PM-1150/5
Expansion Chassis
Manual

April 1978 - Plessey Peripheral Systems

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SIZE	CODE IDENT NO.	DWG NO.
A	52648	MA 701200
SCALE	REV A	SHEET 0-0

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Preface

This manual provides the information needed to install, operate, maintain, and troubleshoot the PM-1150/5 expansion chassis manufactured by Plessey Peripheral Systems, Irvine, California.

The reader is assumed to have a basic knowledge of digital computer theory and an understanding of the PDP-11 computer with which the expansion chassis is used.

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Section 1
General Information

1.1 INTRODUCTION

This manual provides the information needed to install, operate, maintain and troubleshoot the PM-1150/5 expansion chassis manufactured by Plessey Peripheral Systems, Irvine, California 92714.

The material is arranged into five sections as follows:

Section 1 - GENERAL INFORMATION. This section contains a brief electrical and physical description of system general specifications and configuration.

Section 2 - INSTALLATION. This section provides the information required to install the PM-1150/5 chassis. Installation of backplanes and modules in the chassis is also included.

Section 3 - OPERATION. This section provides information needed to operate the PM-1150/5 expansion chassis.

Section 4 - MAINTENANCE AND TROUBLESHOOTING. This section describes general maintenance and specific troubleshooting procedures.

Drawing Package - A separate drawing package is available. This document contains logic diagram, schematics, and assemblies required for a complete understanding of the chassis and power supply.

1.2 GENERAL DESCRIPTION

The PM-1150/5 expansion chassis is a general purpose add-on chassis suitable for memories and/or controllers which have been designed for all Digital Equipment Corporation (DEC) PDP-11 processors.* The PM-1150/5 chassis provides mounting space for up to six system units (SU) in any configuration. Five sets of power outputs are provided. The chassis also provides forced air cooling for installed modules at each double SU location.

* DEC and PDP are registered trademarks of Digital Equipment Corporation.

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The PM-1150/5 expansion chassis is a stand alone system requiring only a standard Unibus cable for interfacing with the PDP-11 processor.* All interface lines conform to the AC and the DC requirements of the PDP-11 Unibus.

Table 1-1 lists the specifications of the chassis.

1.3 MECHANICAL DESCRIPTION

The PM-1150/5 expansion chassis uses 10.5 inches of standard 19 inch rack. Rack mount slides and mounting hardware are provided with each system.

The PM-1150/5 expansion chassis interfaces to the PDP-11 processor via a flat Unibus cable. The cable enters through a port at the rear of the chassis and is plugged directly into a Unibus slot in one of the installed SU's. Unibus jumpers are available to continue the Unibus to each SU installed. If the Unibus is to be terminated in the chassis, a DEC M930, M9302 or Plessey PM-930 or PM-9302 terminator card should be placed in the last Unibus slot of the last SU.

1.4 COOLING SYSTEM

The PM-1150/5 chassis contains four fans for forced air cooling. Three fans are installed across the backplanes to provide cooling air for the installed modules and a fourth fan is installed in the power supply unit to provide cooling air for the power supply. A removable air filter is mounted at the front of the chassis to provide filtering of the air used in the cooling system. Each fan is rated at 120CFM and is connected to the AC input via the front panel on/off switch.

1.5 CABLE ACCESS

The PM-1150/5 chassis provides access ports for both round and flat I/O and Unibus cables. The flat cable port is provided with a strain relief clamp and provides easy egress for Unibus cables. Access to these ports is by removing the top cover. The round I/O cable port also includes a strain relief clamp and can accept cables up to 1/2" in diameter.

*Unibus is a registered trademark of Digital Equipment Corporation.

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Operating Temperature	0°C to 50°C
Non-Operating Temperature	-40°C to +85°C
Operating Thermal Shock	10°C/hour between operating temperature limits.
Operating Humidity	Up to 95% at 50°C without condensation
Non-Operating Humidity	Between 5% and 95% during shipment or long term storage without damage
Operating Altitude	From -1000 ft. to 10,000 ft.
Shipping Altitude	30,000 maximum without damage
Shipping Shock	In accordance with MIL Specification MIL-STD-810B method 516, procedure V without damage

Table 1-1: PM-1150/5 Specifications

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The last Unibus slot (A and B connectors) of the first installed SU and the first Unibus slot (A and B connectors) of the second installed SU are dedicated to a Unibus cable jumper. This is necessary to provide continuation of the bus. A DEC M9202 Unibus jumper can be used for Unibus continuation or the Plessey PM-9202 can be used.* With three double SU backplanes installed, two Unibus cable jumpers are required: one from slot 9 of the first backplane to slot 1 of the second backplane and one from slot 9 of the second backplane to slot 1 of the third backplane. The last installed SU on the Unibus must either be terminated or designated as Unibus out.

