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BA11-K mounting box user's manual

digital

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BA11-K mounting box user's manual

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CHAPTER 1
BA11-K CHARACTERISTICS AND SPECIFICATIONS

1.1 GENERAL

The BA11-K is a 10-1/2 inch expander box which is mounted in a standard 19-inch rack. It is designed to house the Digital standard system units that make up a PDP-11 expansion system. The expansion system (expander box) can contain memory, peripheral controllers, devices, or options compatible with the PDP-11 family. The BA11-K is modular in design enabling a high degree of serviceability with minimum downtime.

The BA11-K can accept a maximum of five system units providing a great degree of flexibility in selecting a system unit configuration (e.g., single and double system units may be mixed).

There are two basic versions of the mounting box: the BA11-KE for 115 Vac, and the BA11-KF for 230 Vac. These two variations are the result of two ac input boxes, one for each line voltage. The two ac input boxes can be interchanged within the same BA11-K mounting box with no other modifications.

1.2 PHYSICAL CHARACTERISTICS

1.2.1 BA11-K Characteristics

Figure 1-1 shows the BA11-K mounted in a rack. Basically it is composed of a main chassis and an H765 power system. The BA11-KE and BA11-KF are physically identical except for the ac input box in the H765. The BA11-KE (115 Vac) contains a 7009811-1 ac input box; the BA11-KF (230 Vac) contains a 7009811-2 ac input box.

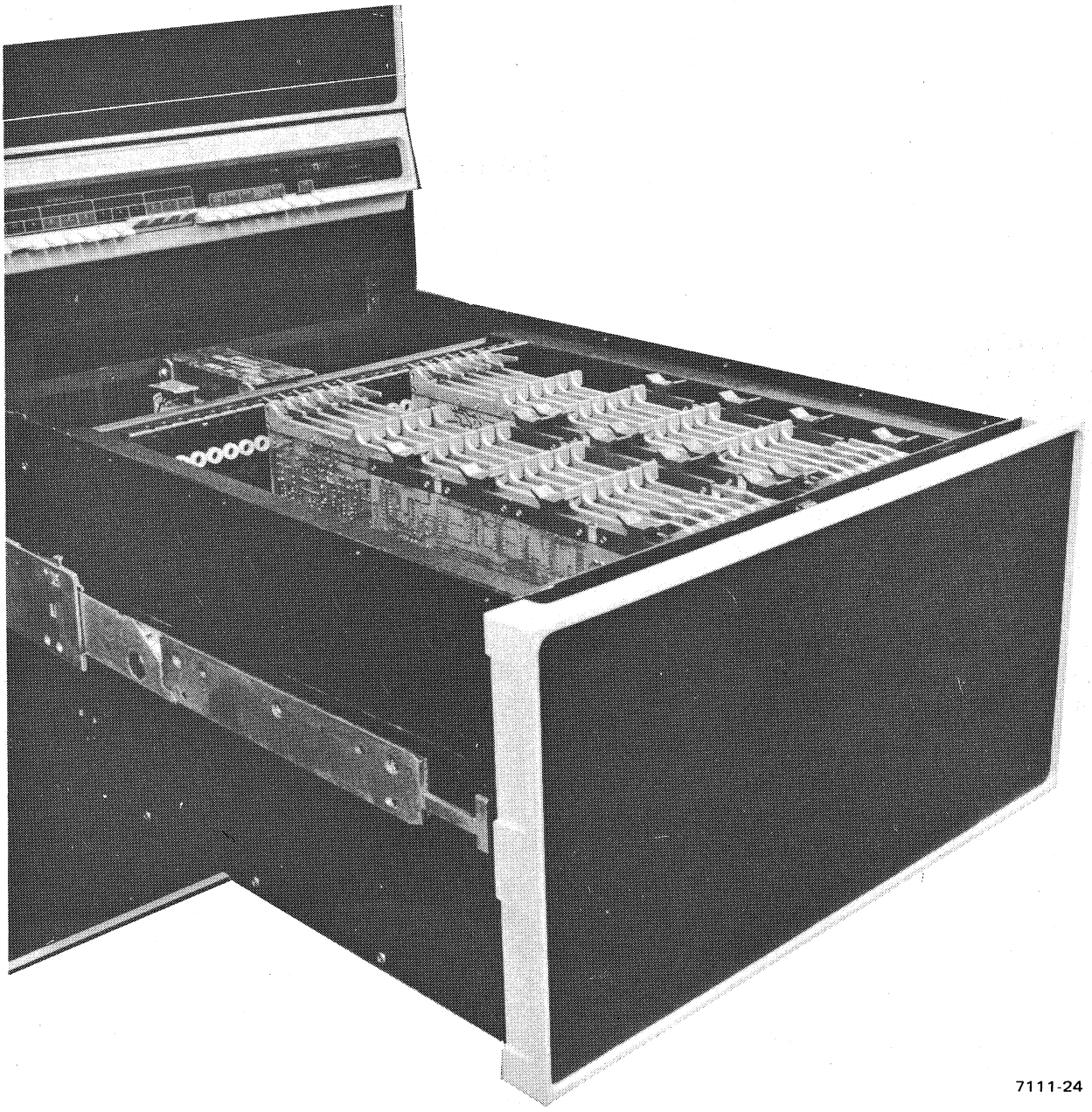
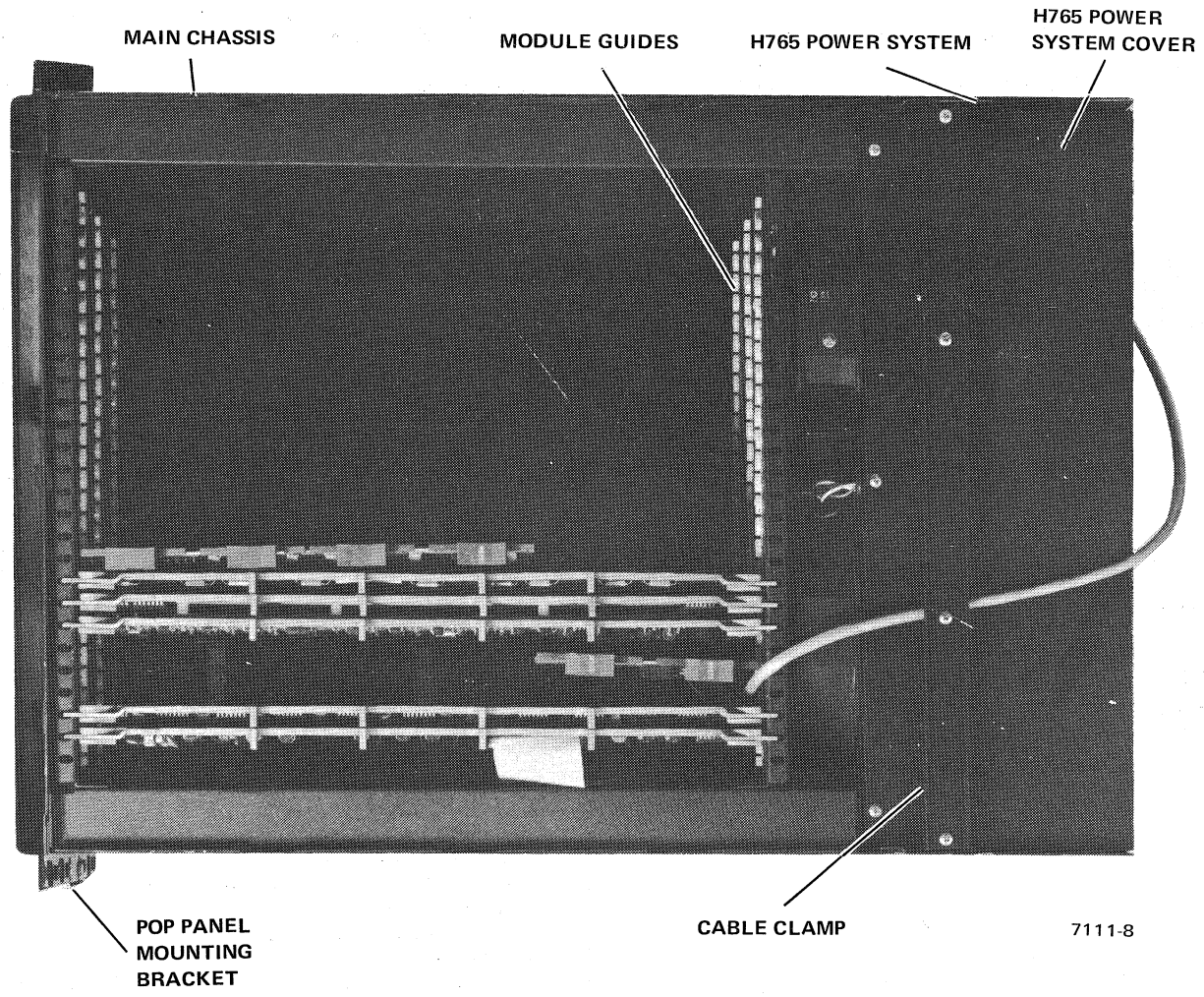


