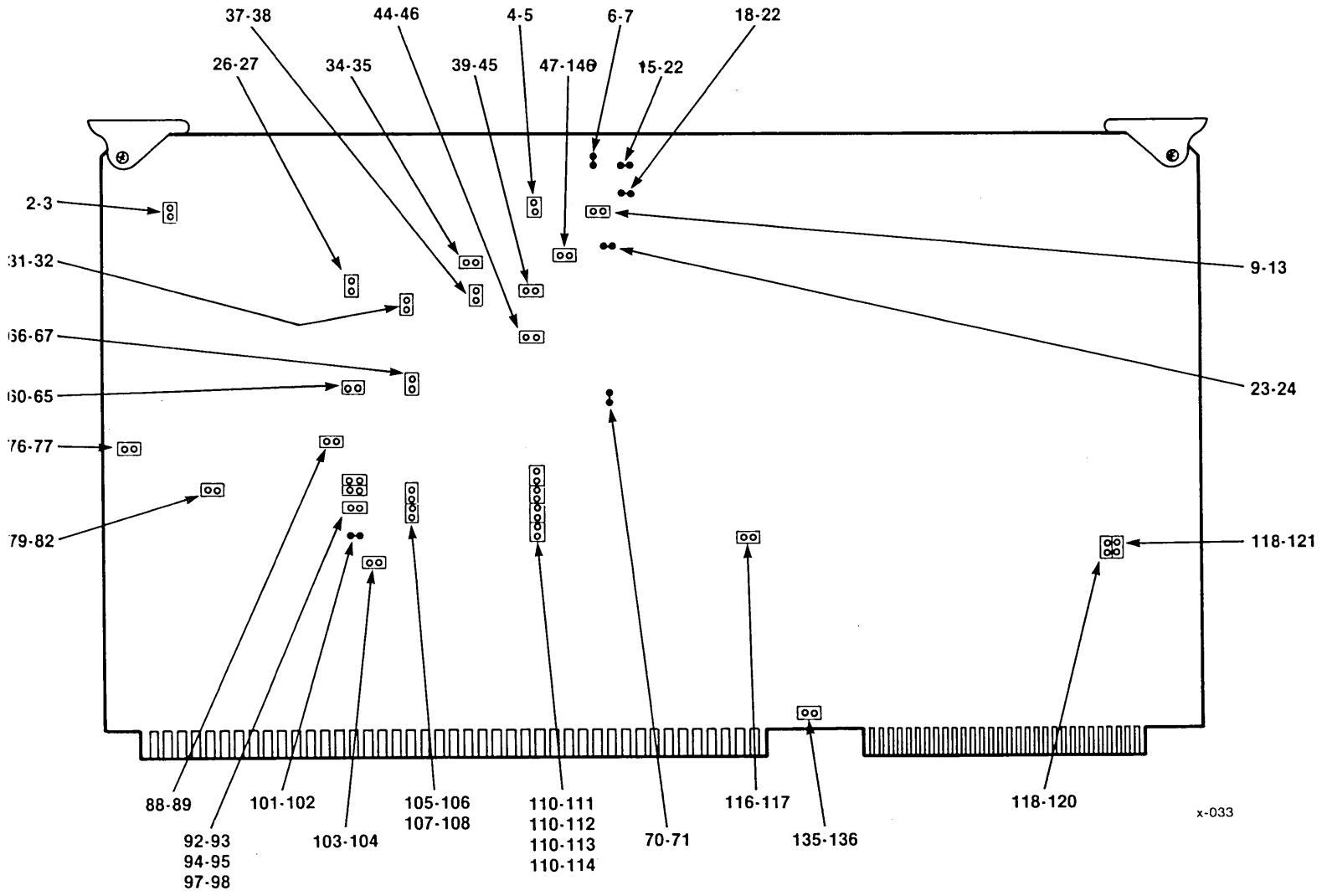
x-032
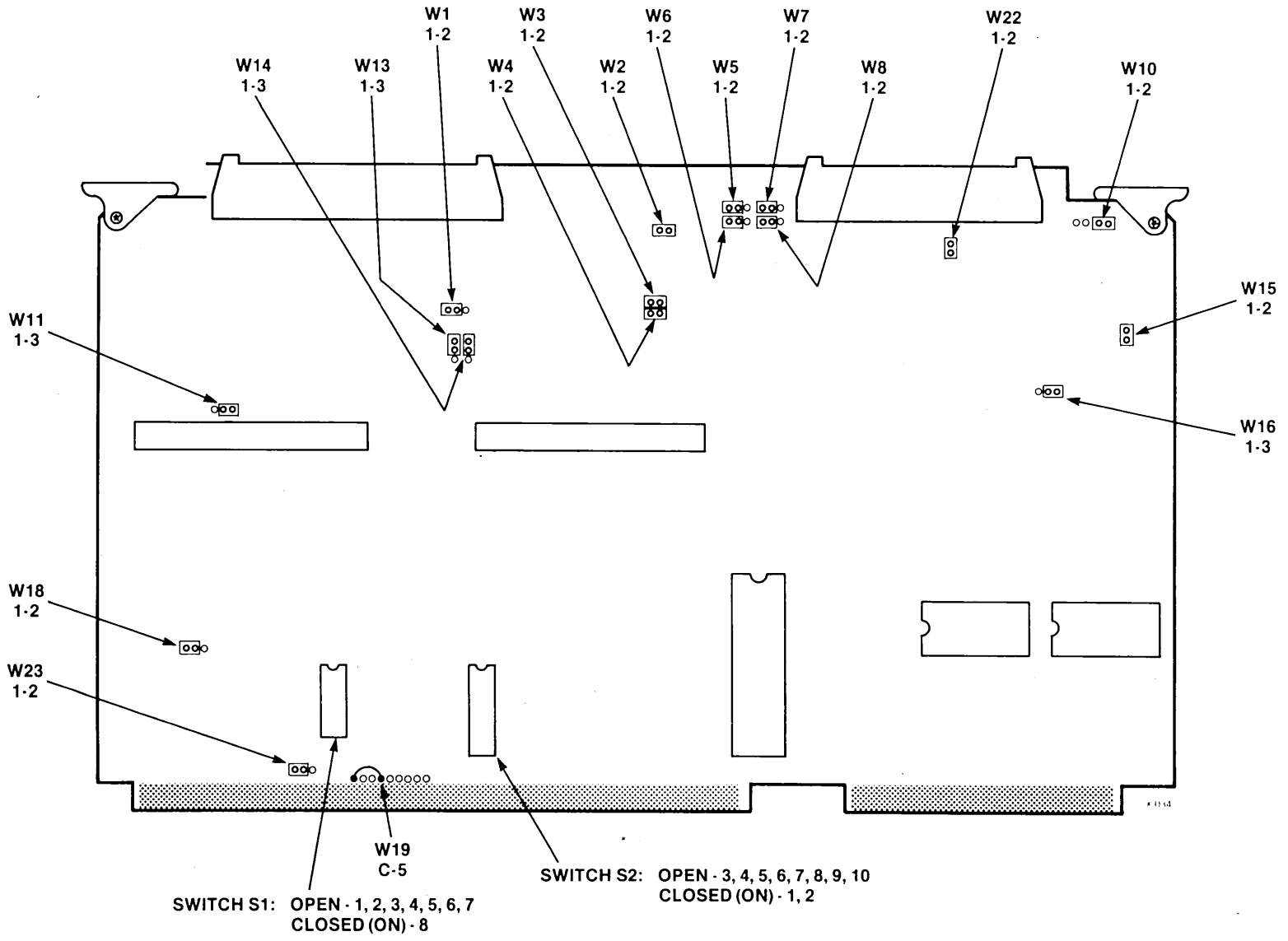
Figure 6-19. iSBC® 056A RAM Board Jumper Configuration
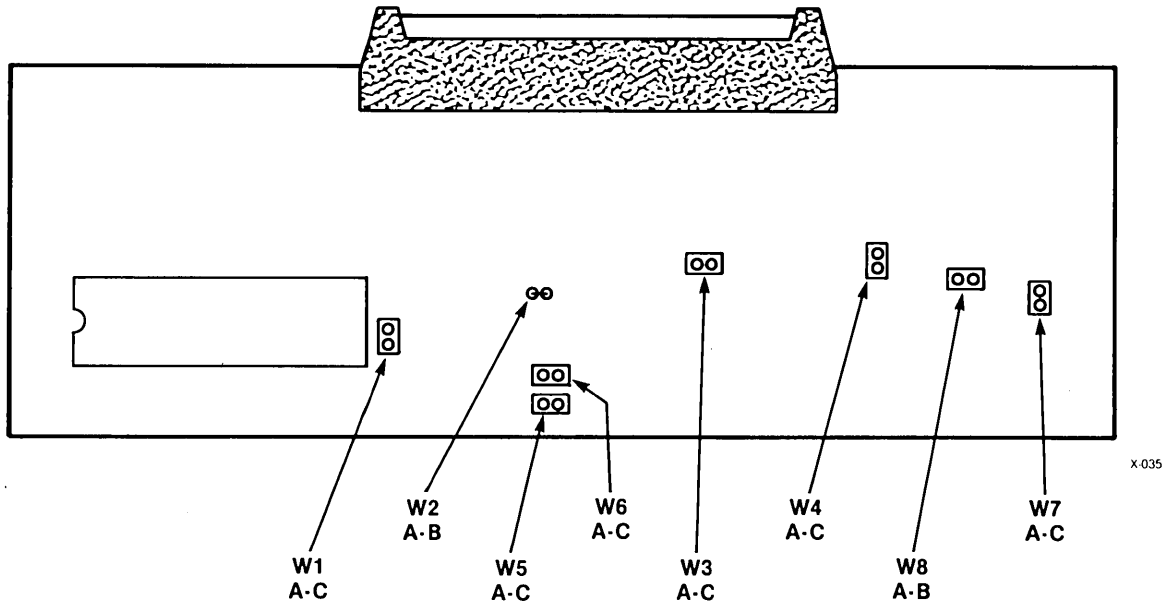
6-31