1.6 COVERS

The PM-1150/5 chassis includes top and bottom covers. The top cover removes to allow cable access and installation of the various modules. The bottom cover removes to expose the mounting access and the wire wrap pins of the backplanes and is insulated to prevent accidental shorts. When installed, the covers provide part of the air plenum and serve to prevent debris from falling into the modules.

1.7 POWER SUPPLY

The PM-1150/5 chassis contains a power supply which provides power to the installed modules. The supply is designed with switching regulators and is mounted at the rear of the chassis. It is short circuit and over-voltage protected to guard the installed modules from damage due to excessive voltage excursions,and to protect the power supply from damage due to accidental shorts of any output voltage.

Power supply specifications are as follows:

Input Specification:

Input Voltage	115VAC or 230VAC ± 10% †
Frequency	48 to 63Hz
Load	1200 volt-amps maximum with nominal AC input.

† Input voltage is fixed at assembly time and is not changeable in the field.

*For the PM-9202 Unibus cable, use Plessey part number 700144-107.

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Maximum Inrush Current:

115V range	175A peak for 10ms maximum at 115V line.
230V range	80A peak for 10ms maximum at 230V line.
Power Factor:	0.70 minimum for either input range
Fuse Rating (fuses located on PM-1150/5 rear panel):	15Amp at 115VAC 7 Amp at 230VAC

Line Noise Toleration:

Single transient without causing excursion of any output voltage from nominal value to beyond specified regulation tolerance	0.2 W-sec at 300V maximum
Single transient without power supply damage	2.5 W-sec at 1000V maximum
Average transient power survival	0.5W-sec maximum
Power Fail	Capable of withstanding power interruptions of any magnitude and duration without damage. Storage time at full load and low line, see Figure 3-3.

Conducted Noise to Line:

10KHz to 3MHz	3VRMS maximum
3MHz to 500MHz	1VRMS maximum
500MHz to 1GHz	0.5VRMS maximum

Output Signals

ACLO — Asserted when the AC input voltage drops below 20% of the rated line voltage.

DCLO — Asserted no less than 5ms after an ACLO occurs.

LTC — A clipped 60Hz logic signal

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Signal Specifications

ACLO and DCLO perform to the following electrical requirements:

True (asserted)	0 - 0.5VDC at 60mA
False	3.5 - 5VDC at -40mA

DC Regulation

With a load current varied from no load to full load and an AC line voltage variation of ± 10%, the maximum variation in DC output voltages is ± 1% per supply output.

Transient Response

Maximum transient voltage variation for each supply output is ±3% with the following load changes:

- +5V supply - change in load current of 4A at 1A per microsecond rate.
- -5VDC and +15VDC supplies - change in load current of 2A at 1A per microsecond rate.
- -15VDC and +20VDC - change in load current up to the rated load at 1A per microsecond rate.

Ripple and Noise

The maximum ripple under all specified AC line and load conditions is 150mV RMS for all supplies.

Current Limiting

Current limiting of 110% to 150% maximum rated load is provided for each output. In the event of overcurrent condition, the output voltage is reduced to limit the current to less than 40% of its specified maximum level.

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Overvoltage Protection

The power supply is overvoltage protected and its high limit response and voltages are as shown in Table 1-2.

OUTPUT VOLTS	TRIP RANGE VOLTS	RESPONSE TIME	PEAK VOLTAGE ALLOWED
-15	-16.5 - 18.5	10ms	20V
+5	6.0 - 7.0	10ms	8V
	+22.0 - 24.0	10ms	26V
	6.0 - 7.0	10ms	8V

Table 1-2: Power Supply Peak Voltage

Power supply output specifications are listed in Table 1-3.

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PARAMETERS	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4	OUTPUT 5
Output Voltage	+5VDC	-15VDC	+15VDC	+20VDC	-5VDC
Output Current	71ADC*	10ADC	3ADC	8ADC	4ADC
Output Voltage Adj. Range	±10%				
Line Regulation	0.4%				
Load Regulation for current step % of load	3% peak 30%	1.5% peak 80%	3% peak 30%	3% peak 30%	3% peak 30%
Thermal Overload Protection	Provided				
Storage Time	See Fig. 2-1				
Remote Turn On/Off	Closure of one remote, floating low-power switch energizes all outputs.				
Turn On/Off Overshoot	10% maximum				
Overvoltage Protection (input/Output)	Trips at nominal 20% overvoltage				
Overload Protection	Not to exceed 140% rated output current				
Temp Coefficient	Standard Commercial				

Table 1-3: Power Supply Output Specifications

* Total output power must not exceed 680 watts at 40°C. For operation above 40°C derate at 10 W/°C.

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Section 2
Installation

2.1 INTRODUCTION

This section provides information for installation of the PM-1150/5 chassis.

