

№ 01125

PDP1134A
power system
description

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1.0 INTRODUCTION

This document is provided as initial information to help the user understand and install an H775 Battery Backup Assembly and the new H7441 and H785 Voltage Regulators used in the PDP1134A power system.

The PDP1134A system is contained in either a 5.25 inch BALL-L Mounting box or a 10.5 inch Mounting Box. The Battery Backup Unit (BBU) is an external assembly to the mounting box and is connected via an interface cable (See Figure 2-6).

NOTE:

Before continuing, the following explanation may be necessary to prevent confusion when discussing the mounting box. The complete mounting box used with the PDP1134A is made up of the following:

- BALL-KA -- Bare sheet metal box (no power supply).
- H765 (120/240 Vac) -- Power Supply (no regulators) refer to NOTE; paragraph 1.5.
- Regulator Units: Refer to Table 1-3.

Because there is no BALL-K designation that defines a complete box in the PDP1134A system, the complete box will be referred to as a 10.5 inch Mounting Box in this document.

The BALL-K box used with the PDP11/34 does not have Battery Backup as an option, therefore it is not mentioned in this description except to differentiate between it and the 10.5 inch box, used with the PDP1134A that does have this option.

NOTE:

References made to the PDP11/34 in this document, will also apply to the PDP11/04.

The options available with the PDP1134A system are listed in Table 1-1 as follows and are defined further in the text.

TABLE 1-1 OPTIONS

<u>OPTION</u>	<u>DESCRIPTION</u>
H775A (BALL-L Box Only)	<ul style="list-style-type: none"> ● Battery Pack ● Battery Charger ● Interface Cable to MOS Regulator
H775BA	<ul style="list-style-type: none"> ● H775A ● Transformer Assembly (120 VAC)
H775BB	<ul style="list-style-type: none"> ● H775A ● Transformer Assembly (240 VAC)
H785	Battery Backup Regulator
H775CA	<ul style="list-style-type: none"> ● H775BA ● H785 ● Extender Cable(H785 to Console)
H775CB	<ul style="list-style-type: none"> ● H775BB ● H785 ● Extender Cable(H785 to Console)

1.1 MOS Memory Refresh (AC)

MOS Memory unlike core memory constantly requires power to maintain its stored information. A system that uses core memory may be powered down and the information stored will maintain its state. MOS memory however, will lose its stored information if power to it is removed. Therefore, in this MOS memory system, to be able to power down and maintain information stored in memory, the ON/OFF/STBY switch must be set to STBY (Standby mode). Refer to STBY switch position below.

NOTE:

MOS memory in this system as of the time of this document includes MS11-E, F, H, and J.

The ON/OFF/STBY switch located on the front panel of the PDP11/34 and PDP1134A CPU Box can be defined as follows:

- ON - All logic and fans are powered.
- OFF - All logic power and fans are off.
- STBY - *(STANDBY) MOS refresh voltage buses are powered. Only fans in the BALL-L Box are powered. All other power is off.

1.1.1 BALL-L Box

In the BALL-L Box, the BBU need not be present for the STBY function to operate. AC input via the power cord is rectified in the H777 power supply and the power for MOS refresh (raw DC) is fed directly to the MOS regulator input.

1.1.2 PDP1134A 10.5 Inch Box

In the PDP1134A 10.5 Inch Box, the AC input for MOS refresh is derived from two sources when the ON/OFF/STBY switch is set to on. The main AC power is brought into the 10.5 inch box, full wave rectified to raw DC and then fed to the H785 MOS regulator. This refresh voltage does not require a BBU in the system.

*This only applies to the BALL-L Box and the 10.5 inch box used in the PDP1134A that has the BBU. In the BALL-K Box and the PDP1134A without BBU, STBY functions as an OFF position.

The PDP1134A system with BBU option has an alternative source of AC input power for MOS memory refresh. With the ON/OFF/STBY switch set to STBY, AC input is brought into the H775, fed to the H785 MOS regulator where it is then rectified to raw DC for MOS memory refresh.

1.2 MOS Memory Refresh (Battery Powered)

The battery pack (Refer to paragraph 1.3 below) provides refresh power to MOS memory in a situation when raw DC goes below a predetermined value such as during an AC power failure. In this situation, with the ON/OFF/STBY switch set to ON or STBY, the battery pack takes over and provides battery input voltage to the MOS regulator for a limited time.

1.3 H775 Battery Backup Option

The H775 BBU is contained in a 5.25 inch high X 19 inch wide X 4.25 inch deep chassis. This size makes it suitable for rack mounting. The BBU contains two 12-Volt batteries (Battery Pack) and a battery charging circuit to keep the batteries fully charged. This option is designed to keep MOS memory alive in the event AC Input power is removed from the system. Should this occur without a Battery Backup unit, information stored in MOS Memory would be lost. The Battery Backup in this case would take over and provide power to MOS memory until the AC input power is either restored or the batteries are dead.

The H775A was designed for the BALL-L Box. It gets its input power for battery charging via the BALL-L Box, thereby eliminating the need for its own AC power cord. Using this BALL-L Box, AC input power is brought into the Box where it is rectified to raw DC. This voltage is then fed via the interface cable to the BBU charging circuit to keep the battery pack fully charged.