Figure 6-20. iSBC® 215 Board Jumper Configuration

SWITCH S1: OPEN - 1, 2, 3, 4, 5, 6, 7
CLOSED (ON) - 8

SWITCH S2: OPEN - 3, 4, 5, 6, 7, 8, 9, 10
CLOSED (ON) - 1, 2

W19
C-5

W23
1-2

W18
1-2

W11
1-3

W14
1-3

W13
1-3

W1
1-2

W4
1-2

W3
1-2

W2
1-2

W6
1-2

W5
1-2

W7
1-2

W8
1-2

W22
1-2

W10
1-2

W15
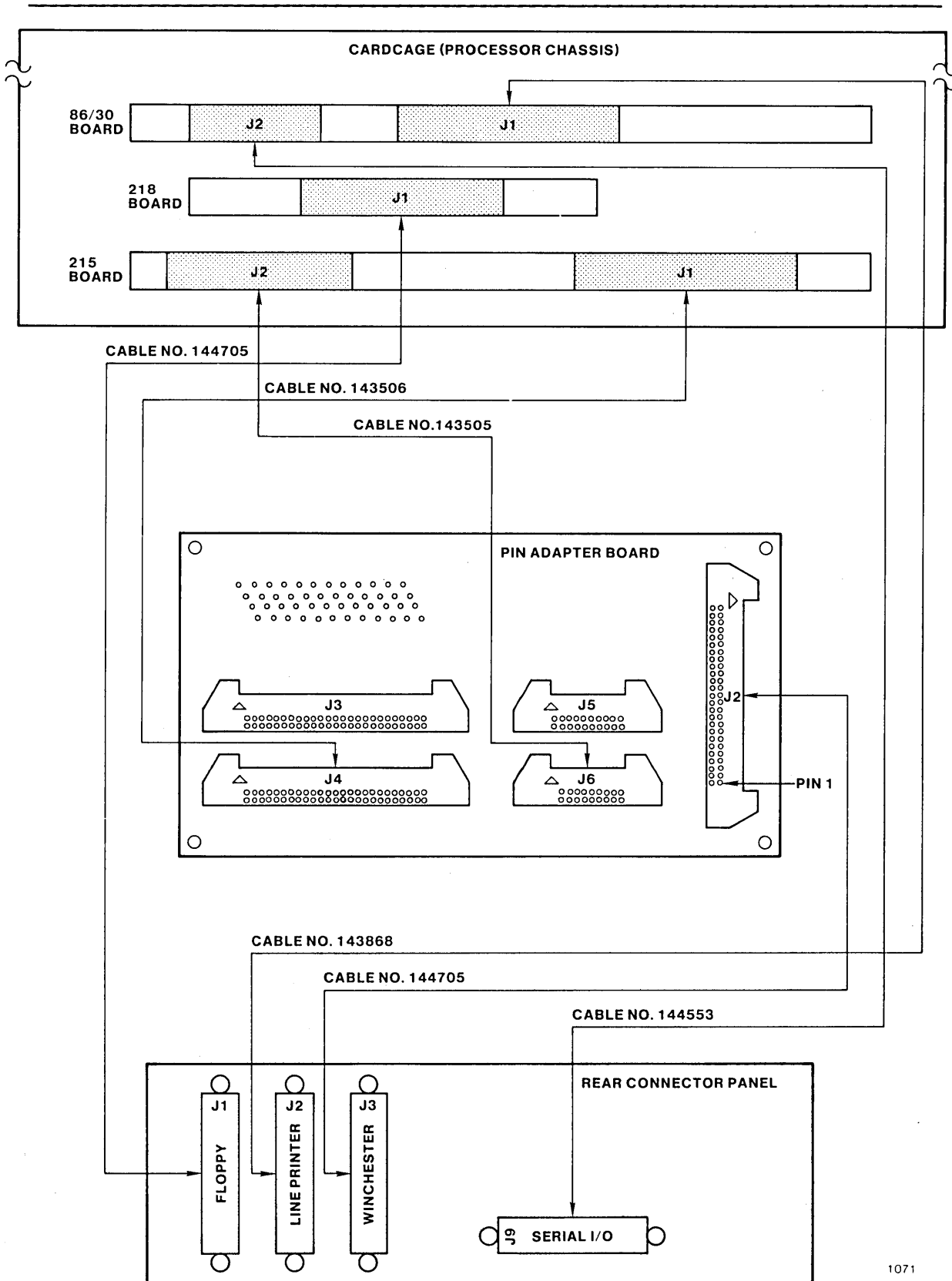1-2

W16
1-3

X-035

W2
A·B

W6
A·C

W4
A·C

W7
A·C

W1
A·C

W5
A·C

W3
A·C

W8
A·B

Figure 6-21. iSBX™ 218 Board Jumper Configuration

Figure 6-22. Pin Adapter Board Cabling Diagram (Processor Chassis)