The PM-1150/5 chassis is designed to be mounted in a standard 19-inch rack. An 8 foot power cord terminating in a standard UL approved connector is wired to the power supply. A removable air filter is located in the front bezel. All air used in cooling the installed modules draws through this filter.

Installing the PM-1150/5 chassis normally involves unpacking it, placing it in a rack, installing SU backplanes, installing modules in the backplanes, and installing Unibus jumpers.

2.2 UNPACKING AND INSPECTION

Remove any packing material and visually inspect for physical damage. Check all hardware attaching the various assemblies.

Inspect the power output plugs located on the bottom of the power supply assembly. If the box is shipped with backplanes already installed, verify that the power cables from the backplanes to the power supply are tightly secured to provide good contact.

2.3 BACKPLANE INSTALLATION

The PM-1150/5 chassis is designed to accept Plessey or DEC System Unit (SU) backplanes. The power cables which plug into the output connectors located at the bottom of the power supply assembly are routed to the SU backplanes and attach to these backplanes using Faston receptacles. These power cables are not included with the PM-1150/5 but are included with each SU backplane ordered.

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Backplane Installation

Remove the bottom cover, install the backplane onto the mounting rails with the "A" connector closest to the power supply. Tighten the mounting screws provided in the backplane assembly. Connect the power cable to the power distribution panel. Replace the bottom cover. Remove the top cover and install the Unibus jumper to the adjacent backplane and terminate or continue the Unibus to other devices.

2.4 RACK MOUNTING INSTRUCTIONS

The PM-1150/5 can be mounted in a standard 19 inch rack. Each unit is shipped with rack slides and all necessary mounting hardware.

1. Remove the left and the right slide brackets from the system box by pulling the slide brackets all the way out, and pushing on the spring bar to release the slide bracket.

2. Mount rear mounting brackets onto the rear of the slide brackets. Use pan head 10-32 screws.

3. Mount right and left slide brackets, both front and back, onto the standard 19 inch rack.

4. Lift the PM-1150/5 and align it with the mounted slide brackets, then slide it into the rack until the spring bars lock-in.

2.5 INTERFACE INFORMATION

The chassis interfaces with the PDP-11 processor via the flat Unibus cable (see Table 2-1). The cable enters and exits from right and left sides on top of the power supply assembly. If the PM-1150/5 chassis is connected at the end of the Unibus, it must be terminated using either the DEC M9302 or M930, or the Plessey PM-9302 or PM-930 terminator cards. If the Unibus is to be continued to other devices, another Unibus cable must exit from the PM-1150/5 box. All Unibus cables and SU backplane units are keyed and extra care must be taken to make sure that both male and female keys are aligned when installed.

When using DEC or Plessey SPC backplanes, a Plessey Bus Grant Continuity Card must always be plugged into slot D with the jumpers facing the pin 2 side. Figure 2-1 illustrates Unibus cable pin assignments. Interface signals are listed in Table 2-2.

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VERSION	LENGTH IN INCHES
701392-100	12
701392-101	24
701392-103	60
701392-104	102
701392-105	114
701392-106	120
701392-107	162
701392-108	300

Table 2-1: Unibus Cable Options

NAME	NO. OF LINES	FUNCTION
ADDRESS	18	Memory and device selection
DATA	16	Information transfer
CONTROL	2	Type of data transfer
MASTER SYNC SLAVE SYNC	1 1	Timing control for data transfer
PARITY	2	Byte parity error indication
BUS REQUEST BUS GRANT	4 4	Priority bus control
NON-PROCESSOR REQUEST NON-PROCESSOR GRANT SLAVE ACKNOWLEDGE	1 1 1	DMA Bus Control
INTERPUPT	1	
BUSY INITIALIZE	1 1	 Reset System
AC LINE LOW DC LINE LOW	1 1	Power Detection Power Detection

Table 2-2: Interface Signals

* Unless otherwise specified, a 701392-105 cable is supplied with the PM-1150/5RP.