In order to use the H775A in the PDP1134A 10.5 inch box, a transformer assembly with an AC line cord had to be added to the BBU. In this system, AC input power is brought into the H775 transformer via its own power cord, fed to the H785 in the 10.5 inch box via the interface cable where it is rectified to raw DC and then returned to the H775 for battery charging.

With the ON/OFF/STBY switch on the front panel set to STBY, the H775 transformer is the only source of power to the 10.5 inch box. The H785 uses this raw DC to provide refresh power to MOS Memory and to keep the battery pack fully charged.

1.4 H7441 and H785 Regulators

1.4.1 H7441 Regulator

There are two H7441 (+5V DC @ 32 Amps) Voltage Regulators contained in the 10.5 Inch Mounting Box for the PDP1134A system. These regulators are an upgrade version of the H744 (+5V DC @ 25 Amps) Voltage Regulators and are designed to be used with the new 5410864-YA power distribution board. This new design is required by the PDP1134A system to supply the extra current needed by the system backplanes.

1.4.2 H785 Regulator

The H785 Regulator is designed to power MOS memory in a PDP1134A MOS memory system and to provide raw DC for the H775 battery charging circuit to keep the batteries charged. The H785 is physically located in the PDP1134A 10.5 inch box. The H775 interfaces with the H785 and may be located anywhere suitable within the limits of the interface cable. The H785 MOS regulator is located in regulator slot #4 when a BBU is present.

1.5 Power System Differences Between PDP11/34 and PDP1134A

The differences between the PDP11/34 and PDP1134A power systems are listed below in Table 1-2. Only specific features that do not exist in, or have been changed from the PDP11/34 system are described.

TABLE 1-2 PDP1134A POWER SYSTEM

<u>FEATURE</u>	<u>DESCRIPTION</u>
1. H785	MOS Memory Regulator: Supplies regulated +15 and -15V DC for MOS memory and +5V DC "B" voltages for backplane modules.
2. H765 (Basic Chassis, see Note below)	Power Supply Assembly: The sheet metal for this assembly has been modified in the PDP1134A with an opening in the rear. This allows the BBU cable to attach to the H785 Regulator.
3. H7441	+5Volt; 32Amp Regulator: Supplies power to backplane modules.
4. 5410864-YA	Power distribution board. This is an upgraded version of the 5410864-0 in that a bus bar has been added to allow distribution of the H785 Regulator "B" voltages. Additional wires have been added to handle 32 Amps from the H7441 Regulators.

NOTE:

The basic H765 power supply chassis consists of the following:

1. AC Input Box Assembly; 120V (7009811-1) or 240V (7009811-2).
2. AC Power Control Board (5410993).
3. Power Distribution Board (5410864-0) or (5410864-YA).
4. AC Power Cord (7012500).
5. +15V DC Power Line Monitor (5411086).
6. Transformer Assembly with fans (7011486).

The H765 chassis with regulator units installed are designated with 70-13323-XX numbers. These numbers represent AC input power and regulator unit configurations as shown in Table 1-3.

TABLE 1-3 REGULATOR UNIT CONFIGURATIONS

<u>P.S. ASSEMBLY</u>	<u>AC INPUT</u>	<u>REGULATORS</u>	
		<u>UNIT</u>	<u>QTY</u>
70-13323-00	120	H745	1
		H7441	2
70-13323-01	120	H745	1
		H7441	2
		H785	1
70-13323-02	120	H745	1
		H7441	2
		H754	1
70-13323-03	240	H745	1
		H7441	2
70-13323-04	240	H745	1
		H7441	2
		H785	1
70-13323-05	240	H745	1
		H7441	2
		H754	1

1.6 PDP1134A Power Distribution

The power distribution board (5410864-YA) in the PDP1134A 10.5 inch box is an upgraded version of the 5410864-0 board used in the PDP11/34 system, and is standard in the PDP1134A. The 5410864-YA was designed to accept a BBU option for MOS memory and to be capable of handling a higher current (32 amps) generated by the H7441 regulators used in the PDP1134A. The power distribution board (YA version) is also part of the FP11-AU upgrade kit required to upgrade the PDP11/34 system to floating point.

NOTE:

There are no arrangements for upgrading the PDP11/34 (10.5 inch box) to include a Battery Backup option.

The 5410864-0 power distribution board was designed to be used with the H744 regulators that generated only 25 amps of current.

The YA version also contains buses for the battery "B" voltages required by the DD11-PK, DK, CK backplanes, where as the 5410864-0 power distribution board does not have these buses. The "B" voltages (+5, -15, and +15) are generated by the H785 voltage regulator and supplied to the power distribution board for MOS memory.

Both the 5410864-0 board (used with H744 Regulators) and the 5410864-YA board (used with H7441 Regulators) distribute the +5V current generated by these regulators. The first regulator (Reg. #2) supplies current to the CPU backplane and the second regulator (Reg. #3) supplies current to all other backplanes.