Figure 1-1 BA11-K Mounting Box (Top Covers Removed)

Figure 1-2 is the top view of the physical layout of the BA11-K. The mechanical and environmental specifications are described in Table 1-1.

1.2.2 H765 Power System

The H765 power system is self-contained in its own chassis. It is secured to the main BA11-K chassis with six screws. Two are special-purpose screws which function as hinges, enabling the H765 to be swung away from the main chassis during maintenance. The H765 power system contains five regulators, two fans, an ac input box, a transformer assembly, and a power distribution board. Four of the regulators are self-contained DEC standard modular types. The fifth regulator is a regulator board that is mounted in the ac input box. Table 1-2 lists the H765 Power System's physical characteristics.



Top View - Main Chassis Cover Removed

Figure 1-2 BA11-K Physical Layout

Table 1-1
BA11-K Physical and Environmental Characteristics

Item	Description
Chassis size (with H765 power system and pop panel)	10.44 in. high, 17.12 in. wide, 26.53 in. deep
Chassis size (with H765 power system without console panel and bezel)	10.44 in. high, 17.12 in. wide, 25 in. deep
Chassis size (without H765 power system, console panel and bezel)	10.44 in. high, 17.12 in. wide, 17.25 in. deep
BA11-K expander box chassis weight (without system units)	87 lb
H765 power system size	10.38 in. high, 17.12 in. wide, 7.75 in. deep
Slide extension (three-section slide)	27 in. maximum
Slide weight capacity (BA11-K fully extended)	150 lb
Three-stop slide	Positions: Horizontal, 45 degrees, and 90 degrees (front panel facing up)
Fan air movement direction	Horizontally toward rear of BA11-K
Module slots	22 maximum (2 double system units and 1 single system unit) using DEC standard configuration backplanes
Operating temperature range at inlet to box	41° F–122° F (5° C–50° C)
Operating humidity	10 to 95% (no condensation)
Cooling efficiency for both fans at 90 Vac, 50 Hz	Temperature rise no greater than 18° F (10° C) from inlet air temperature to exhaust air

Table 1-2
H765 Power System Physical Characteristics

Item	Description
H765 power system contents	H744 regulators (two) (+5 V) H745 regulator (-15 V) H754 regulator (+20 V, -5 V) 5411086 regulator (+15 V)* 7010014 transformer assembly 7009811-1 or -2 ac input box with 5410993 power control board 5410864 power distribution board 1211714 box fans (two)
Fan size	6 in.
Fan type	Ball bearing
Fan capacity at 115 V, 50 Hz	260 cfm at 0 static pressure
Fan efficiency at 90 Vac, 50 Hz	60%
7010014 transformer assembly weight	25 lb

*Early versions of the BA11-K may contain a 5409730-YA regulator in place of the 5411086 regulator.

1.3 ELECTRICAL SPECIFICATIONS

1.3.1 BA11-KE, BA11-KF Input Power Electrical Specifications

The BA11-KE and KF are electrically identical except for the ac input box. A BA11-KE expander box designation indicates that the input voltage is 115 Vac and that a 7009811-1 ac input box is installed in the H765 power system. A BA11-KF expander box designation indicates that the input voltage is 230 Vac and that a 7009811-2 ac input box is installed in the H765 power system. Tables 1-3 and 1-4 contain the input power electrical specifications of the BA11-KE and KF, respectively.

Table 1-3
BA11-KE Input Power Electrical Specifications

Parameter	Specification
Input power	90–132 Vac, 115 Vac nominal, 47–63 Hz, single phase
Inrush current	175 A peak for 10 ms max. at 115 V line voltage
Input power	1200 W maximum at 115 V nominal line voltage
Input current	12 A max at 115 Vac
Circuit breaker rating	20 A at 115 Vac
Power factor	The ratio of input power to apparent power must be greater than 0.85
Conducted Noise (noise on ac line)	
Transients	Single transient without loss of data: 300 V at 0.2 W sec max.
	Single transient, survival: 1000 V at 2.5 W sec max.
	Average transient power survival: 0.5 W max.
CW Noise	10 KHz – 3 MHz: 3 V rms 3 MHz – 500 MHz: 1 V rms 500 MHz – 1000 MHz: 0.5 V rms
RF field susceptibility	10 KHz – 1000 MHz: 1 V/M
Power fail	H765 power system is capable of withstanding power interruptions of any magnitude and duration without damage. Storage time of power supply at low line and full load shall be 20 ms minimum. Storage time is measured from the time the power outage occurs until the time the regulator voltages listed in Table 1-5 drop below their specified regulation limits.

Table 1-4
BA11-KF Input Power Electrical Specifications

Parameter	Specification
Input power	180 – 264 Vac, 230 Vac nominal, 47–63 Hz, single phase
Inrush current	80 A peak for 10 ms max. at 230 Vac line voltage
Input power	1200 W maximum at 230 Vac nominal line voltage
Input current	6 A max at 230 Vac
Circuit breaker rating	10 A at 230 Vac
Power factor	The ratio of input power to apparent power shall be greater than 0.85
Conducted Noise (noise on ac line)	
Transients	Single transient, without loss of data: 300 V at 0.2 W sec
	Single transient, survival: 1000 V at 2.5 W sec max.
	Average transient power survival: 0.5 W maximum
CW Noise	10 KHz – 3 MHz: 3 V rms 3 MHz – 50 MHz: 1 V rms 500 MHz – 1000 MHz: 0.5 V rms
RF field susceptibility	10 KHz – 1000 MHz: 1 V/M
Power fail	H765 power system is capable of withstanding power interruptions of any magnitude and duration without damage. Storage time of power supply at low line and full load shall be 20 ms minimum. Storage time is measured from the time the regulator voltages listed in Table 1-5 drop below their specified regulation limits.