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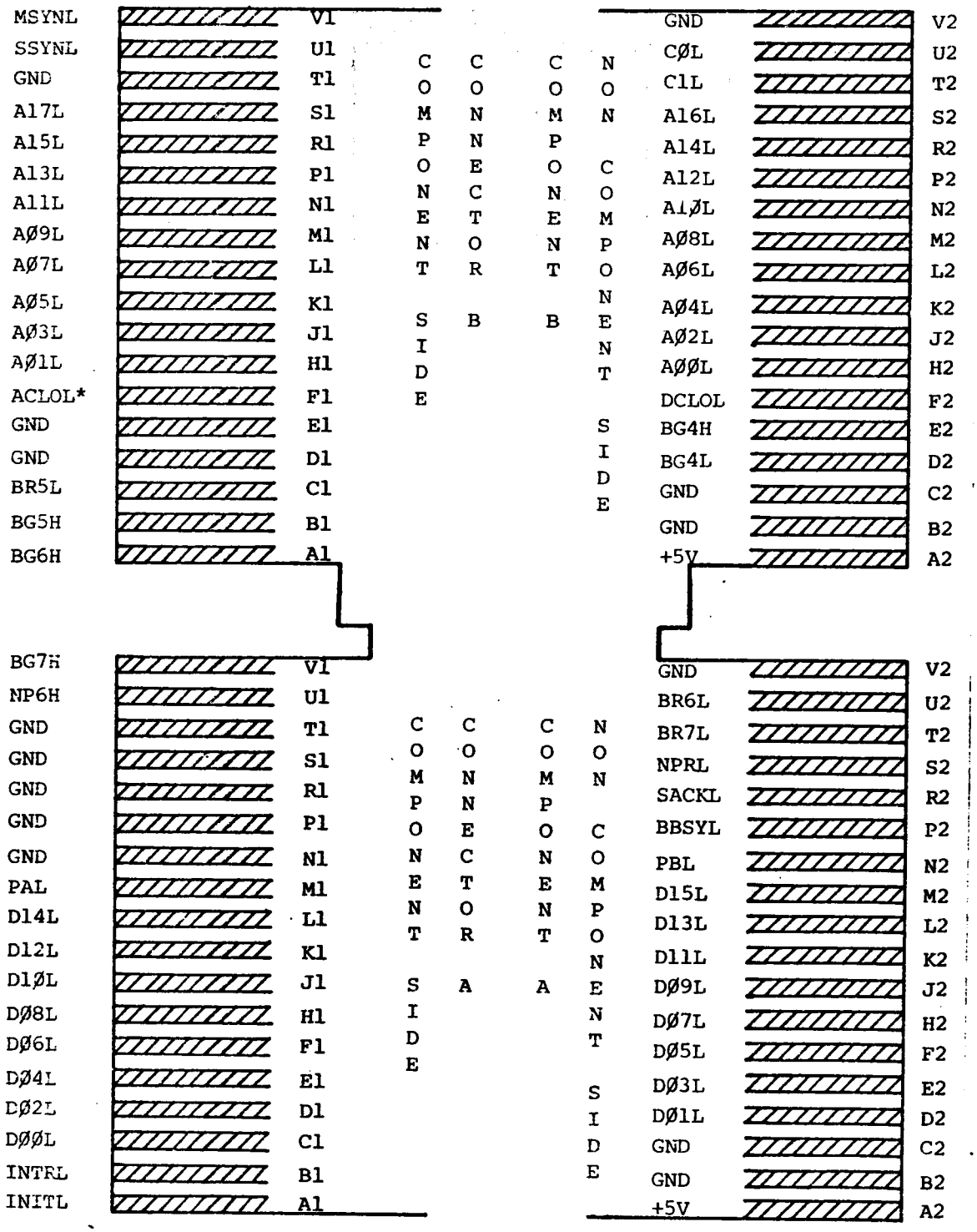


Figure 2-1: Unibus Cable

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Section 3

Operation

The PM-1150/5 expansion chassis is a stand alone system. It needs only a Unibus cable to interface with the PDP-11 processors. Located in the front bezel of the chassis is a removable air filter to provide clean air for cooling units that are plugged into the SU backplanes.

The front panel includes an on-off power switch. Two AC fuses, one for each side of the AC line, and a main power switch are located at the rear of the chassis.

CAUTION

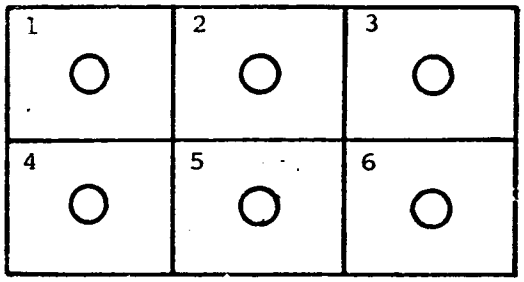
The front panel switch does not disconnect the AC mains from the power supply. Be sure the AC power is disconnected before servicing the unit.

3.1 POWER SUPPLY DESCRIPTION

The power supply is located at the back of the PM-1150/5 expansion chassis. It interfaces with the SU backplanes through dual 15 pin and 6 pin female connectors. There are a total of five sets of output connectors in parallel. Each SU backplane is supplied with a power cable and a male connector set that interfaces with one of the five female connector sets which are located at the bottom of the power supply unit. Figures 3-1 and 3-2 illustrate the 6 pin and 15 pin power connectors.

The power supply is short circuit protected and therefore any accidental shorts of any output voltages should not cause circuit or component damage in the power suply. However, when measuring voltages or when adjusting the power supply use caution.

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Six pin power supply output connector.