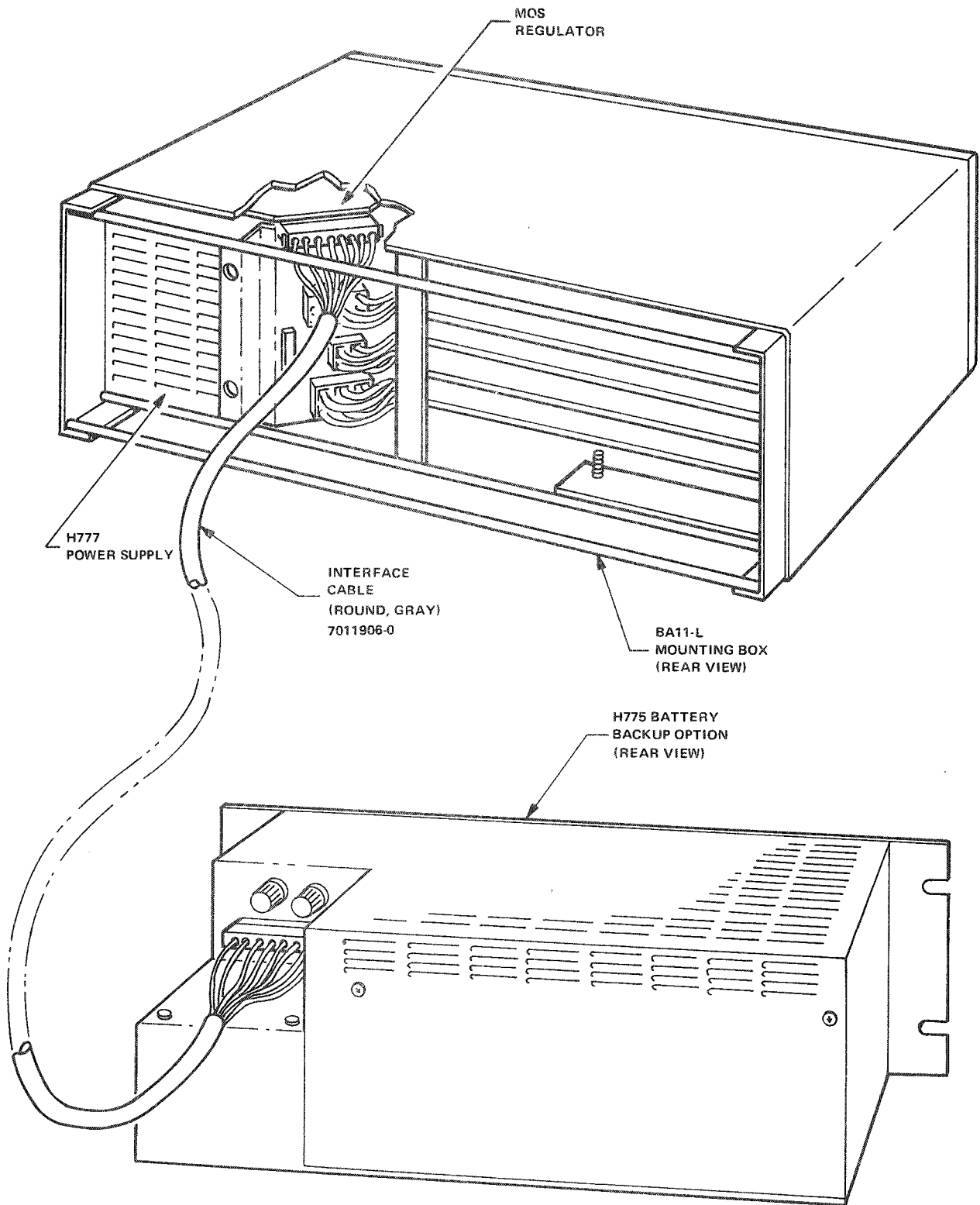
2.0 INSTALLATION

Installation of options are described in this Section along with associated diagrams where applicable. Diagrams are supported with instructions to cover any configuration that the customer may require.

2.1 H775 to BA11-L Installation

Figure 2-1 shows the interconnection between the MOS Regulator in the BA11-L H777 power supply to the H775A Battery Backup option.

The interface cable connectors have locating lugs that insure a correct connection. This cable is shown in Figure 2-6.