1.3.2 BA11-K Output Power Specifications

The BA11-K output power is determined by the rating of the regulators (Figure 1-3) listed in Table 1-5. Due to the great degree of flexibility and options available, each BA11-K configuration must be analyzed for total load requirements. Once the current drain of the options is

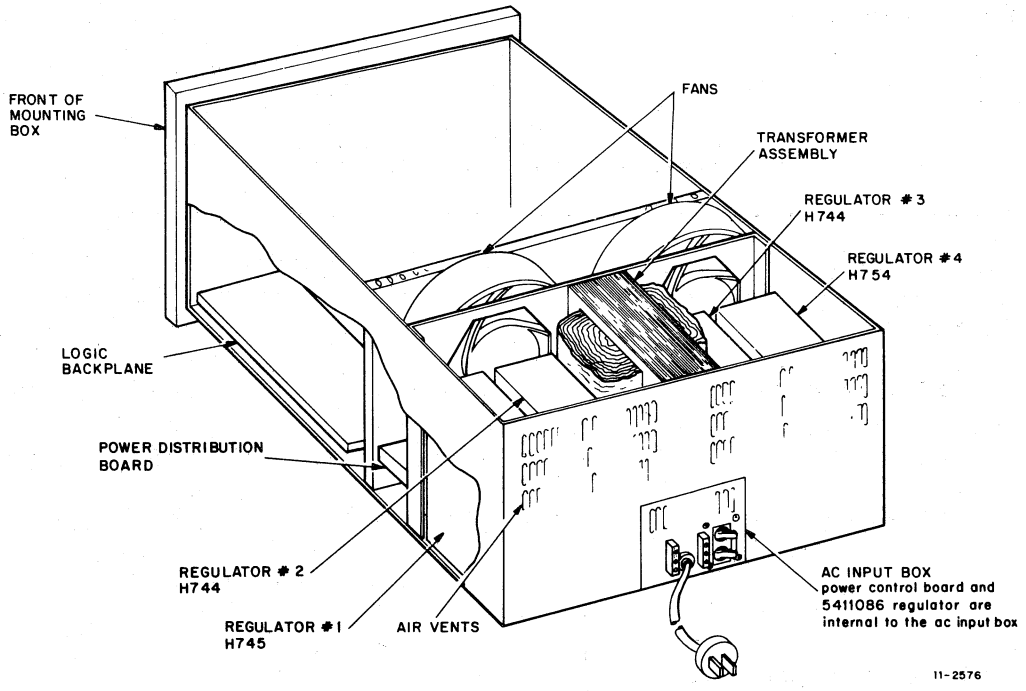


Figure 1-3 Physical Layout of H765 Power Supply

Table 1-5
BA11-K Output Power Characteristics

Regulator	Voltage and Regulation	Output Current (max)	Power Distribution Board Jacks	Peak-to-Peak Ripple (max)
H745 (No. 1)	-15 Vdc ± 750 mV	10 A	J3, J5, J7, J9, J11	450 mV
H744 (No. 2)	+5 Vdc ± 250 mV	25 A	J9, J11	200 mV
H744 (No. 3)	+5 Vdc ± 250 mV	25 A	J3, J5, J7	200 mV
H754 (No. 4)	+20 Vdc ± 1 V -5 Vdc ± 250 mV	8 A 1 A – 8 A†	J3, J5, J7, J9, J11	5%* 5%*
5411086**	+15 Vdc ± 1.5 V	4 A	J3, J5, J7, J9, J11	3%
	AC LO, DC LO LTCL	–	J4, J6, J8, J10, J12	–

*At backplane. Typical ripple ±3%.

**Early versions of the BA11-K may contain a 5409730-YA regulator in place of the 5411086 regulator.

†Maximum -5 V current is dependent upon +20 V current. It is equal to 1 A plus the current of the +20 V supply, up to a total of 8 A.

totaled, it should be compared with the output currents listed in Table 1-5. (See Tables 2-4 and 2-5 for a list of some of the available options and their load requirements.) When configuring the expansion system, care must be taken to ensure that the options do not exceed the current capabilities of the regulators.

1.3.3 Power Up, Power Down Characteristics

The BA11-K power up and power down characteristics are determined by regulator 5411086. Table 1-6 lists the dynamic and static power up and power down characteristics of regulator 5411086.

Table 1-6
Power Up and Power Down Characteristics

Parameter	Specification
Dynamic Performance	
BA11-K Power Down	4 ms min from ac Power Down to AC LO L asserted
	5 ms min from AC LO L asserted to DC LO L asserted
BA11-K Power Up	1 ms min from +15 V to DC LO L negated
	2 ms nominal from DC LO L negated to AC LO L negated
Static Performance at full load*	
BA11-K Power Down	AC LO L drops to LOW: 83–88 Vac
	DC LO L drops to LOW: 73–78 Vac
BA11-K Power Up	DC LO L goes to HIGH: 75–80 Vac
	AC LO L goes to HIGH: 85–90 Vac

*Response to changing ac input (less than 10/V second).

CHAPTER 2
SYSTEM UNITS, OPTIONS, HARNESSES, AND INSTALLATION INFORMATION

2.1 GENERAL

This chapter details the configuration and expansion capabilities of the BA11-K mounting box. The configuration and expansion information should not only be used for initial installation, but also used as an ongoing aid when adding or modifying system units. The following paragraphs describe the items listed below:

DEC system units

BA11-K system unit configurations

System unit installation

Option configurations

Harness information

Cable routing

Cabinet mounting specifications

2.1.1 Introduction to System Units

The system unit is the basic mounting assembly for PDP-11 logic. Logic module and cable connectors plug into the module side of the system unit. The other side of the system unit contains either backplane wiring or etched board wiring which connects the pins together. A system unit connects to another system via the Unibus. Four slots of a system unit are reserved for Unibus connections. These are slots A and B of the first and last slots as shown in Figure 2-1.

The following types of system units are utilized in the PDP-11 system.

Dedicated – Dedicated system units are prewired and tested for specific functions such as processor, memory, or disk controller.

General Purpose – General purpose system units use a standard backplane wiring which has been established for the controllers of small peripherals, such as printers, card readers, and terminals. Each system unit has four small peripheral controller (SPC) slots with wiring provided for signal conditioning options. A variety of general purpose interfaces, communications devices, and options are available for use in these SPC slots.

Blank – Unwired single system units are made available for OEM use, enabling custom application.