PIN ASSIGNMENTS

PIN NUMBER	SIGNAL
1	LO GND
2	LTC
3	DCLO
4	ACLO
5	NOT USED
6	NOT USED

Figure 3-1: Six Pin Power Connector

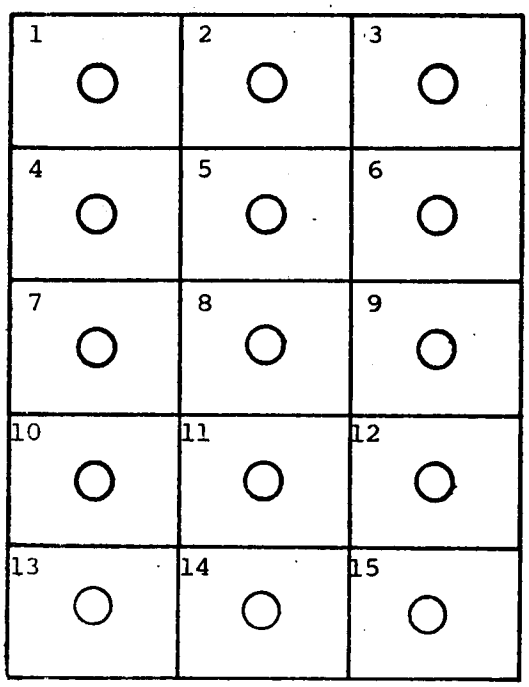
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PIN ASSIGNMENTS

PIN NUMBER	SIGNAL
1	+5V
2	+15V
3	+20V
4	+5V
5	GND
6	+15V
7	GND
8	GND
9	GND
10	NOT USED
11	GND
12	+5V
13	-15V
14	-5V
15	-15V

Figure 3-2: Fifteen Pin Power Connector

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15 Pin Power Supply Output Connector.

(Figure 3-2 continued)

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3.2 UNIBUS

The PM-1150/5 chassis interfaces with the PDP-11 processor via the Unibus lines. These 56 lines consist of address lines, data lines, and control lines. DEC specifies the total length of the Unibus cable not to exceed 50 feet. The cable must always be terminated at the end of the line where the last device is connected.

Communication between two devices on the Unibus is a master-slave relationship. The device that controls the bus is called the bus master and the device that communicates with the bus master is called the slave. In order for a device to become a bus master, it must initiate a bus request command. There are five bus request lines. They are listed in the order of their priorities as follows:

Non-Processor Request	NPR
Bus Request 7	BR7
Bus Request 6	BR6
Bus Request 5	BR5
Bus Request 4	BR4

When more than one device is connected to the same bus request line, the device electrically nearer the processor has a higher priority than the device further away. The processor priority is set under program control. Any request on a priority level equal to or lower than the one to which the processor is set, is ignored.

When a bus request signal is generated on the bus request line, or when a bus request is generated on the non-processor request line (NPR), the processor responds with a bus grant signal (BG), or with a non-processor grant signal (NPG). The device in return asserts selection acknowledge (SACK). If SACK is not received within 10μs, a time-out occurs and the bus grant is cleared automatically by the processor. The device must wait until bus busy (BBSY), bus grant (BG) and slave sync (SSYN) are cleared at the end of the previous data transfer. When BBSY, BG, and SSYN are cleared, the device has control of the bus. It asserts the bus busy (BBSY) and interrupt (INTR) lines.

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An interrupt is made only if the bus control has been gained through the bus request lines (BR7-BR4), a non-processor request (NPR) does not use interrupt. Each device has its own interrupt vector. The first 1000 octal locations in the address map are reserved for trap and interrupt vectors. Locations 0 through 37 are used for trap vectors for internal processor use only. Locations 40 through 57 are reserved for use as system software communication words, and the remaining locations are used for device interrupt vectors.

3.3 PRIORITY CHAIN INTERRUPT

Electrical chaining of devices is used by the PDP-11 to assign another level of priority within each priority line. This priority is highest for the device next to the processor and is diminished with an increase in distance from the processor.

Each priority grant line (BG4-BG7) enters and exits each device starting with the device next to the processor. When a bus grant line is asserted, the signal goes first to the device nearest the processor. If this device has not issued a bus request, the bus grant signal continues to the next device and so forth down the line. After the bus grant reaches the requesting device, the bus grant line is blocked from continuing to other devices.

When boards are installed or removed from the PM-1150/5 chassis, it is necessary to keep the program priority chains uninterrupted. The program priority bus grant lines enter each board slot at one pin and exit at another pin as shown in Table 3-1.