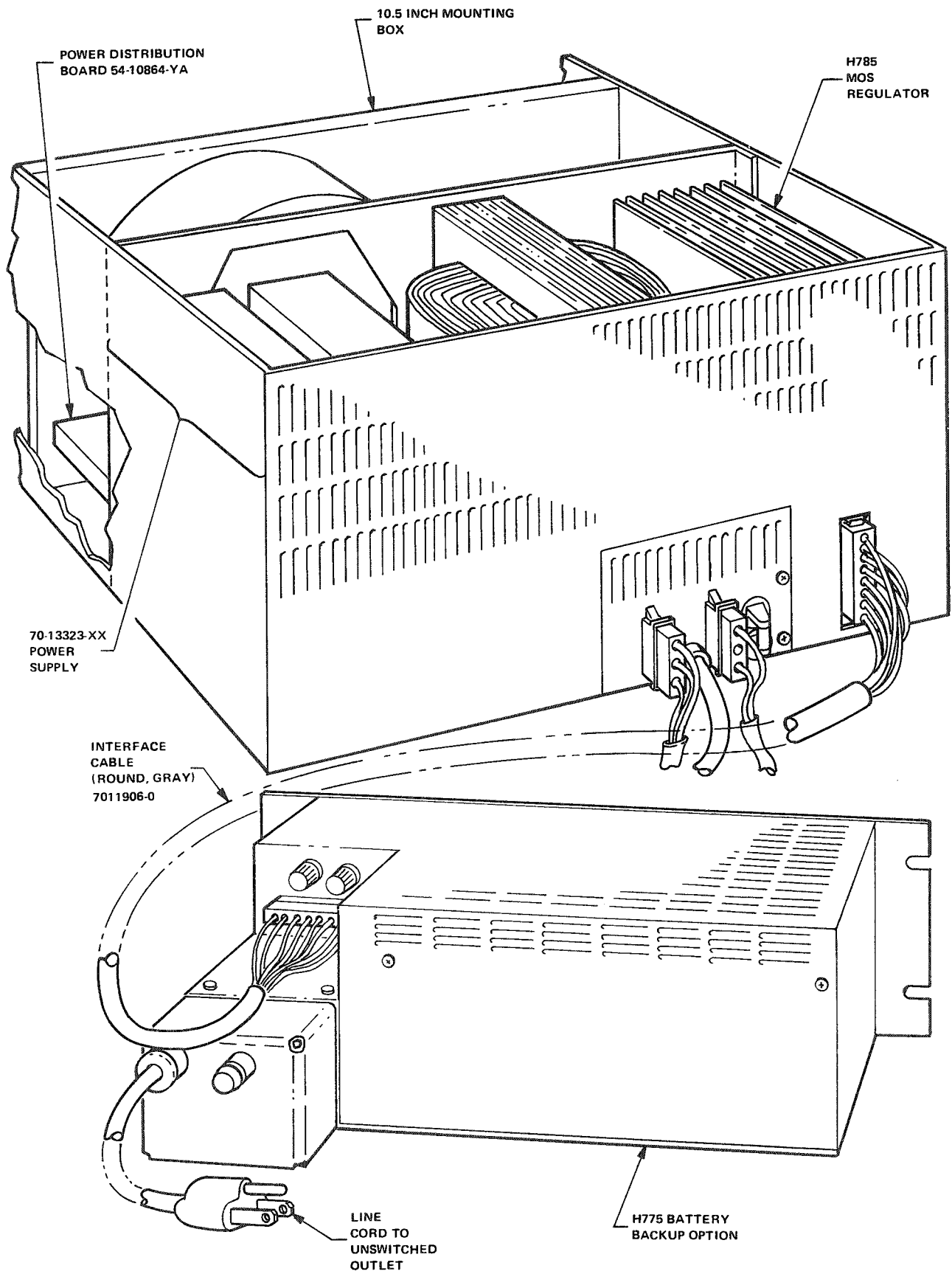


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FIGURE 2-1 H775A TO BA11-L Box Interconnection

2.2 H775CA/CB To PDP1134A 10.5 Inch Box Interconnection

Figure 2-2 shows the interconnection between the H785 MOS Regulator in the 10.5 inch box Power supply connected to the H775CA/CB Battery Backup Option. This interface cable is the same as the one used in the BALL-L system with locating lugs on the connectors to insure a correct connection. This cable is shown in Figure 2-6.