Figure 6-23. Pin Adapter Board Schematic Diagram
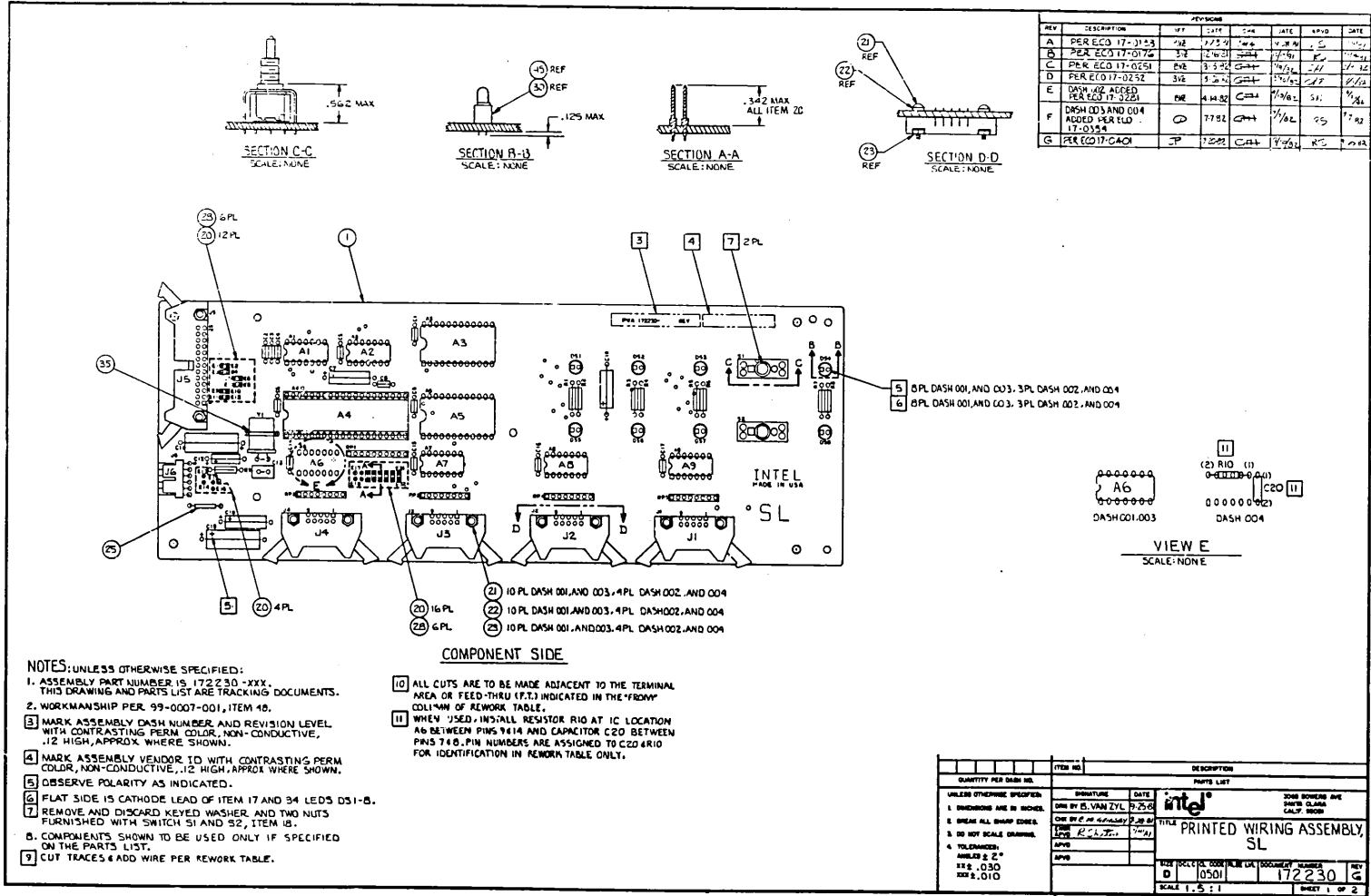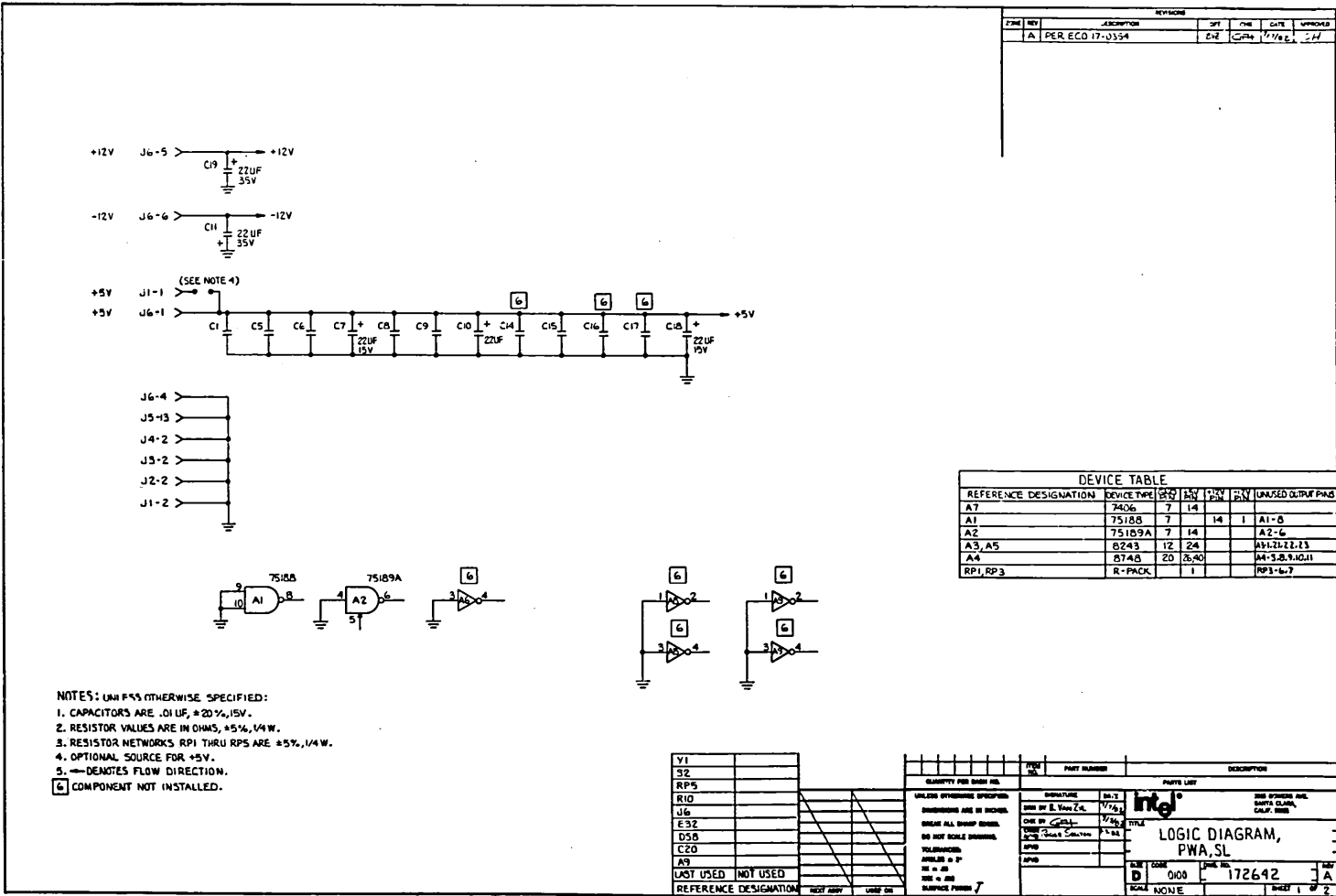
Figure 6-24. Switch and Light Board Assembly Diagram