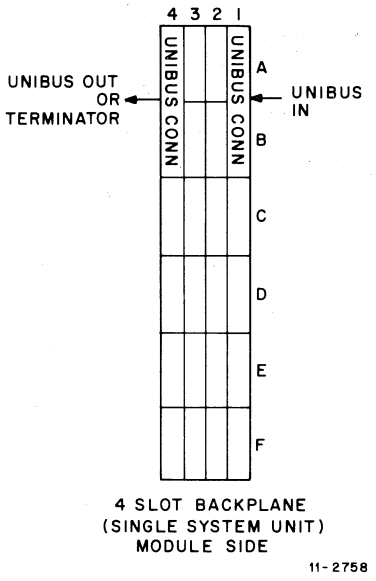


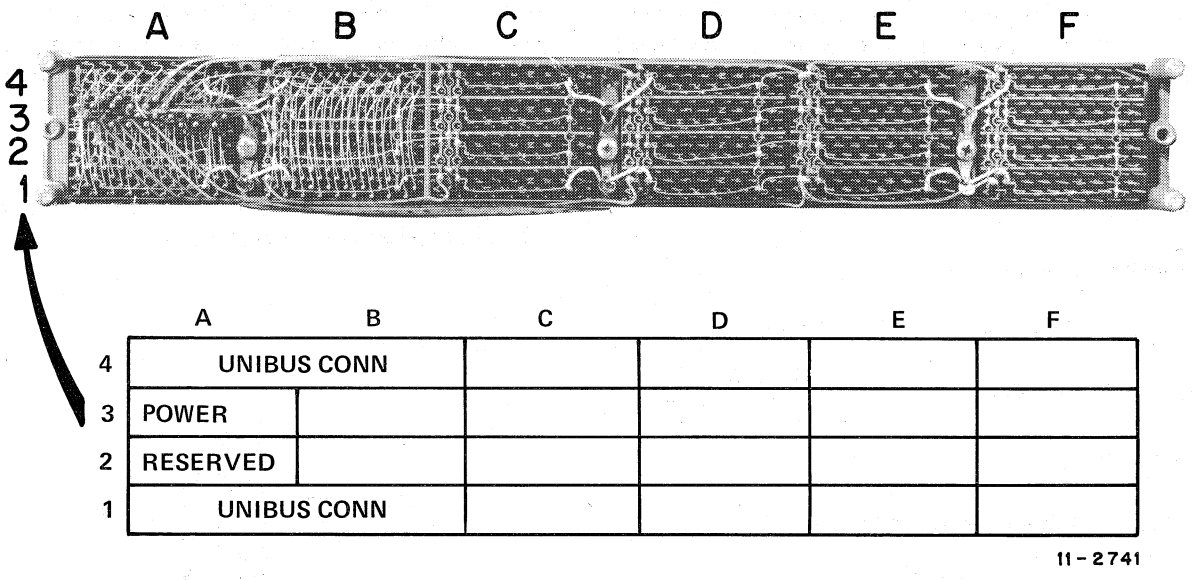
Figure 2-1 Standard Unibus Connection

The BB11 blank mounting panel (Figure 2-2) is a prewired system unit (SU) designed for general interfacing. It is prewired only for the Unibus and power. The unit contains three 288-pin blocks assembled end-to-end in a casting which can be mounted in the various PDP-11 assembly units. Bus and power connectors, described below, use only 6 of the module slots, leaving 18 slots available for customer use.

The BB11 is wired to accept the Unibus in slots A1 and B1. This connection can be made with an M920 Unibus connector or a BC11A Unibus cable assembly. All bus signals, including grant signals, are wired directly to corresponding pins in slots A4 and B4. From this point, the Unibus can be continued to the next unit by using an M920 or BC11A. If the BB11 is the last unit on the bus, slot A4-B4 accepts the M930 bus terminator module.

The bus grant signals are wired through the BB11. These grant signal wires must be removed and replaced with wires to and from the user's control circuits for the grant levels used by the customer-supplied device.

Power for +5 V is distributed to all A2 pins; -15 V is distributed to all B2 pins except in slots A1, B1, A4, and B4; and ground is maintained through the frame and power connector on pins C2 and T1 of all slots.



	A	B	C	D	E	F
4	UNIBUS CONN					
3	POWER					
2	RESERVED					
1	UNIBUS CONN					

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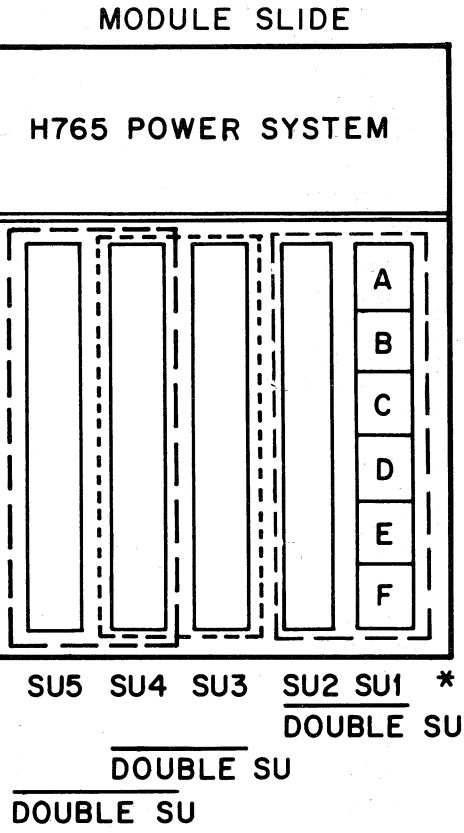
Figure 2-2 BB11 Single System Unit

2.1.2 BA11-K System Unit Configuration

Using DEC standard logic planes, the BA11-K has the following configuration capabilities (Figure 2-3).

1. Five single-system units, 20 slots. (A system unit is a four-slot logic backplane.)
2. One double-system unit and three single-system units. (A double system unit is a nine-slot logic backplane.)
3. Two double-system units and one single-system unit.



* If a single system unit is installed in location SU1 a double system unit cannot be installed in locations SU2 and SU3 due to power distribution board layout.

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Figure 2-3 System Unit Configurations

2.1.3 Unibus Pin Assignments

Table 2-1 lists the Unibus pin assignments for slots A and B of a system unit. These pin assignments are applicable regardless of the type PDP-11 system unit selected.

Table 2-1
Unibus Pin Assignments
(By Pin Numbers)

Pin	Signal	Pin	Signal
AA1	INIT L	BA1	BG 6 H
AA2	POWER (+5 V)	BA2	POWER (+5 V)
AB1	INTR L	BB1	BG 5 H
AB2	GROUND	BB2	GROUND
AC1	D00 L	BC1	BR 5 L
AC2	GROUND	BC2	GROUND
AD1	D02 L	BD1	GROUND
AD2	D01 L	BD2	BR 4 L
AE1	D04 L	BE1	GROUND
AE2	D03 L	BE2	BG 4 H
AF1	D06 L	BF1	ACLO L
AF2	D05 L	BF2	DCLO L
AH1	D08 L	BH1	A01 L
AH2	D07 L	BH2	A00 L
AJ1	D10 L	BJ1	A03 L
AJ2	D09 L	BJ2	A02 L
AK1	D12 L	BK1	A05 L
AK2	D11 L	BK2	A04 L
AL1	D14 L	BL1	A07 L
AL2	D13 L	BL2	A06 L
AM1	PA L	BM1	A09 L
AM2	D15 L	BM2	A08 L
AN1	GROUND	BN1	A11 L
AN2	PB L	BN2	A10 L
AP1	GROUND	BP1	A13 L
AP2	BBSY L	BP2	A12 L
AR1	GROUND	BR1	A15 L
AR2	SACK L	BR2	A14 L
AS1	GROUND	BS1	A17 L
AS2	NPR L	BS2	A16 L
AT1	GROUND	BT1	GROUND
AT2	BR 7 L	BT2	C1 L
AU1	NPG H	BU1	SSYN L
AU2	BR 6 L	BU2	C0 L
AV1	BG 7 H	BV1	MSYN L
AV2	GROUND	BV2	GROUND

2.1.4 System Unit Installation

The installation of a system unit (SU) requires the items listed in Table 2-2.

The following steps outline the procedure to be used when installing a system unit.

1. Install the required number of system units in the BA11-K and secure them to the mounting boxes using the screws provided. The system units are installed with slot A adjacent to the power distribution board. Figure 2-4 shows a double system unit installed in a BA11-K box configuration.

2. Install a Unibus jumper module (M920) from the last slots A and B (see Figure 2-1) of the first SU to adjacent SU slots A and B. This extends the system Unibus continuity to each logic backplane in the BA11-K.

3. The Unibus In should be connected to the first slot (A1 and B1) of the first SU. The Unibus Out should be connected to the last slot of the last SU in the BA11-K.

4. Ensure that the M930 terminator module is plugged into the last SU slot (slots A and B) when terminating the Unibus.

Table 2-2
SU Installation Requirements

Quantity	Item	Remarks
1	Backplane	
1	Power harness	See Tables 2-4 and 2-5.
1	M920 Unibus jumper module	Unless the SU is the first installed in a BA11-K expansion box.