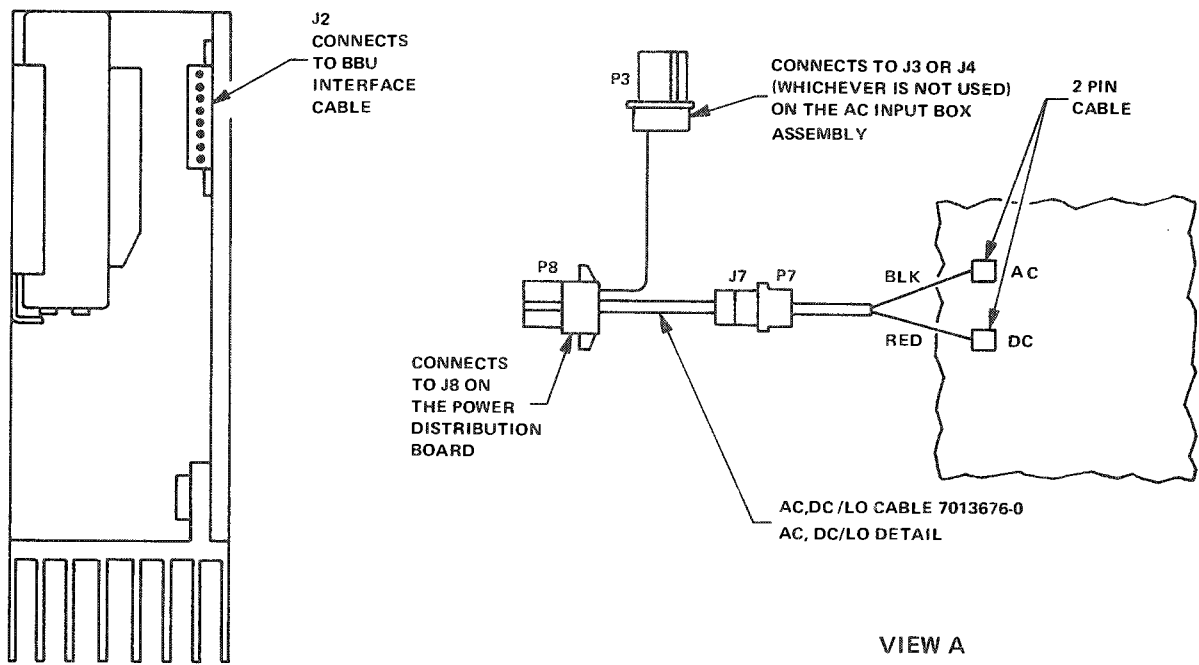
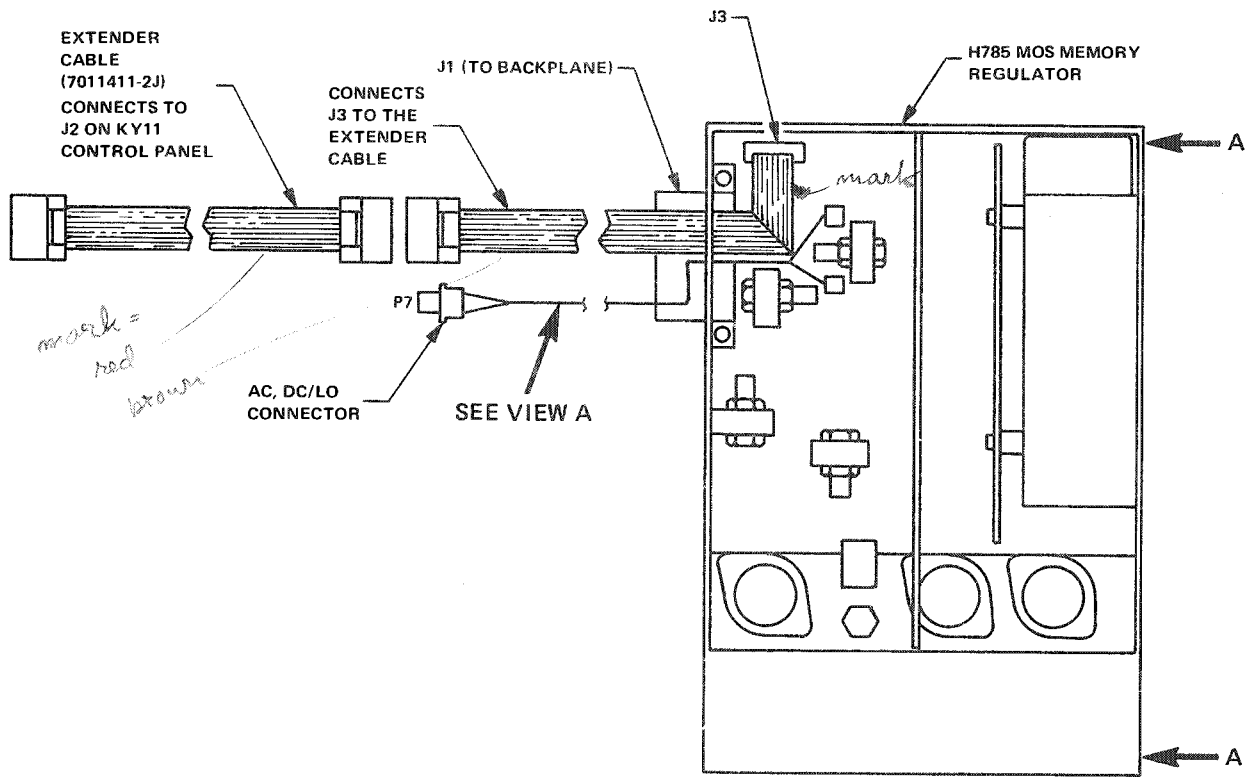


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FIGURE 2-2 H775CA/CB TO PDP1134A 10.5 Inch Box Interconnection

2.3 H785 Regulator Installation

The H785 regulator is secured to the 10.5 inch box power system chassis with three Phillips head screws. The mounting screws pass through the chassis holes and screw into the regulator. The position of the H785 in the chassis is such that its BBU connection aligns with an opening in the sheet metal to allow connection of the cable from the H775 (This opening may not be present on PDP11/34 10.5" Box). The H785 attaches to the power distribution board in the 10.5 Inch Box in regulator slot location #4. An additional connection is made to the front console (KY11-LA or LB) on J2. After the regulator is installed, the AC,DC/LO wires must be connected to the Power distribution board and to the AC input assembly of the 10.5 inch Mounting box as shown in Figure 2-3. An extender cable (7011411-2J) is also provided. One end connects to the flat grey cable (70133-4-1D) on the H785 and the other end connects to J2 on the console.



VIEW A-A

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FIGURE 2-3 H785 Regulator Interconnection

2.4 H7441 Regulator Installation

The two H7441 (32Amp @ +5V DC) regulators contained in the 10.5 inch version of the PDP1134A are installed in exactly the same way, and in the same physical positions as the H744's used in the PDP11/34 system. They are each secured to the 10.5 inch box power system chassis in regulator slot locations 2 and 3 with three phillips head screws. The mounting screws pass through the chassis holes and screw into the regulators.

2.5 Backplane Jumper Installation

A layout of the DD11-PK backplane is shown in Figure 2-4. Three jumpers are shown on the backplane.

The voltages jumpered are: -15 to -15B; +15 to +15B; and +5 to +5B.

NOTE:

The voltage and signal nomenclature shown adjacent to the pins do not exist on the actual backplane.

The DD11-PK, DK, CK were designed to provide MOS refresh voltages separate from the other logic voltages. This means that the MOS refresh logic can be powered when the rest of the logic in the backplane is off. The battery backup option utilizes this special busing of MOS refresh voltages.