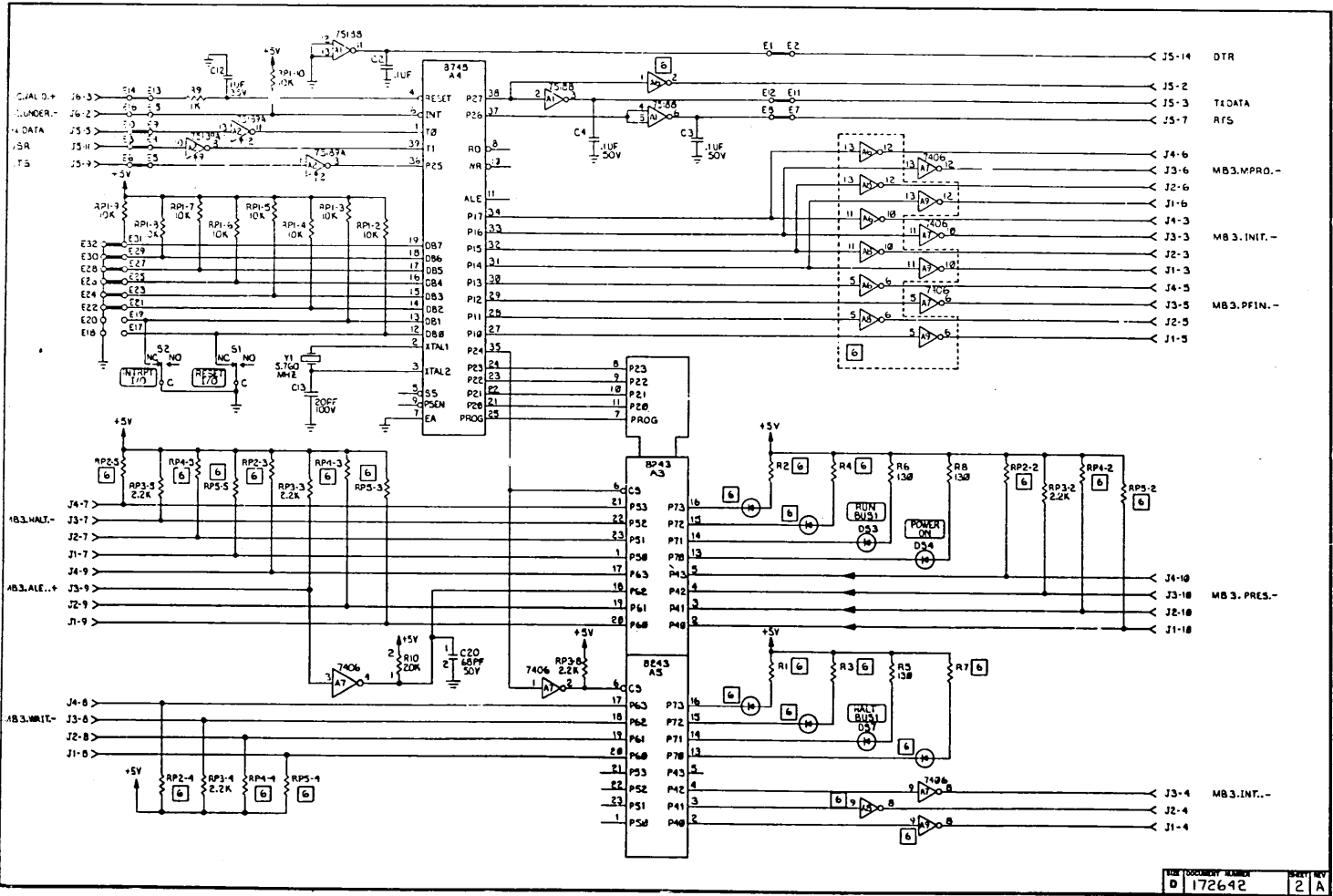Figure 6-25. Switch and Light Board Schematic Diagram (Sheet 1 of 2)

Figure 6-25. Switch and Light Board Schematic Diagram (Sheet 2 of 2)

APPENDIX .A. INSTALLING ADDITIONAL WINCHESTER DRIVES

The System 86/380 allows user installation of one additional Winchester
disk drive into the left-most bay (when viewed from the front) of the
Peripheral Chassis. The actual installation involves removing the filler
panel installed onto the front of the chassis, installing the drive from
the front of the chassis, connecting power and signal cables to the
drive, and replacing the front filler panel onto the chassis. A
step-by-step procedure is described in the following text.

1. Turn the AC power switch on the Peripheral Chassis to OFF.

WARNING

Hazardous voltages are presented within
the chassis whenever the AC power cord
is connected to a power source. Do not
attempt to service any subassembly
within either chassis if AC power is
applied to the chassis.

2. Disconnect the AC power cord on the Peripheral. Chassis from the
    power source.

3. Remove the top cover from the Peripheral Chassis (refer to
    Section 4.4.1.2).

4. Remove the front panel from the front of the chassis (refer to
    Section 4.4.1.1).

5. Remove the filler panels from the front of the chassis (refer to
    Section 4.4.1.3).

6. LOCK the shipping restraint on the existing Winchester drive (see
    Section 2.5 for the head LOCK/UNLOCK procedure) and ensure that
    the heads are still locked on the additional Winchester drive.

7. Slide the existing Winchester drive forward until the terminator
    board and the daisychain cable connector on the drive are
    accessible. This must be performed in three steps, as follows:

    ●   First, disconnect the the signal cable from the front of the
        existing Winchester drive (refer to Figure A-1 for location
        of the signal cable on a PRIAM Winchester drive).

    ●   Remove three screws securing the existing Winchester drive to
        the chassis (refer to Figure 4-7 fo screw locations).

    ●   Slide the drive forward approximately 5 inches to gain some
        working room behind the existing drive.

A-1

8. Remove the drive mounting plate from inside the chassis and install it onto the bottom of the additional Winchester drive; refer to Figure 4-8.

9. Remove the terminator board from the existing Winchester drive and ensure that a terminator board is installed properly onto the additional drive. The terminator board is required on only the last drive on the daisychain cable (in this instance, the new drive is the "last" drive) and is normally installed in the drive when it is shipped from the factory. Refer to Figure A-1 for an approximate location of the terminator board.

10. Select the required sector size for the Winchester drive. On the PRIAM Winchester drive, the selection is performed by configuring the jumpers W1 and W2, and by configuring the switches at IC location 5H. The as-shipped configuration of the switches selects 32 sector operation, as follows:

    switch 1   off
    switch 2   off
    switch 3   on
    switch 4   on
    switch 5   off
    switch 6   off
    switch 7   off
    switch 8   off

11. Assign an address to each of the Winchester drives. This is done by positioning the drive address select switches located at 6K on the printed circuit board on the Winchester drives. There are four allowable addresses for a Winchester drive in the System 86/380; these four addresses conform with the maximum limits for the daisychaining of drives. The possible drive address are as follows:

Switch No.	Position	Drive Address Selected
1, 7, 8	ON, all others OFF	1 (Default in System 86/380)
2, 7, 8	ON, all others OFF	2
3, 7, 8	ON, all others OFF	3
4, 7, 8	ON, all others OFF	4

12. Then, from the front, slide the additional Winchester drive about half way into the empty bay within the Peripheral Chassis.

13. Connect the user-provided dc power cable between the additional Winchester drive and the unused 9-pin Molex connector on the power supply (connector P5 in Figure 6-7) within the Peripheral Chassis. Refer to Figures 6-10 and 6-15 for a PRIAM Winchester drive cabling diagram and to Figure 6-4 for a connector pin assignment listing.

14. Connect the daisychained signal cable to both drives. This step must be performed in two separate operations, as follows:

- First, plug the daisychain cable connector at the end of the cable (that was installed onto the original drive) onto the front of the additional Winchester drive.

- When the previous step is done properly, a second connector on the daisychain cable will align itself with the connector on the front of the existing drive. Seat this connector onto the existing Winchester drive.