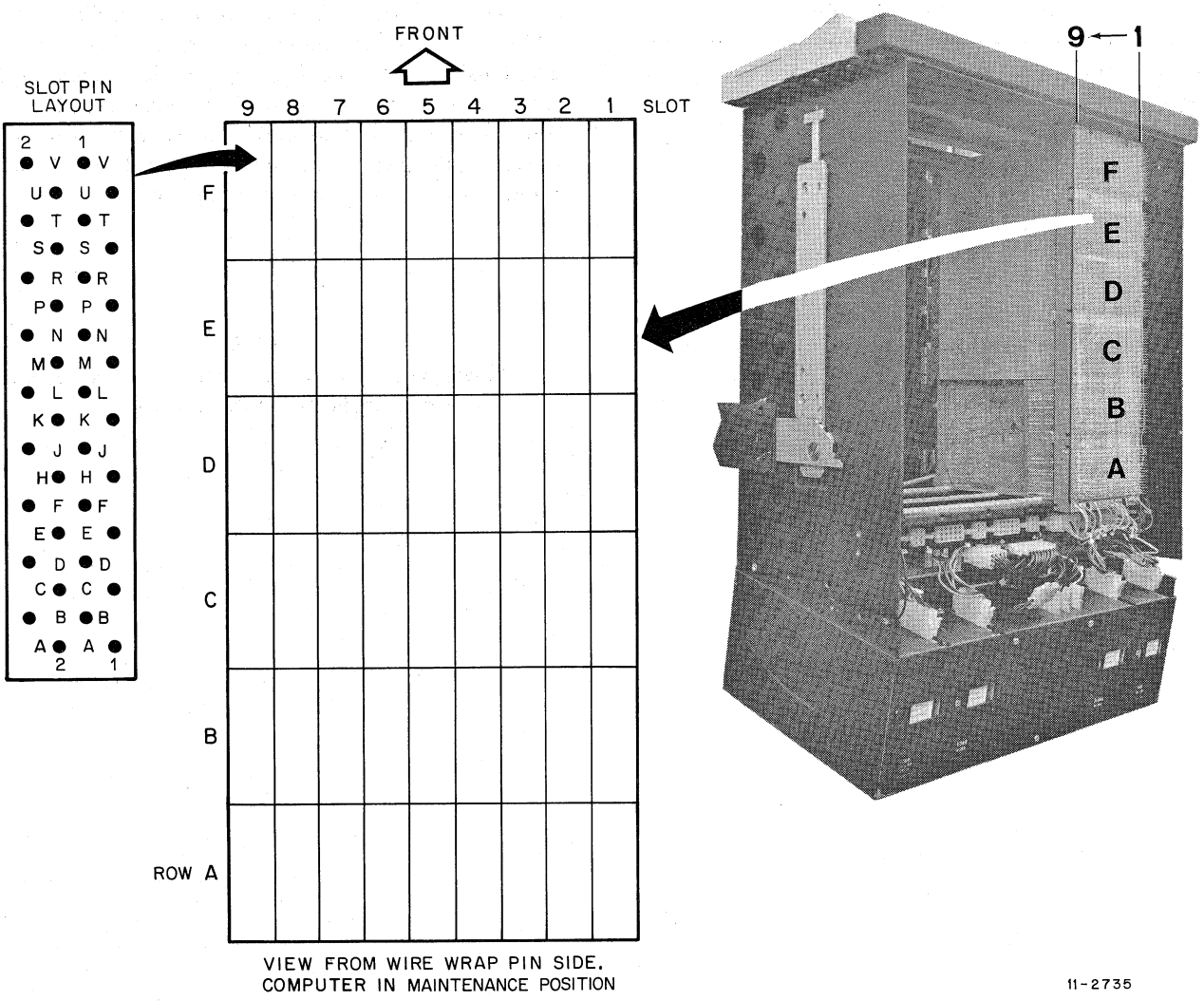


Figure 2-4 BA11-K with Double System Unit (Wire Wrap Side)

Table 2-3 lists the various combinations of system units that can be installed in the BA11-K.

Table 2-3
System Unit Combinations

Variations	System Unit Combinations*
1	2 double system units and 1 single system unit
2	3 single system units and 1 double system unit
3	5 single system units

*Double system units are prewired DEC configurations.

2.2 OPTION CONFIGURATIONS

Utilizing two double system units, and one single system unit, or a variation of these, the BA11-K can accept as many as 16 hex and 6 quad module circuit boards. Due to the power that these system units could require, care must be taken to assure that the power capabilities of the BA11-K H765 power system, is not exceeded. To aid in a safe, reliable module configuration Tables 2-4 and 2-5 have been included in this section. These tables list the various DEC module or system unit options with its dc and ac power requirements. Also included in Tables 2-4 and 2-5 are the power harness options, if applicable.

NOTE
Power harnesses used in other mounting boxes may not be applicable to the BA11-K.

Table 2-4
PDP-11 Family Models and Options

Model/Option	Description	+5 V (CPU)	Current Needed (Amperes)					AC Line Current (Amperes)
			+5 V (Options)	-15 V	+20 V	-5 V	+15 V	
H765 A/B	BA11-K Power Supply							
	H744	25						2.5
	H744		25					2.5
	H745			10				2.5
	H754				8	8		3.3
	5411086						4	
11/05-S	KD11-B	8.0		0.25			0.05	
	MM11-U	5.4			4.4	0.51		
	3 SPC	6.0						
	2 M930's	2.5						
	Total Amperes	16.6		0.25	4.4	0.51	0.05	5.0
11/35-S	KD11-A	10.5						
	KE11-F	2.0						
	KE11-E	3.0						
	KJ11-A Optional	0.5						
	KT11-D	2.5						
	KW11-L	0.5						
	SPC	2.0						
	M981		1.25					
	MF11-U (16K)		6.1					
	M930		1.25					
	Total Amperes	21	8.6		4.4	0.51		6.0
MF11-U/MM11-U*	16K Sense							
(Active)	Core Memory		6.1		4.4	0.51		2.2
(Standby)	(Double SU)		5.4		0.56	0.41		0.8
MF11-UP/MM11-UP	16K Sense							
(Active)	Core with Parity		7.3		4.4	0.51		2.3
(Standby)	(Double SU)		5.4		0.56	0.41		0.8
MF11-L (MM11-L)	8K Core							
(Active)	Memory		3.4	6.0				1.8
(Standby)	(Double SU)		1.7	0.5				0.3
MF11-LP (MM11-LP)	8K Parity							
(Active)	Core Memory		4.9	6.0				2
(Standby)	(Double SU)		1.7	0.5				0.3
MM11-S	Same as MM11-L Except in SU Configuration (1 SU)		Same as MF11-L					

*Non-Interleaved.