When the DD11-PK/DK/CK are installed in a BALL-L (5.25 Inch Box), the H777 power supply provides the special "B" voltages to the backplane. Because the backplanes for the PDP11/34 must also be used in the PDP1134A 10.5 inch box where these "B" voltages are not supplied by the basic power supply, jumpers have to be used to connect these voltages to a voltage source available in the 10.5 inch box.

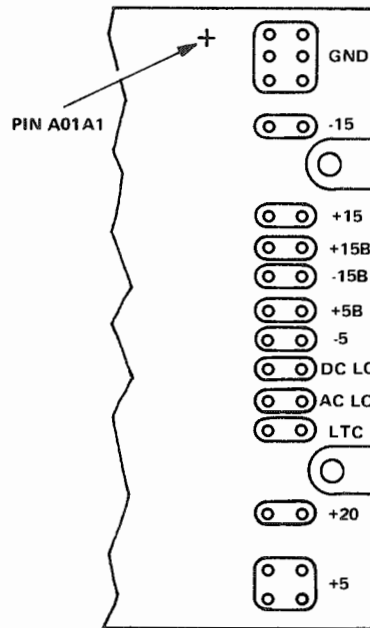
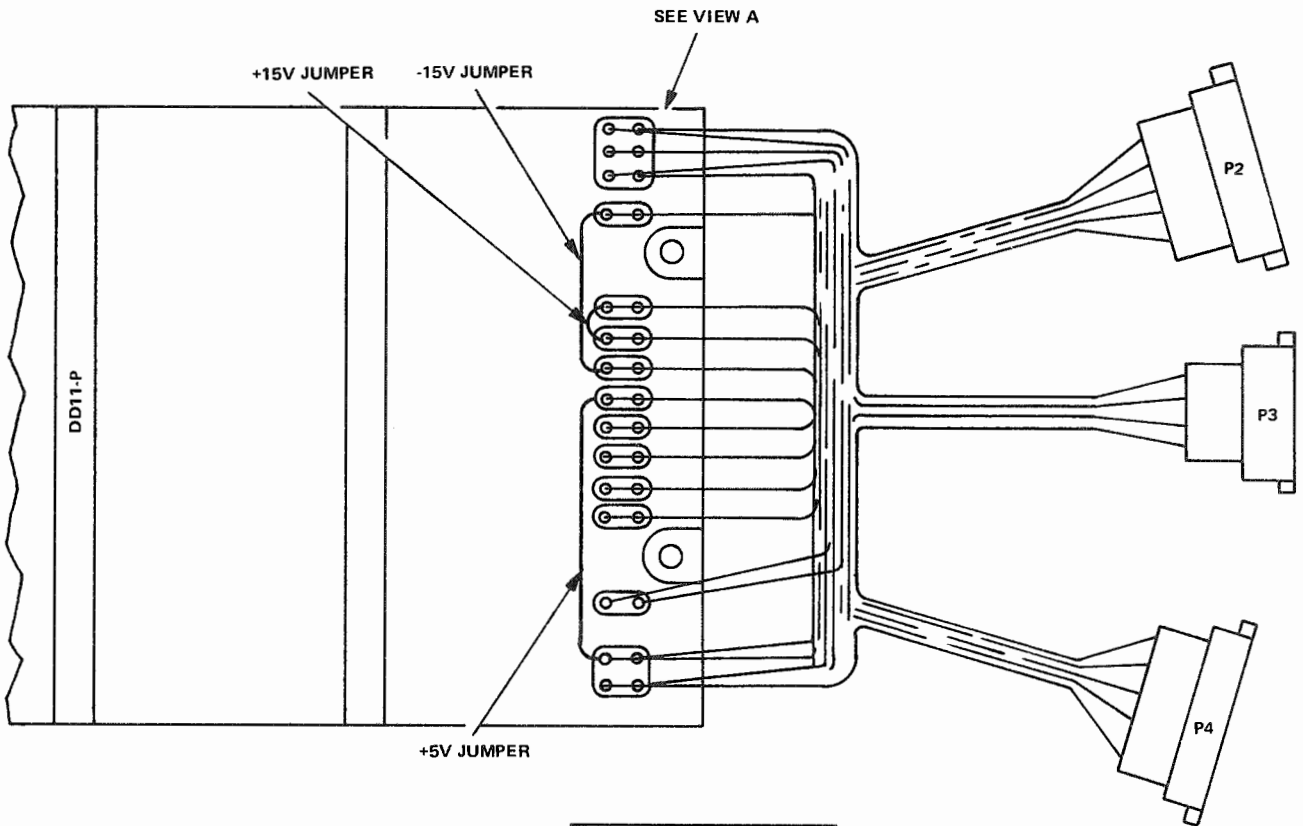
This source is the existing +5V, +15V, and -15V. The jumpers on the backplane simply short the "B" buses to the normal rails.

The special voltages used by MOS Memory are as follows:

- +5B Used by MOS memory to power TTL in refresh logic.
- +15B Used by MOS memory to derive +12V for the array chips.
- 15B Used by MOS memory to derive -9V for the array chips.

When the DD11-PK,DK,CK backplanes are used in the 10.5 inch box for the PDP11/34, and PDP1134A without BBU the jumpers shown in Figure 2-4 must be installed. If these jumpers are not installed, the +5B, -15B, and +15B rails would be left floating.