15. Slide each drive fully into the Peripheral Chassis and secure each with 3 hold-down screws.

16. UNLOCK the shipping restraint on all Winchester drives, allowing the heads to load when directed. Refer to Section 2.5 for the procedure.

17. Replace the top cover onto the chassis, reconnect the power to the chassis, and run the System 86/380 diagnostics to ensure the integrity of the Winchester drives.
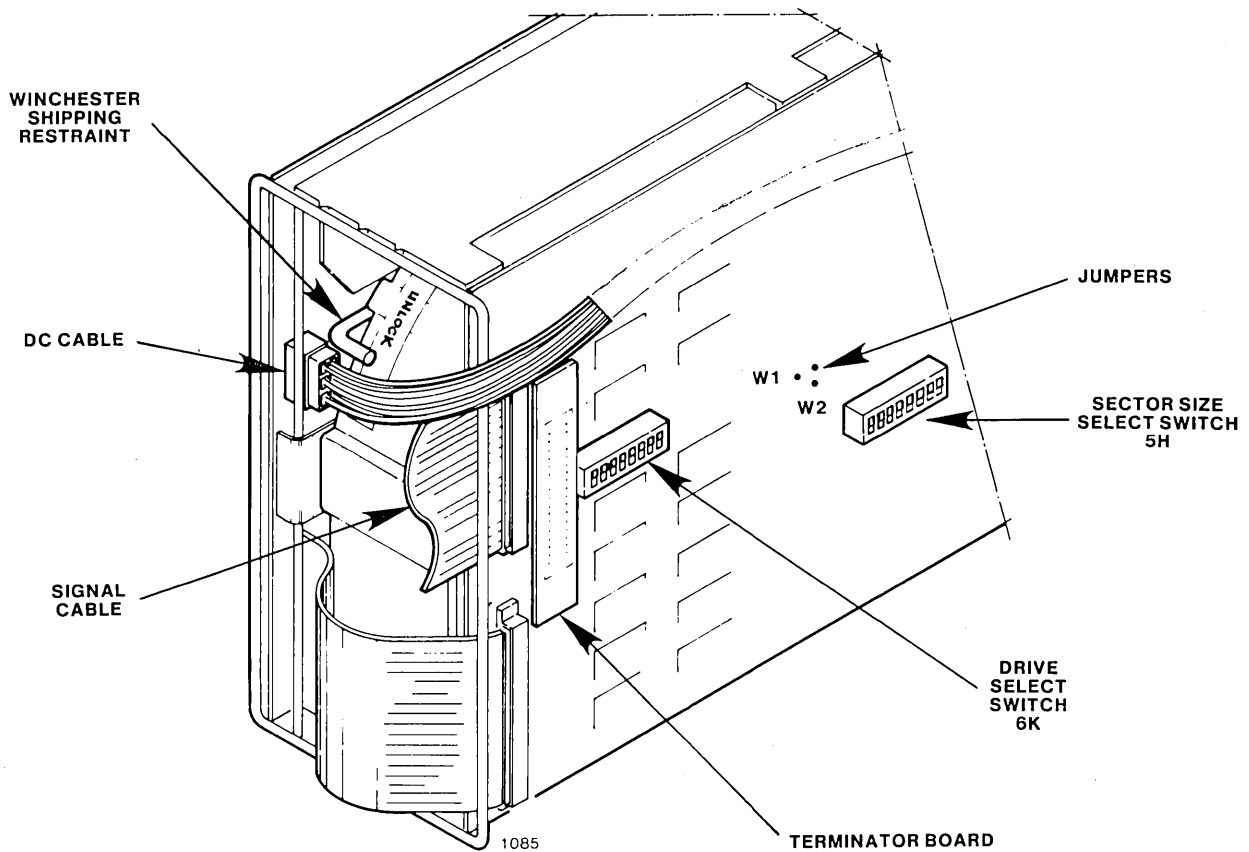

Figure A-1. Drive Select and Terminator Location (PRIAM drive)

***

APPENDIX B. INSTALLING ADDITIONAL FLOPPY DISK DRIVES

The System 86/380 accepts installation of one additional floppy disk
drive in the left-most bay (as viewed from the front) of the Peripheral
Chassis. The existing floppy disk drive is installed into the right-most
bay of the Peripheral Chassis and is assigned drive number 0. When
installing the second floppy disk drive, you must configure it as another
device number. The procedure for installing an additional floppy disk
drive is as follows:

1. Turn the AC power switch on the Peripheral Chassis to OFF.

WARNING

Hazardous voltages are present within
the chassis whenever the AC power cord
is connected to a power source. Do not
attempt to service any subassembly
within either chassis if AC power is
applied to the chassis.

2. Disconnect the AC power cord on the Peripheral Chassis from the
power source.

3. Remove the top cover from the Peripheral Chassis (refer to
Section 4.4.1.2).

4. Remove the front panel from the front of the chassis (refer to
Section 4.4.1.1).

5. Remove the two filler panels from the front of the chassis (refer
to Section 4.4.1.3).

6. Remove the three screws securing the existing floppy disk drive
to the chassis (refer to Figure 4-7 for locations).

7. Slide the existing floppy drive forward to provide more working
room in the rear of the Peripheral Chassis.

8. From the front, LOCK the heads on the existing Winchester drive
(refer to Section 2.5 for the procedure).

9. Remove the three screws securing the Winchester drive into the
Peripheral Chassis and slide the drive forward to provide more
room for working with the cables on the rear of the floppy
drives. Refer to Figure B-1 for approximate locations of the
cables.

10. Remove the terminator resistor pack installed at IC location 5E on the additional floppy disk drive (refer to Figure B-1 for an approximate location).

11. Ensure that a comparable terminator resistor pack is installed into the existing floppy disk drive.

NOTE

The terminator pack is required on only the last drive on the daisychain cable. (In this instance, the existing drive is configured as device number 0, the "last" drive in the system.) Each floppy drive normally contains a resistor pack when it is shipped from the factory.

12. Assign an address to the additional floppy disk drive. This is done by positioning the drive address select jumpers located as shown in Figure B-1. There are four allowable addresses for a floppy drive in the System 86/380; one of them, device number 0, is used by the existing drive. These four addresses conform with the maximum limits for the daisychaining of drives. The possible drive address are as follows:

Jumper Plug	Position	Drive Address Selected
DS1	in, all others out	0 (Default in System 86/380)
DS2	in, all others out	1
DS3	in, all others out	2
DS4	in, all others out	3

When expanding the System 86/380 to include two floppy drives, you should reconfigure the additional drive as device number 1 and leave the existing drive as device number 0.

NOTE

You may be required to perform additional drive set-up functions, depending on the type of user-provided floppy disk drive installed into the system.

13. Remove the additional drive mounting plate from inside the chassis and install it onto the bottom of the additional floppy drive. Refer to Figure 4-8 and associated text.

14. Then, from the front, slide the additional floppy drive about half way into the empty bay within the Peripheral Chassis.

15. Connect a user-provided dc power cable between the additional floppy drive and the unused 9-pin Molex connector on the power supply within the Peripheral Chassis and a user-provided, 3-pin, ac power cable between the additional floppy drive and the terminal barrier strip (TB1). Refer to Figures 6-11, 6-12, 6-13, and 6-14 for floppy drive cabling diagrams.

16. You will find another connector on the daisychained signal cable for the existing floppy drive that will align itself readily with the connector on the additional drive. Seat this connector onto the additional floppy drive and ensure that pin-1 of the cable connector is connected to pin-1 of the drive connector.