PRIORITY LINE	SU BACKPLANE PIN NUMBER
BUS GRANT 7 IN	DK2
BUS GRANT 7 OUT	DL2
BUS GRANT 6 IN	DM2
BUS GRANT 6 OUT	DN2
BUS GRANT 5 IN	DP2
BUS GRANT 5 OUT	DR2
BUS GRANT 4 IN	DS2
BUS GRANT 4 OUT	DT2

Table 3-1: Bus Grant Pin Assignments

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On SU backplanes designed to accept interrupting devices, a Bus Continuity Card must be installed in any unused slots. The Plessey PM-G727 or DEC G727 Bus Grant Continuity Card should be installed in slot D with the jumpers facing side 2 of the backplane connectors. Extra care should be taken to ensure that all pins are properly aligned. If a Bus Continuity card is not readily available, Table 3-1 can be used to install jumper wires onto the pin side of the SU backplane connector. Each bus grant IN line is jumpered to each bus grant OUT line (BG4 through BG7) so that there are four jumpers for each unused slot.

3.4 POWER FAIL SEQUENCE

The PDP-11 power fail sequence uses Unibus lines ACLO and DCLO as follows:

ACLO: AC Line Low. This signal comes from the power supply. ACLO is asserted when the AC input voltage drops below a specified level.

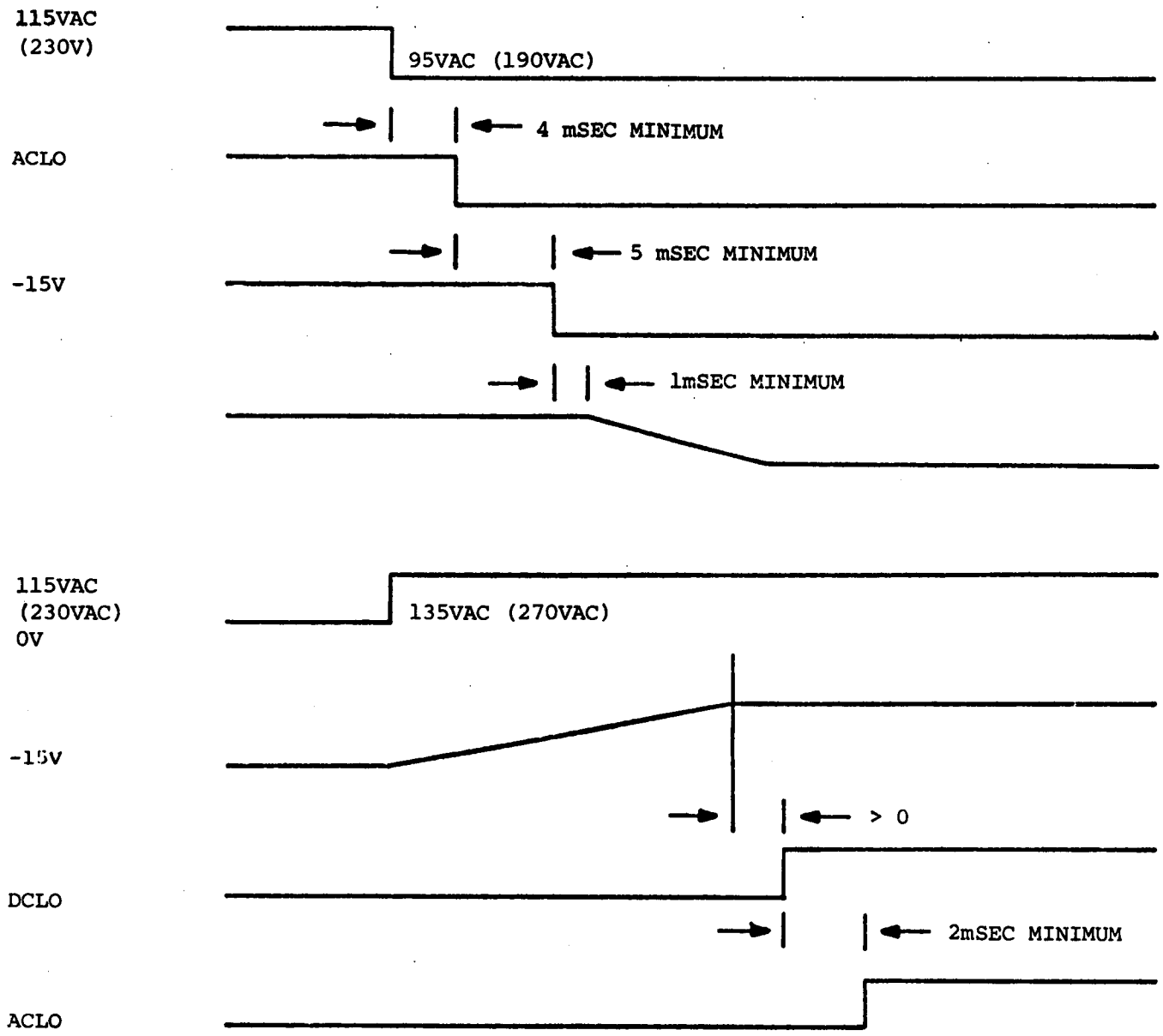
When ACLO is asserted, the power down instruction sequence in the processor begins. The programmer must make sure that the trap vector is loaded with a pointer to the power fail routine.