With the BBU present in the PDP1134A, the jumpers must be removed. Without a BBU present, all the jumpers shown in Figure 2-4 must be installed in the CPU backplane and only the +15V and -15V jumpers need to be installed on any other backplanes in the box. The +5V jumper is left off these non-CPU backplanes because the YA board has a +5B bus bar that is common to all backplanes. With this jumper in the CPU backplane, all backplanes are supplied.



NOTES

1. JUMPERS SHOWN ARE
 - 15 TO -15B
 - +15 TO +15B
 - +5 TO +5B
2. USE #20 INSULATED BUS WIRE FOR JUMPERS

VIEW A

11-5343

FIGURE 2-4 Backplane Jumpers

2.6 Backplane Jumper Configuration

Table 2-1 below is a list of the system mounting boxes and their required backplane jumpers, if any.

TABLE 2-1. BACKPLANE JUMPERS

<u>SYSTEM</u>	<u>JUMPERS</u>
BAll-L Box with Battery Backup Option	No Jumpers
BAll-L Box without Battery Backup Option	No Jumpers
PDP11/34 10.5 Inch Box	All jumpers in each backplane (Refer to paragraph 2.7)
PDP1134A; 10.5 Inch Box with Battery Backup Option	No Jumpers
PDP1134A; 10.5 Inch Box Without Battery Backup Option	CPU Backplane jumpers only (Refer to paragraph 2.7)

2.7 Backplane +5V Power Distribution

2.7.1 General

The power distribution board existing in the 10.5 inch mounting box is either a 5410864-0 or a 5410864-YA. The description of these boards is discussed in paragraph 1.6 in the Introduction Section.

The 5410864-0 board was not designed to be used with the BBU option, therefore it does not contain +5B, -15B and +15B buses. In order for this board to provide "B" voltages, all backplanes have to have jumpers installed to +5, -15, and +15V sources. Paragraph 2.5 discussed these jumpers.

The YA version was designed for the BBU option. With this option present, an H785 regulator exists in the mounting box and +5B is on the bus bar (Refer to Figure 2-5). In a situation where a BBU is not present in the system, there is no H785 regulator, therefore, there is no +5B on the bus bar. In this situation, we can install a jumper from +5V to +5B on the CPU backplane.

This places 5V on the bus bar and all backplanes are supplied by the 5V, 32 Amp regulator (Reg #2).

- CAUTION -

DO NOT INSTALL A JUMPER BETWEEN +5V AND +5B AT ANY OTHER POINT IN THE POWER DISTRIBUTION SYSTEM IN THE PDP1134A WITHOUT BBU (OR PDP11/34 USING YA VERSION) WHILE THERE IS ONE ON THE CPU BACKPLANE. THIS PLACES BOTH 5V REGULATORS IN PARALLEL WHICH IS UNDESIRABLE.

If there is any MOS memory present in any backplane in the same box, it will have its refresh circuitry powered by the +5V regulator that is providing power to the backplane with the +5V to +5B jumper. That regulator will therefore be required to furnish 0.5 amps of current for each MS11 board present in the box regardless of which backplane it may be located in.