Table 2-5
PDP-11 Family Options

Option	Mounting Code	Description	Power Harness	Current Needed (Amperes)					AC Line Current (Amperes)
				+5 V	-15 V	+20 V	-5 V	+15 V	
AA11-D	1 SU	Digital to Analog Converter Subsystem	7009562	3.0					0.3
AR-11	SPC	ADC and DAC's	N/A	5.0					0.5
BA614	(AA11-D)	D/A Converter		3.0					0.3
BM792-Y	SPC	Bootstrap Loader		0.3					0.3
CD11-A/B	1 SU	1000 CPM, 80 Col. Card Reader Controller	7010117	2.5					0.25
CD11-E	1 SU	1200 CPM, 80 Col. Card Reader Controller	7010117	2.5					0.25
CM11	SPC	200 CPM, 80 Col. Card Reader Controller		1.5					0.15
CR11	SPC	300 CPM, 80 Col. Card Reader Controller		1.5					0.15
DA11-DB	1 SU	Unibus Link		4.0					0.4
DA11-F	1 SU	Unibus Window	7010117	5.0					0.5
DB11-A*	1 SU	Bus Repeater	7009562	3.2					0.31
DC11-A	1 SU	Dual Clock and System Unit	7010117	0.2					0.02
DC11-DA	(DC11-A)	Full Duplex Module Set		2.0	0.2			0.2	0.2
DD11-B	1 SU	Peripheral Mounting Panel	7010117						
DH11-AA	DLB SU	Prog Async 16-Line Multiplexer	7010118	8.4	0.42				0.9
DH11-AD	DLB SU	@ Modem Control	7010118	10.8	0.665			0.4	1.33
DJ11-A	1 SU	Async 16-Line MUX	7010117	4.7	0.25			0.25	0.6
DJ11-AC	1 SU	Async 16-Line MUX			1.0				0.25
DL11	SPC	Async Interface		1.8	.15			.016	0.21
DM11-B	(DH11)	16-Line Modem Control	(DH11)	2.4					0.24
DN11-A	1 SU	Auto Calling System Unit	7009562	2.6					2.5
DP11-D	1 SU	Half/Full Duplex Sync Interface	7009562	2.56	0.07			0.04	0.28
DP11-C	(DP11-D)	Data/Sync Register Extender		0.77					0.08
DP11-K	(DP11-D)	Internal DP11 Clock		0.18					0.02
DQ11-D	1 SU	Full/Half Duplex Sync Interface	7010117	6.0	0.07			0.04	0.62
DQ11-E	1 SU	Full/Half Duplex Sync Interface	7010117	6.0	0.07			0.04	0.62

*When installing a DB11-A bus repeater in a BA11-K 10-1/2 in. mounting box, the AC LO and DC LO wires must be removed from the harnesses of all the options (located in the same box) after the DB11-A.

Table 2-5 (Cont)
PDP-11 Family Options

Option	Mounting Code	Description	Power Harness	Current Needed (Amperes)					AC Line Current (Amperes)
				+5 V	-15 V	+20 V	-5 V	+15 V	
DFC11-A	(DU/DP CLOCK)	Level Converter Clock Recovery		0.4	0.02			0.02	0.05
DQ11-K	(DQ11-D/A)	Crystal Clock			0.05				0.012
DR11-B	SPC	General Purpose DMA	7009562	3.3					0.32
DR11-C	1 SU	General Purpose Digital Interface		1.5					0.15
DR11-K	SPC	Digital I/O		N/A	0.15				0.6
DU11-D	SPC	Full/Half Duplex		2.2	2.5			0.05	0.27
DU11-EA	SPC	Sync Prog. Interface		2.6	0.20			0.07	0.33
DV11	DBL SU	Sync MUX	13.5	.083				0.435	0.5
KG11-A	SPC	Comm Arith Unit		1.2					0.12
KW11-L	(CPU)	Line Clock		0.8					0.08
KW11-P	SPC	Prog Line Clk		1.0					0.1
LC11-A	SPC	LA30 Control		1.5					0.15
LP11-R	SPC	1200 LPM Printer		1.0					0.1
LP11-S	SPC	900 LPM Printer		1.0					0.1
LP11-W	SPC	240 LPM Printer		1.5					0.15
LP11-V	SPC	300 LPM Printer		1.5					0.15
LS11-A	SPC	60 LPM Printer		1.5					0.15
LV11-B	SPC	Electrostatic Printer, 500 LPM		1.5					0.15
MR11-DB	2 SPC	Bootstrap							
PC11	SPC	Paper Tape		1.5					0.15
PR11	SPC	Paper Tape (Reader)							
RH11	DBL SU			1.9					0.19
RK11-D	SU	Disk and Cntrl	7010115	8.0					0.8
TA11-A	SPC	Dual Cassette Interface							
VT11	SU	Graphic Processor		6.5	100				0.8
VR11-A	SPC	Push Button Box		4					0.4

2.3 COMPUTER OPTION AND MAIN POWER WIRE HARNESSES

Table 2-6 is a list of typical PDP-11 family wire harnesses.

2.4 POWER DISTRIBUTION WIRE COLOR CODING

Table 2-7 lists the standard colors used for dc power and signal distribution to the backplanes.

Table 2-7
Power Distribution Wire Coding

DC Power/Signal	Color of Wire
Ground	Black
Line clock (LTCL)	Brown
DC LO	Violet
AC LO	Yellow
+5 V	Red
-5 V	Brown
+15 V	Gray
-15 V	Blue
+20 V	Orange

Table 2-6
Option Harnesses

CPU Type Option	11/35-S, 11/05-S BA11-KE/F 10-1/2 in. Box	11/05, 11/10 BA11-D 10-1/2 in. Box	11/35 BA11-D 10-1/2 in. Box	11/45 (Old)	11/40 H960D/E, BA11-F (Old) ****	11/40, 11/45 H960D/E, BA11-F (New)
AA11-DA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
AA11-DB	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DA11-F	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DB11-A	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DC11-A	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DD11-A	70-9562	70-9205	70-9205	70-8855	70-9177 70-8909	70-9562
DD11-B	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DH11-AA	70-10118	N/A	N/A	N/A	70-9466	70-9561
DH11-AB	70-10118	N/A	N/A	N/A	70-9466	70-9561
DH11-AC	70-10118	N/A	N/A	N/A	70-9466	70-9561
DJ11-AA	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DJ11-AB	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DJ11-AC	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DN11-AA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DP11-DA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DR11-B	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
MF11-L*	N/A	70-9206	70-9206	70-9242	70-9103	70-9565
MF11-L**	70-10114	N/A	N/A	N/A	70-9174	70-9560
MF11-LP*	N/A	N/A	70-9206	70-9242	70-9103	70-9565
MF11-LP**	70-10114	N/A	N/A	N/A	70-9174	70-9560
MF11-U***	70-10115	N/A	N/A	N/A	N/A	70-9535
MF11-UP***	70-10115	N/A	N/A	N/A	N/A	70-9535
MM11-S	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
RH11	70-9570	70-9099	70-9099	70-9162	70-9571	70-9570
RH11-AB	70-10117	70-9099	70-9099	70-7162	70-9099	70-9563
RK11-D	70-10116	70-8992	70-8992	70-8855	70-8992	70-9559
VT11	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
CD11 A/B,E	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DQ11	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563

* 11/40 only (1st MF11-L/LP)