DCLO: DC Line Low. This signal is asserted by the power supply no sooner than 5ms after ACLO occurs. It causes a halt to all further operations.

ACLO and DCLO occur in the sequence shown in Figure 3-3.

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NOTE: ACLO AND DCLO LEVELS SHOWN INDICATE OUTPUT VOLTAGES (NOT LOGICAL VALUES).

Figure 3-3: Full Load Power Fail Signal Sequence

Section 4

Maintenance and Troubleshooting

4.1 INTRODUCTION

This section describes the procedures for periodic maintenance and troubleshooting the PM-1150/5 chassis.

4.2 AIR FILTER CLEANING

The air filter is located on the front panel and should be removed at least once every 300 operating hours for cleaning. To remove the air filter, use a screwdriver or similar tool, insert it directly into the face of the air filter and lift out.

After the air filter is removed, turn it so that the inside is facing down and tap to loosen accumulated particles. Flush the filter under running water and shake out the excess water. Reinstall when the filter is dry.

4.3 TROUBLESHOOTING THE CHASSIS

When a failure occurs in the PM-1150/5 it is important to isolate the failure to the smallest element possible to expedite repair procedures. The categories of failure include electromechanical failures such as cables, fans, or backplane connectors and electronic failures such as power supplies installed modules, or front panel devices. These elements can then be categorized further as follows:

- Power supply failures such as low output supply, no output supply, or excessive ripple in the supply output. ACLO, DCLO, or LTC signal malfunctions also constitute a power supply failure. Troubleshooting procedures for the power supply are described later in this section.

- Failures caused by installed modules such as backplane units, logic cards, memory cards, cables, etc. These failures usually appear as total or partial system malfunctions. The procedure for troubleshooting this type of failure is contained in the following section.

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4.4 LOCATING A FAULTY MODULE

The information in this section is designed to aid in locating a malfunction in a specific printed circuit board in the SU backplane.

Before attempting to isolate a malfunctioning unit, operate all applicable diagnostics in the system to help define the possible failed unit. Table 4-1 lists the decimal equivalents for the octal locations listed in the diagnostics. Save all relevant hardcopy output to assist further trouble-shooting and repair.

The more common method for locating a failure is to "walk" the error. This is accomplished by interchanging the cards and observing the error mode again. If the error moved when the cards were swapped, it is likely that the moved card is faulty. If the error did not move, the malfunction is probably elsewhere.

OCTAL EQUIVALENT	DECIMAL (APPROXIMATION)
200000	32K
174000	31K
160000	28K
140000	24K
120000	20K
100000	16K
060000	12K
040000	8K
020000	4K

Table 4-1: Octal/Decimal Address Conversion

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If the error disappears when the cards are swapped, this indicates that connector contacts are misaligned or dirty or that there is a loose connection on the card.

LPS instant contact cleaner or alcohol may be used to clean contacts. When printed circuit contacts must be cleaned, hold the card so that the contacts are pointed down and thoroughly saturate the contact area. While the contacts are still wet, scrub with a soft, natural bristle brush.

CAUTION

Do not spray pressurized air directly inside the core matrices of a core module.

When baseplate connector contacts require cleaning, remove the printed circuit board, then clean and rewet the contact area. Insert and then withdraw the board several times or until contacts seem clean. Rewet the contacts and the connector and, using a soft cloth wipe any residue from the board contacts Repeat this sequence if necessary. Use only alcohol on baseplate connectors.

CAUTION

Insertion of objects other than printed circuit boards may destroy contact surfaces or pressure characteristics.

If the malfunction is found to not be in the card, the following procedure is recommended:

1. Check all cables out of the PM-1150/5 chassis. Make sure that all lines are intact—not broken or shorted to each other.

2. Check all DC voltages to the cards on the SU backplane.

3. Check all terminations for the last device on the Unibus.

4. Visually inspect for physical damage to the chassis or installed modules.

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5. Inspect all plugs for misaligned pins, dirty contacts or broken wires. Make sure that all the cards' plug connectors are properly aligned.

CAUTION

It is important to verify that all connectors including the male and female power plugs are properly aligned.

6. Verify that each unused slot has a bus grant continuity card installed in the D connector.

4.5 POWER SUPPLY

Maintenance Procedure

Periodic maintenance consists of careful visual inspection and cleaning. Visual inspection includes checking for loose connections, and for discolored parts and wires. If the supply is operating properly, the visual inspection is performed without the use of tools for prying and moving parts and harnesses for inspection.