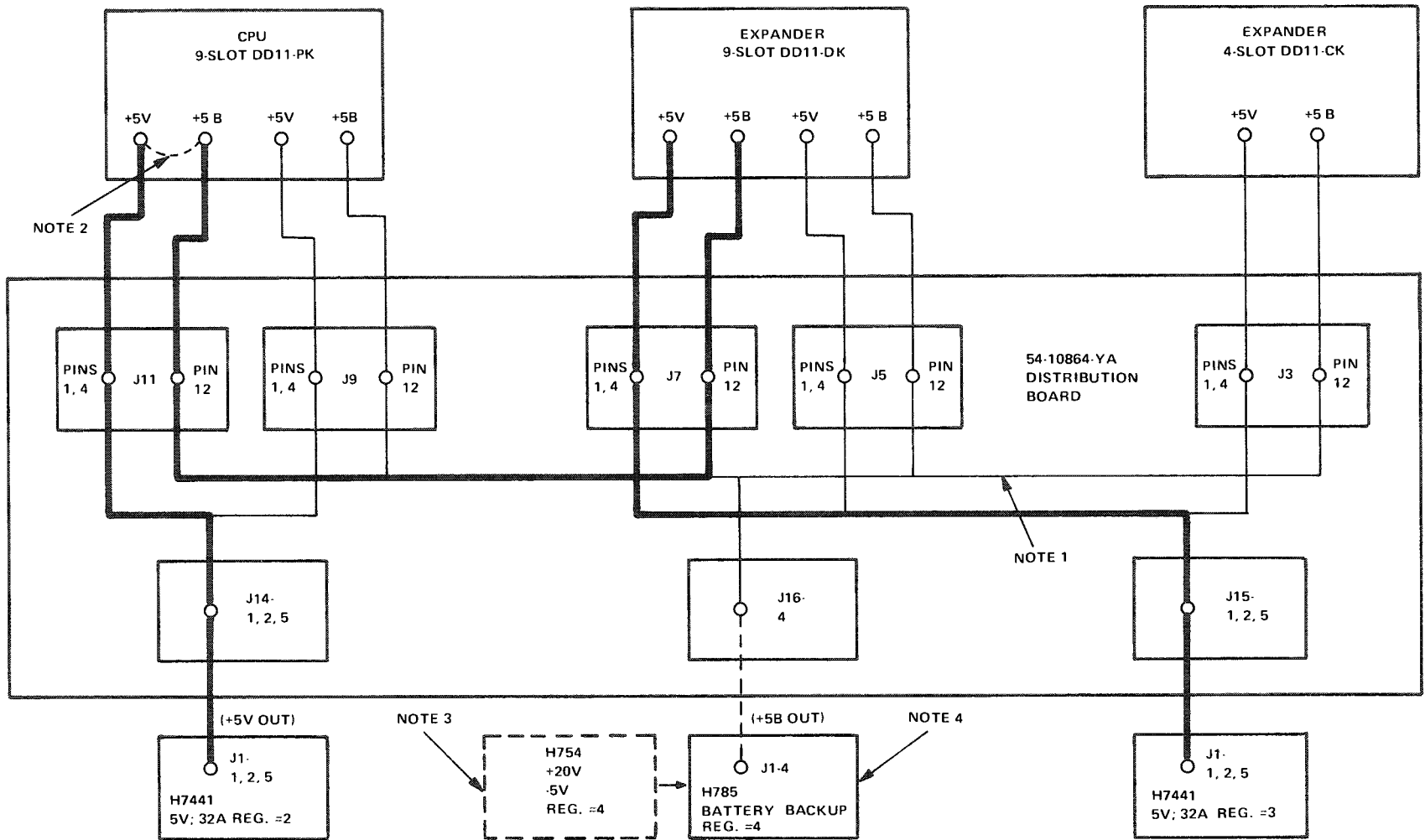
2.7.2 FP11-AU Upgrade Kit Jumpers

When a PDP11/34 system is upgraded to include floating point capability (FP11-AU Kit), the possibility of placing both 5V regulators in parallel is greatest. This is because all backplanes had all jumpers previously installed. All +5V to +5B jumpers must now be removed from all backplanes in the same box, except on the CPU backplane.

NOTE:

Figure 2-5 shows how +5 Volts is connected to the +5B bus bar when both, the BBU option is connected to the system, and when the BBU option is not used:

- With BBU in the system; the H785 Regulator supplies the +5B via J1-4.
- Without the BBU option; the H785 Regulator is not present. We can then install a jumper as indicated by the Note 2 callout.



NOTE 1 +5B bus bar. Available on the 54-10864-YA Distribution Panel only. It was designed for a Battery Backup system.

NOTE 2 This jumper must be installed in the CPU backplane if a Battery Backup option is not present. It places +5 Volts on the +5B bus bar for distribution to backplane modules.

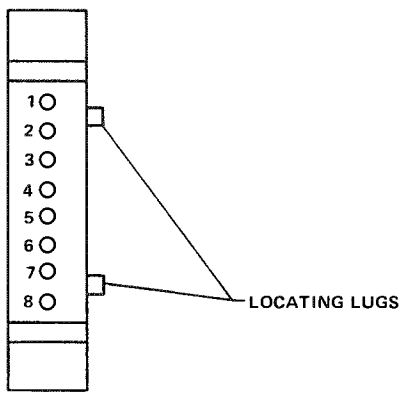
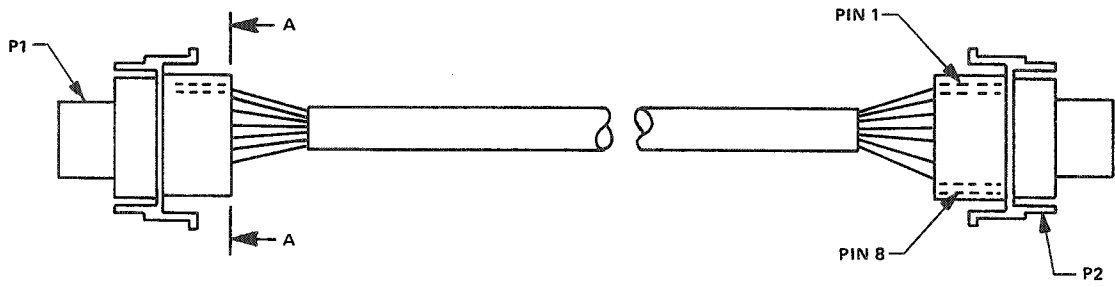
NOTE 3 This regulator may be present if there is no Battery Backup option.

NOTE 4 This regulator is inserted in regulator slot location =4 if a Battery Backup option is present. It supplies +15B; -15B & +5B to the bus bar for MOS memory.

FIGURE 2-5 +5 Volt Power Distribution

2.8 Battery Backup Interconnection Cable

Figure 2-6 illustrates the interconnecting cable between the Battery Backup Unit and the MOS Regulator in the system Mounting Box.



PIN	COLOR	SIGNAL
1	ORANGE	RAW DC
2	BLACK	GND
3	BLUE	BATTERY OUT
4	GRAY	CHARGE MODE
5	RED	+5B
6	WHITE	BAT. MON.
7	YELLOW	AC POWER
8	BROWN	AC POWER

VIEW A - A

*Pins 7 and 8 were added to the cable on Rev. C. This is required for the 10.5 inch box if the BBU option is used.

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FIGURE 2-6 Interface Cable