** 11/40 only (2nd MF11-L/LP)

*** MF11-U/UP cannot be mounted in old style 11/45 CPU box.

****Use 70-9177 if due to new module guide layout, 70-8909 cables are too short.

Table 2-5 (Cont)
PDP-11 Family Options

Option	Mounting Code	Description	Power Harness	Current Needed (Amperes)					AC Line Current (Amperes)
				+5 V	-15 V	+20 V	-5 V	+15 V	
DFC11-A	(DU/DP CLOCK)	Level Converter Clock Recovery		0.4	0.02			0.02	0.05
DQ11-K	(DQ11-D/A)	Crystal Clock			0.05				0.012
DR11-B	SPC	General Purpose DMA	7009562	3.3					0.32
DR11-C	1 SU	General Purpose Digital Interface		1.5					0.15
DR11-K	SPC	Digital I/O		N/A	0.15				0.6
DU11-D	SPC	Full/Half Duplex		2.2	2.5			0.05	0.27
DU11-EA	SPC	Sync Prog. Interface		2.6	0.20			0.07	0.33
DV11	DBL SU	Sync MUX	13.5	.083				0.435	0.5
KG11-A	SPC	Comm Arith Unit		1.2					0.12
KW11-L	(CPU)	Line Clock		0.8					0.08
KW11-P	SPC	Prog Line Clk		1.0					0.1
LC11-A	SPC	LA30 Control		1.5					0.15
LP11-R	SPC	1200 LPM Printer		1.0					0.1
LP11-S	SPC	900 LPM Printer		1.0					0.1
LP11-W	SPC	240 LPM Printer		1.5					0.15
LP11-V	SPC	300 LPM Printer		1.5					0.15
LS11-A	SPC	60 LPM Printer		1.5					0.15
LV11-B	SPC	Electrostatic Printer, 500 LPM		1.5					0.15
MR11-DB	2 SPC	Bootstrap							
PC11	SPC	Paper Tape		1.5					0.15
PR11	SPC	Paper Tape (Reader)							
RH11	DBL SU			1.9					0.19
RK11-D	SU	Disk and Cntrl	7010115	8.0					0.8
TA11-A	SPC	Dual Cassette Interface							
VT11	SU	Graphic Processor		6.5	100				0.8
VR11-A	SPC	Push Button Box		4					0.4

2.3 COMPUTER OPTION AND MAIN POWER WIRE HARNESSES

Table 2-6 is a list of typical PDP-11 family wire harnesses.

2.4 POWER DISTRIBUTION WIRE COLOR CODING

Table 2-7 lists the standard colors used for dc power and signal distribution to the backplanes.

Table 2-7
Power Distribution Wire Coding

DC Power/Signal	Color of Wire
Ground	Black
Line clock (LTCL)	Brown
DC LO	Violet
AC LO	Yellow
+5 V	Red
-5 V	Brown
+15 V	Gray
-15 V	Blue
+20 V	Orange

Table 2-6
Option Harnesses

CPU Type Option	11/35-S, 11/05-S BA11-KE/F 10-1/2 in. Box	11/05, 11/10 BA11-D 10-1/2 in. Box	11/35 BA11-D 10-1/2 in. Box	11/45 (Old)	11/40 H960D/E, BA11-F (Old) ****	11/40, 11/45 H960D/E, BA11-F (New)
AA11-DA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
AA11-DB	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DA11-F	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DB11-A	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DC11-A	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DD11-A	70-9562	70-9205	70-9205	70-8855	70-9177 70-8909	70-9562
DD11-B	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DH11-AA	70-10118	N/A	N/A	N/A	70-9466	70-9561
DH11-AB	70-10118	N/A	N/A	N/A	70-9466	70-9561
DH11-AC	70-10118	N/A	N/A	N/A	70-9466	70-9561
DJ11-AA	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DJ11-AB	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DJ11-AC	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DN11-AA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DP11-DA	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
DR11-B	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
MF11-L*	N/A	70-9206	70-9206	70-9242	70-9103	70-9565
MF11-L**	70-10114	N/A	N/A	N/A	70-9174	70-9560
MF11-LP*	N/A	N/A	70-9206	70-9242	70-9103	70-9565
MF11-LP**	70-10114	N/A	N/A	N/A	70-9174	70-9560
MF11-U***	70-10115	N/A	N/A	N/A	N/A	70-9535
MF11-UP***	70-10115	N/A	N/A	N/A	N/A	70-9535
MM11-S	70-9562	70-9205	70-9205	70-8855	70-8909	70-9562
RH11	70-9570	70-9099	70-9099	70-9162	70-9571	70-9570
RH11-AB	70-10117	70-9099	70-9099	70-7162	70-9099	70-9563
RK11-D	70-10116	70-8992	70-8992	70-8855	70-8992	70-9559
VT11	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
CD11 A/B,E	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563
DQ11	70-10117	70-9099	70-9099	70-9162	70-9099	70-9563

* 11/40 only (1st MF11-L/LP)

** 11/40 only (2nd MF11-L/LP)

*** MF11-U/UP cannot be mounted in old style 11/45 CPU box.

****Use 70-9177 if due to new module guide layout, 70-8909 cables are too short.

2.5 UNIBUS AND COMMUNICATION CABLE ROUTING

Figure 2-5 illustrates the routing of Unibus and communication cables in the BA11-K. The routing shown should be used as a guide, taking the following rules into consideration.

1. The maximum height of the cable or cables routed through the BA11-K is 1/2 inches. This is due to the room available under the top cover and cable clamp.
2. Unibus cables should be kept separate from other cables, if possible, to avoid cross talk.
3. Ensure that there is a layer of foam between each Unibus cable when the Unibus cables are stacked.
4. Care should be exercised when routing flat cables to minimize blockage of the exhaust air vents. These air vents are located in back of the BA11-K on each side of the transformer assembly (Figure 1-3).