17. Slide all drives fully into the Peripheral Chassis and secure each with 3 hold-down screws.

18. UNLOCK the heads on the Winchester drive.

19. Replace the top cover onto the chassis, reconnect the power to the chassis, and run the System 86/380 diagnostics to ensure the integrity of the floppy drives.
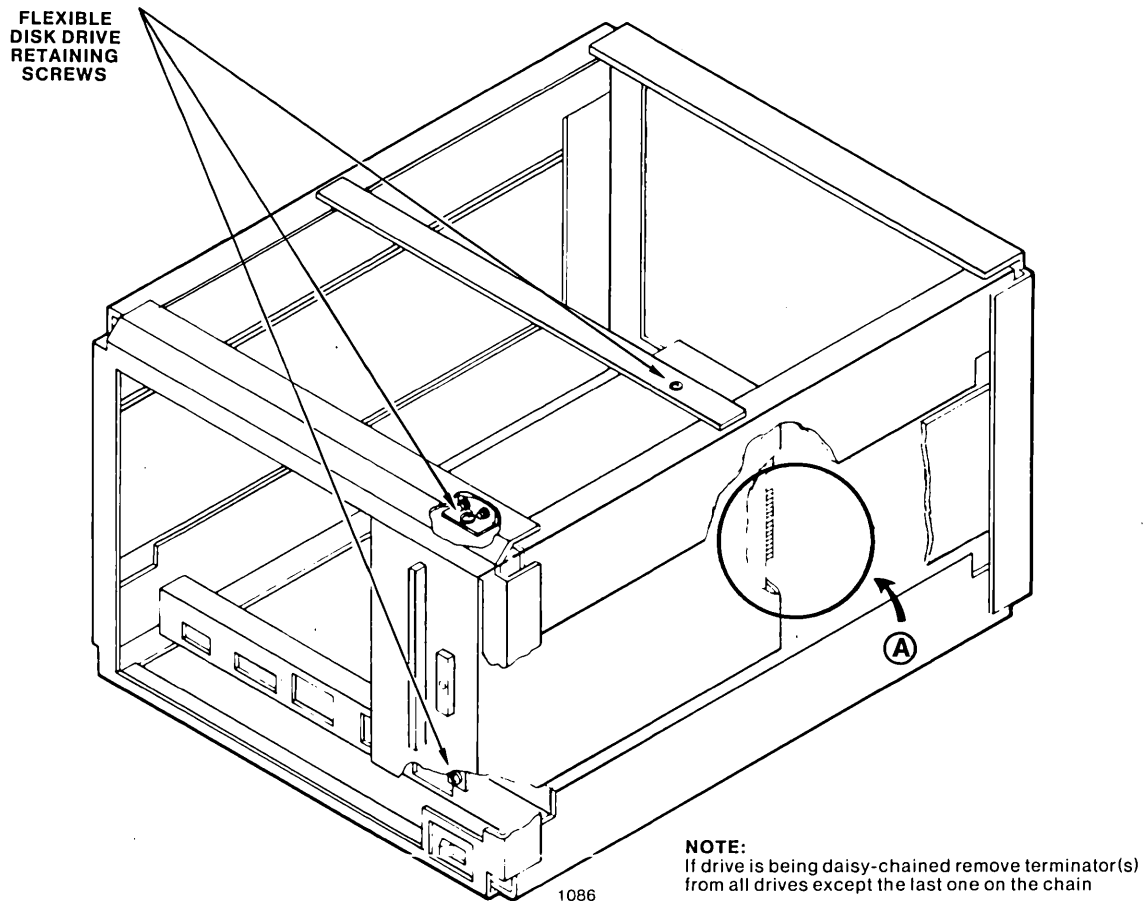
FLEXIBLE
DISK DRIVE
RETAINING
SCREWS

NOTE:
If drive is being daisy-chained remove terminator(s)
from all drives except the last one on the chain

1086

Figure B-1. Drive Select and Terminator Location

RESISTOR PACK
LOCATION

View (A)

1095

JUMPER INSTALLED
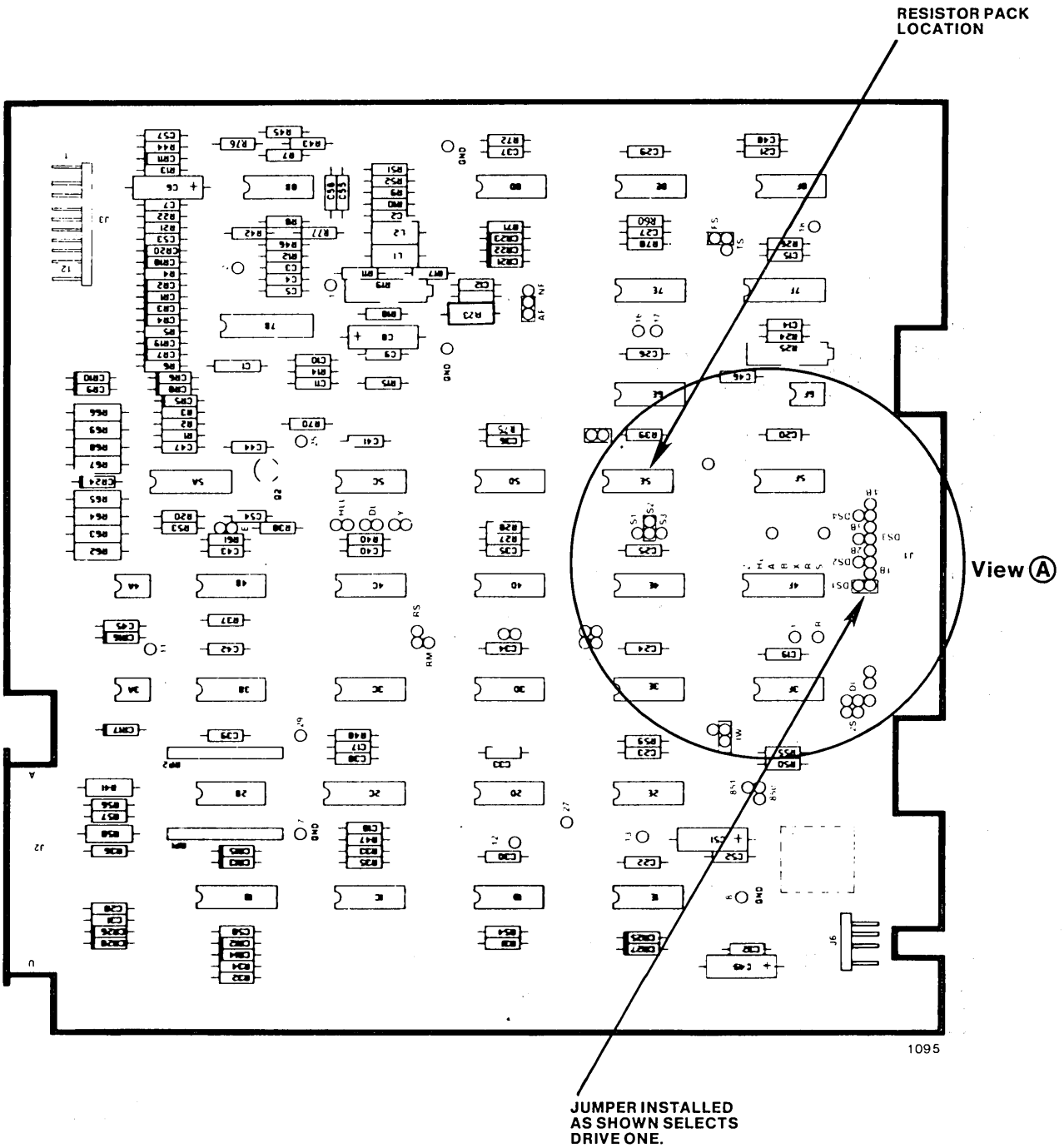AS SHOWN SELECTS
DRIVE ONE.