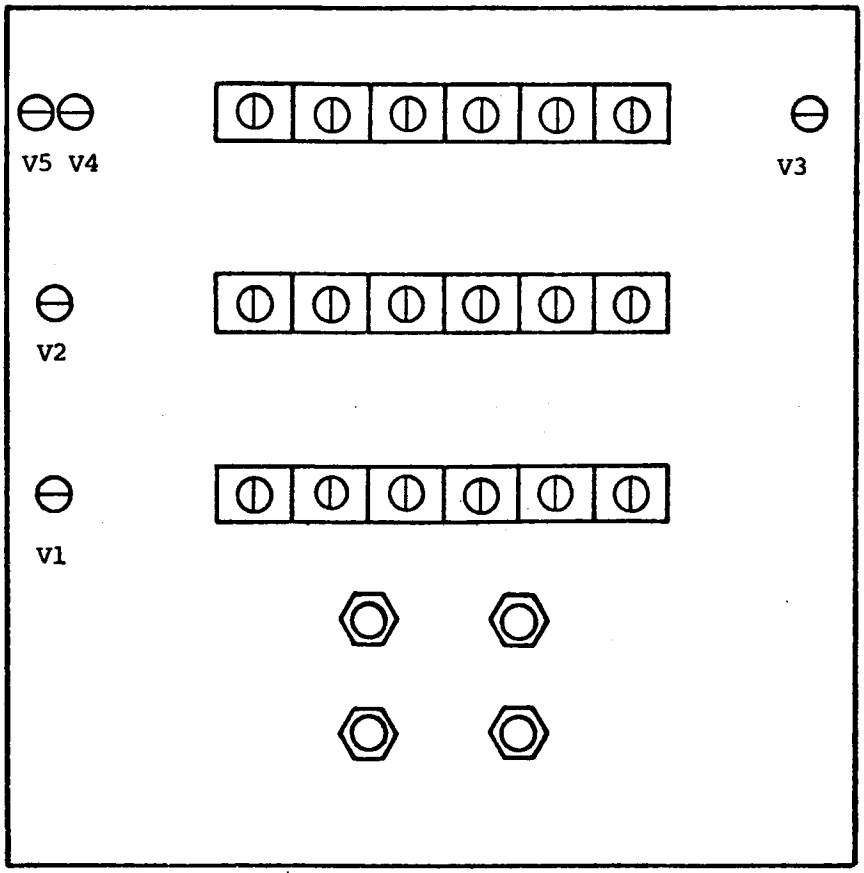
Particular attention should be devoted to cleaning areas where dust accumulations would tend to restrict the flow of cooling air. The safest procedure is to clean with compressed air and soft brushes.

Power Supply Adjustments

All power supply adjustments are set at the factory and should rarely need to be readjusted in the field. If voltages are more than ±10% out of tolerance as listed in Section 1, check the system to see if something other than the power supply is the cause. If it is determined that the supply outputs require adjustment, the adjustment is made using a long insulated screwdriver and a DVM that can measure within 0.1% accuracy from the supply output to the ground.

Extend the chassis on its slides until the entire chassis is beyond the rack. The adjustment access is through the air outlet screen at the left rear of the chassis and through the round cable port at the rear of the chassis. To increase the magnitude of the voltage, turn the pot clockwise. Figure 4-1 shows the location of the adjusting pots.

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V1 = +5V
V2 = +20V
V3 = -15V
V4 = -5V
V5 = +15V

Figure 4-1: Adjusting Pot Locations

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SIZE	CODE IDENT NO.	DWG NO.
A	52648	MA 701200
SCALE	REV A	SHEET 4-5

The chassis is built at the factory to accept 115V or 230V AC inputs and cannot be changed in the field.

The chassis is supplied with two fuses—one on each side of the AC line. The fuse ratings are as follows:

115V chassis	MDA15	15A	250V
230V chassis	MDA7	7A	250V

Power Supply Removal

The power supply should not require removal in the normal course of operation, however, if the power supply requires removal, the following procedure applies.

CAUTION

Be sure that the AC power is unplugged.

1. Remove the bottom cover to expose the power supply mounting screws.
2. Remove the six number 8-32 screws holding the power supply in place. (NOTE: The chassis should be in a vertical position when these screws are removed.)
3. Remove the Unibus cable strain relief bracket over the top of the power supply.
4. Disconnect the AC input coming from the fuse/switch bracket to the power supply.
5. Disconnect all cables going to the power distribution panel including backplane cables and the front panel cable.
6. Carefully lift the power supply assembly from its mounting area. Note that the power supply is an integral part of the assembly.
7. To further disassemble the power supply unit, disconnect the cable harness from the output side of the power supply going to the distribution bus.
8. Remove the two printed circuit board assemblies attached to the outside of the supply.
9. Remove four number 8-32 mounting screws from the rear plate and lift the power supply free.

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