Figure B-2. Jumper Locations On Floppy Disk Drive (PRIAM 3450)

***

APPENDIX C.   UPCOPY AND DOWNCOPY WITH THE SYSTEM 86/380

This appendix provides the information that an Intel customer needs in
order to copy files between the System 86/380 and an Intel Microcomputer
Development System. The customer must modify the parallel port on the
iSBC 86/30 Single Board Computer within the Processor Chassis in the
System 86/380 and connect the parallel port from the iSBC 86/30 board to
the Intel Microcomputer Development System.

NOTE

When the parallel port is modified, the
system will not run the System
Confidence Test, the System Analysis
Test and the System Diagnostic Test
software as intended. It is
recommended that you reconfigure the
System 86/380 to its as-shipped
configuration when you complete the
UPCOPY/DOWNCOPY operation.

To reconfigure the System 86/380 for an UPCOPY or DOWNCOPY sequence with
an Intel Microcomputer Development System, you must remove and
reconfigure the jumpers on the iSBC 86/30 Single Board Computer. A
detailed procedure is as follows:

1. Turn the AC power switches on the System 86/380 and the Intel
    development system to OFF.

WARNING

Hazardous voltages are present within
the chassis whenever the AC power cord
is connected to a power source. Do not
attempt to service any subassembly of
the chassis while the AC power cord is
connected.

2. Disconnect the AC power cord on the Processor Chassis from the
    power source.

3. Remove the top cover from the Processor Chassis (refer to
    paragraph 4-21).

4. Remove the hold-down clamps securing the boards into the cardcage
    in the Processor Chassis; refer to Figure 6-16, sheet 2, items 78
    and 88.

5. Disconnect the two cables from the iSBC 86/30 board within the cardcage.

6. Remove the iSBC 86/30 board from the cardcage.

7. Reconfigure the iSBC 86/30 board for an upcopy/downcopy operation by removing and installing the following jumpers:

Jumper	Function
E61-E52	Remove
E48-E57	Remove
E46-E55	Remove
E50-E59	Remove
E60-E63	Remove
E53-E48	Install
E59-E44	Install
E45-E50	Install
E46-E51	Install
E50-E52	Install

8. Remove the 7438 device installed in IC location U19 on the iSBC 86/30 board.

9. Install the Status Adapter Board (part of the iSBC 957B Monitor) into IC location U19 on the iSBC 86/30 board.

10. Install the iSBC 86/30 board into slot J3 of the Processor Chassis.

11. Connect the parallel cable between the UPP port on the rear of the Intel development system and the parallel edge connector J1 on the iSBC 86/30 board.

12. Place the cable within the System 86/380 so that it hangs neatly over the top edge of the chassis and reinstall the top cover onto the Processor Chassis. Plug the power cord in, and power-up the System 86/380 and the Intel development system.

13. Insert a system disk into the Intel development system drive zero and the iSBC 957B Loader diskette (included as a standard part of the System 86/380) into drive one of the Intel development system.

14. Press the RESET switch on the Intel development system to load the operating system. If using an iMDS-800 Development System, bootload the development system.

15. Press the RESET switch on System 86/380 (Processor Chassis). A series of asterisks on the CRT indicates that the baud rate search program is operating in the System 86/380.

16. Type the following message on the Intel development system:

    :F1:APXLOD   <cr>

    The display of asterisks on the System 86/380 should stop and the CRT on the Intel development system should display:

    ISIS-II iAPX 86, 88 Loader, Vx.y

17. Wait approximately 10 seconds, then press the INTRPT switch on the System 86/380. The Intel development system should display:

    *Break * at <xxxx.xxxx>

    where: <xxxx.xxxx> is a break address.

18. At the development system, enter the following:

    b

    This bootstrap loads the iRMX 86 Operating System into the System 86/330A Microcomputer System. After loading has completed the Operating System displays a sign-on message (and in some cases asks you for additional information; respond as appropriate).

19. At this point you may execute an UPCOPY or DOWNCOPY operation by issuing commands at the keyboard on the System 86/380.

20. To UPCOPY a file from the Intel development system disk to a disk drive in the System 86/380, enter the following at the keyboard on the System 86/380:

    UPCOPY filename TO pathname

    The file with the given ISIS-II filename is copied to the System 86/380 and is assigned the given iRMX 86 pathname. Refer to the iRMX 86 OPERATOR'S MANUAL for more information about the UPCOPY command.

21. To downcopy a file from a disk drive in the System 86/380 to an ISIS-II file in the Intel development system, enter the following at the System 86/380 terminal:

    DOWNCOPY pathname TO filename

    The file with the given iRMX 86 pathname is copied from the System 86/380 to the Intel development system and is assigned the given ISIS-II filename. Refer to the iRMX 86 OPERATOR'S MANUAL for more information.

22. At this point, the file is copied and assigned a filename, or a pathname, depending on the direction of the copy. Power down the system and reconfigure it to its original configuration.

23. Remove power from both systems. Then, disconnect the AC power cord from the Processor Chassis, disconnect the cable from the parallel port on the iSBC 86/30 board, and remove the iSBC 86/30 board from the Processor Chassis.

24. Reconfigure the jumpers on the iSBC 86/30 board as they were before step 8 of this procedure. Perform the reverse of the instructions listed for step 8.

25. Remove the Status Adapter Board (part of the iSBC 957B Monitor) from IC location U19 on the iSBC 86/30 board and reinstall the 7438 device into U19. Then, reinsert the iSBC 86/30 board back into the Processor Chassis.

26. Reassemble the System 86/380 and run the diagnostics to ensure system integrity.

NOTE

When the operating system is loaded
from the System 86/380 with the
parallel interface installed, the line
printer interface will not work.

***

APPENDIX D. FLOPPY DISK DRIVE CONVERSION FROM 60HZ TO 50HZ

This appendix provides information required to convert a floppy disk
drive from 60Hz to 50Hz operation. This procedure is not required for
System 86/380 units built for shipment to Japan; these systems already
have 50Hz drives. The conversion is intended for units which must be
converted to operate in an environment that is different than the current
configuration (50Hz/60Hz). The procedure consists of changing the drive
pulley and the drive belt on the floppy disk drive and is outlined in the
following steps.

1. Turn AC power switch on the Peripheral Chassis to OFF.

WARNING

Hazardous voltages are present within
the chassis whenever the AC power cord
is connected to a power source. Do not
attempt to service any subassembly of
the chassis while the AC power cord is
connected.

2. Disconnect the AC power cord from the power source.

3. Remove the top cover from the Peripheral Chassis (refer to
    section 4.4.1.2).

4. Remove the front panel from the Peripheral Chassis (refer to
    section 4.4.1.1).

5. Disconnect the cables and remove the floppy disk drive from the
    Peripheral Chassis as described in section 4.4.1.7.

6. Remove the screws securing the printed circuit board to the drive
    and remove the printed circuit board; refer to the manual with
    the drive for specific locations and quantities of screws.

7. Remove the three disk drive connectors from the back side of the
    printed circuit board; refer to the drive manual for specific
    information.

8. Remove the drive belt from the floppy disk drive.

9. Loosen the set screw on the motor pulley and remove the motor
    pulley.

10. Replace the 60Hz motor pulley (part number 50358) with a 50Hz
    motor pulley (part number 50357).

11. Replace 60Hz drive belt (part number 50356) with a 50Hz drive belt (part number 50355).

12. Reassemble the drive and reassemble the chassis.

NOTE

When installing a new pulley, the drive pulley must be aligned squarely with the spindle pulley so that the drive belt tracks correctly.

To convert from 50Hz to 60Hz, perform the same steps and install the 60Hz parts identified in steps 12 and 13.

To convert the floppy disk drive from 115 volt to 220 volt operation, you must also replace the floppy disk drive motor. Refer to the drive manual for more information.

***

APPENDIX E. FLOPPY DISK DRIVE HEAD CLEANING

The floppy disk drive read/write heads should be cleaned every 12 months
or 1000 hours of use. The head cleaning is performed by loading the SDT
while a special head-cleaning diskette is inserted into the floppy disk
drive.

The head-cleaning diskette contains 12 discrete bands of cleaning surface
for cleaning the heads on the drive. Each discrete band must not be used
again in another head cleaning operation because it could build up
contamination or damage the heads in subsequent cleaning operations. One
diskette can be used to clean the read/write heads 12 times, after which
the diskette should be discarded.

Keep track of the number of times that the diskette is used by marking on
the diskette after each cleaning session. Each time the cleaning process
is to be performed, increment the cleaning$session$number to ensure that
the heads are in contact with only a clean, lint-free area of the porous
material.

The head-cleaning routine can be invoked by loading the System Diagnostic
Test (SDT) for the iSBC 215 board from the Winchester drive. The
procedure is as follows:

    1. Insert the diagnostic diskette containing the SDT into the floppy
        disk drive and bootload the SDT215 diagnostic test. The SDT215
        prompts for answers to the following questions:

            ENTER A 5 DIGIT DECIMAL RANDOM NUMBER SEED

            WHICH UNIT IS BEING TESTED
                (Enter 1 for floppy)

            IS UNIT 0 BEING TESTED
                (Enter Y or N depending on the address of the unit.
                The standard configuration assigns unit 0 to both the
                floppy and the Winchester drives. If N, the test
                prompts for addresses 1, 2, and 3.)

            IS THIS UNIT BACKED UP
                (Enter Y or N)

            DO YOU WANT TO USE THE INITIALIZATION DEFAULTS
                (Enter Y)

            PASS xx
            iSBC/VERSION Vx.x
            *

2. When the diagnostic places a PASS message onto the CRT screen, you may enter the head cleaning utility by typing:

*INCLUDE ':SD:'

3. Using the Shugart cleaning diskette (Shugart P/N 54612-0). Dispense a moderate amount of cleaning solution onto the diskette surface through the large cutout in the diskette jacket.

4. Remove the diagnostic diskette from the floppy disk drive and insert the cleaning diskette.

5. Invoke the head cleaning procedure as follows:

*CALL .CLEAN (CLEANING$SESSION$NUMBER)

where cleaning$session$number is a decimal number in the range of 1 to 12.

6. The SDT should begin exercising the floppy disk drive. Disregard any FAIL messages appearing on the console. The cleaning process takes about 30 seconds, after which the floppy disk drive will be idle.

The SDT expects the parameter cleaning$session$number to be listed in hexadecimal. If you wish to list the parameter in decimal notation, insert a "T" at the end of the parameter entry. An error message is displayed if the parameter is not within the allowed range (0 to 0FH).

Do not leave the head-cleaning diskette in the floppy disk drive for extended periods of time. Doing so could allow the diskette cleaning solution to dry out, resulting in damage to the heads.

***

The 50-pin printer interface on connector J2 on the System 86/380
Processor Chassis must be modified with a user supplied cable that
connects to a line printer using the standard 36-pin Centronics
interface. Table F-1 lists the signals that the printer expects to find
on the printer-end of the user provided cable.

{ CAUTION }

Failure to modify the pin assignment on
the J2 connector before connecting to a
standard Centronics printer interface
may damage the line printer or the
iSBC 86/30 board.

Table F-1. Centronics Printer Signal Pin Assignment

Pin Number on Connector J2	Signal Name	Pin Number to the Centronics Interface
12	Character Strobe	1
13	Printer Ready (on-line)	13
14	Paper Error (paper out)	12
15	Character Acknowledge	10
17	Data Bit 7	9
18	Data Bit 6	8
19	Data Bit 5	7
20	Data Bit 4	6
21	Data Bit 3	5
22	Data Bit 2	4
23	Data Bit 1	3
24	Data Bit 0	2
26 thru 50	Ground Return	19 thru 29
—	Logic Ground	16
—	Chassis Ground	17

Note: Connector J2 is located on the rear connector panel of the
Processor Chassis.

***

APPENDIX G. SHUGART 850/851 JUMPER CONFIGURATION

The System 86/380 is shipped with a Shugart 850 floppy disk drive that is preconfigured for operation. The configuration includes signal cable termination, drive address selection, and jumper configurations. The configuration of the drive jumpers is listed in Table G-1. For an explanation of the jumper functions, refer to the disk drive maintenance manual.

Table G-1. Shugart 850 Jumper Configurations (as-shipped)

Designator (Fig. B-2)	Description	Configuration When Shipped
5E	Termination (refer to Appendix B)	Installed
DS1	Drive Select 1 input	shorted
DS2	Drive Select 2 input	open
DS3	Drive Select 3 input	open
DS4	Drive Select 4 input	open
1B	Side Select Option Using Drive Select	open
2B	Side Select Option Using Drive Select	open
3B	Side Select Option Using Drive Select	open
4B	Side Select Option Using Drive Select	open
RR	Radial Ready	shorted
RI	Radial Index and Sector	shorted
R at 4F	Ready Output Configuration Switch	shorted
2S	Two-sided Status Output	shorted
850/851	Drive Type Select (Sector Option)	shorted
I at 4F	Index Output Configuration Switch	shorted
S at 4F	Sector Output Configuration Switch	shorted
DC	Disk Change Option	open
HL at 4F	Stepper Power From Head Load	open
DS	Stepper Power From Drive Select	open
WP	Inhibit Write When Write Protected	shorted
NP	Allow Write When Write Protected	open
D	Alternate Input In Use	open
M	Multi-media Option	plug shorted
DL	Door Lock Latch Option	shorted
A at 4F	Radial Head Load Configuration Switch	shorted
B at 4F	Radial Head Load Configuration Switch	shorted
C	Alternate Input Head Load	shorted
Z at 4F	In Use indication from Drive Select	open
Y	In Use indication from Head Load	shorted
S1	Side Select Option Using Direction Select	open

Table G-1.   Jumper Configurations On the Shugart 850 Drive (continued)

Designator (Fig. B-2)	Description	Configuration When Shipped
S2	Standard Side Select Option	plug shorted
S3	Side Select Option Using Direction Select	open
TS and FS	Data Separation Option	TS=open FS=shorted
IW	Write Current Switch	plug shorted
RS	Ready Standard	plug shorted
RM	Ready Modified	open
HLL	Head Load Latch	open
IT	In-use Terminator	plug shorted
HI	Head Loaded or In Use to the In Use Circuitry	shorted to C
F	MFM or M^2FM Encoding Select	open=MFM shorted=M^2FM
AF	Installed for FM or MFM Encoding (on model MLC 10 only)	plug shorted
NF	Installed for M^2FM Encoding (on model MLC 11 and MLC 12 only)	open

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This document is one of a series describing Intel products. Your comments on the back of this form will help us produce better manuals. Each reply will be carefully reviewed by the responsible person. All comments and suggestions become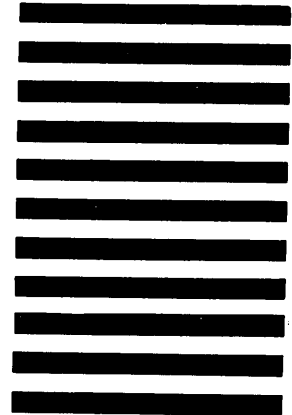 the property of Intel Corporation.