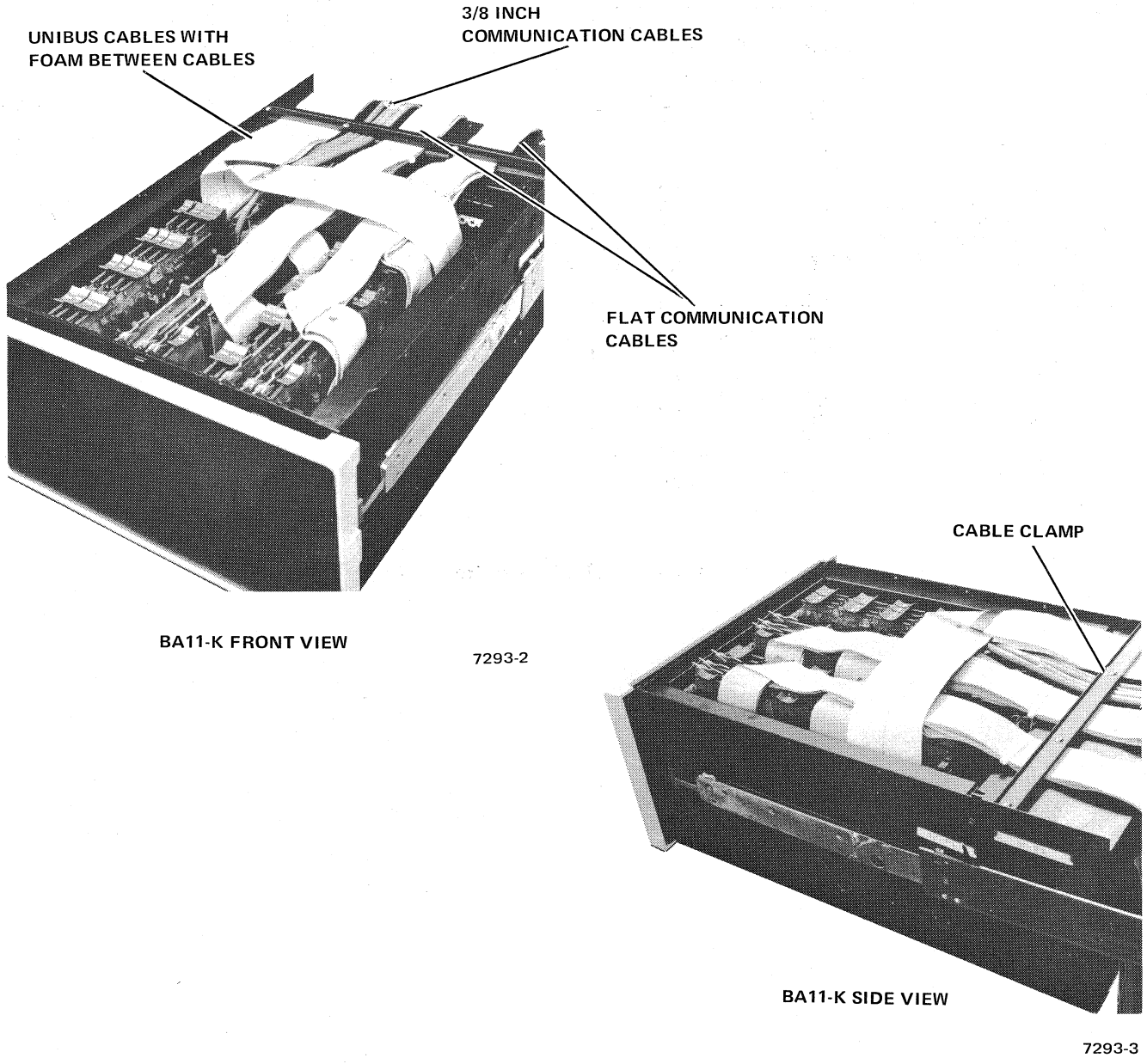


Figure 2-5 Cable Routing

2.6 CABINET AND SLIDE MOUNTING SPECIFICATIONS

The BA11-K and a 10-1/2 inch CPU can be mounted in a H950 cabinet. When using a H950 cabinet the standard configuration is to place the CPU in location 3 and the BA11-K in location 2 (shown in Figure 2-6). The hole numbers shown on Figure 2-6, indicate the exact physical location for mounting an Accuride or Chassis-Trak slide on the front rail. Although the front rail slide placement is identical for both slides, there are some mounting differences when fastening the slides to a chassis. Figures 2-7 and 2-8 illustrate the specific slide mounting specifications for Accuride and Chassis-Trak, respectively.

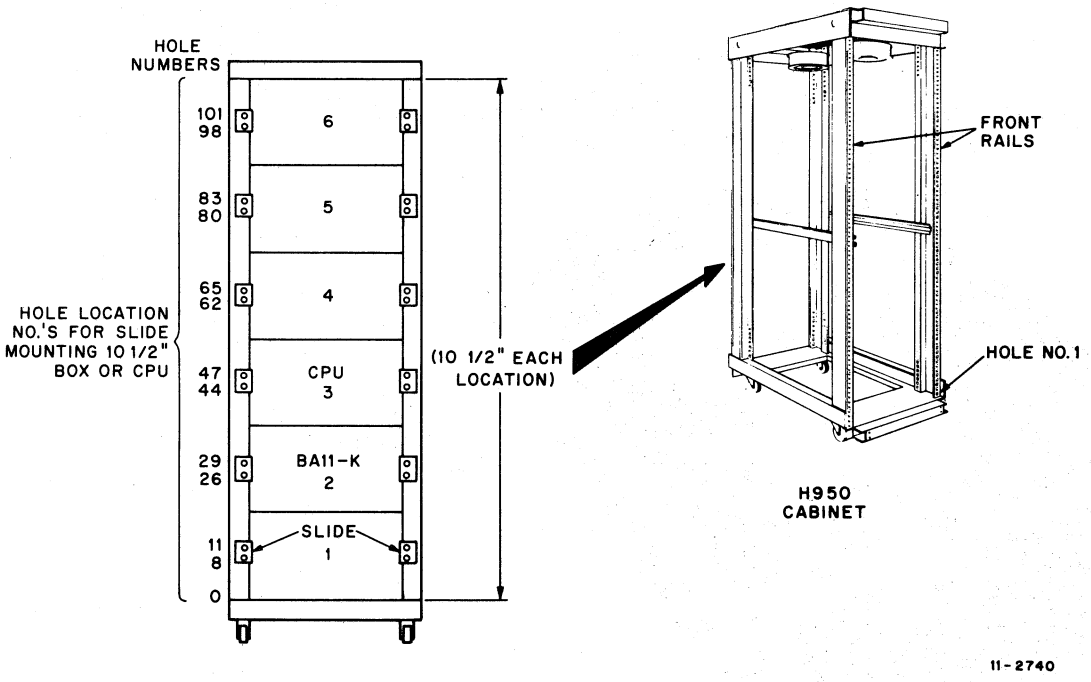


Figure 2-6 BA11-K and CPU Cabinet Mounting Specification

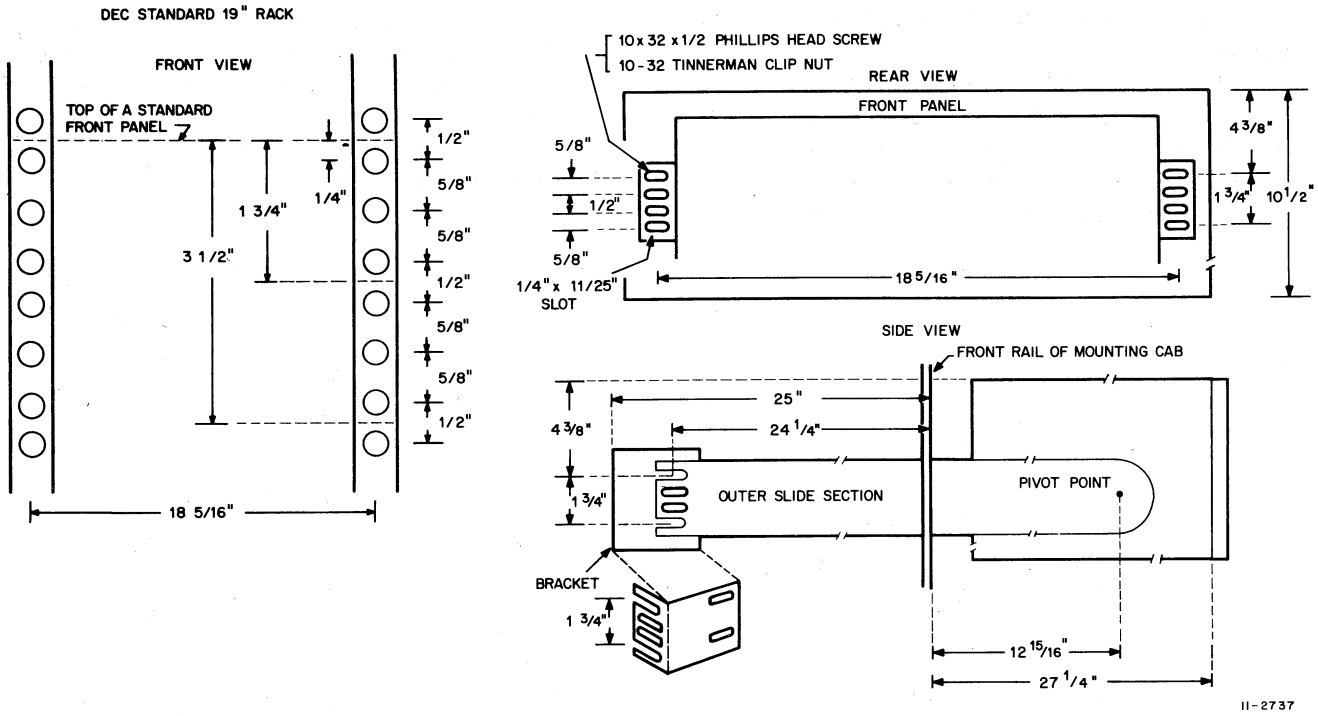


Figure 2-7 Accuride Slide Mounting Specification

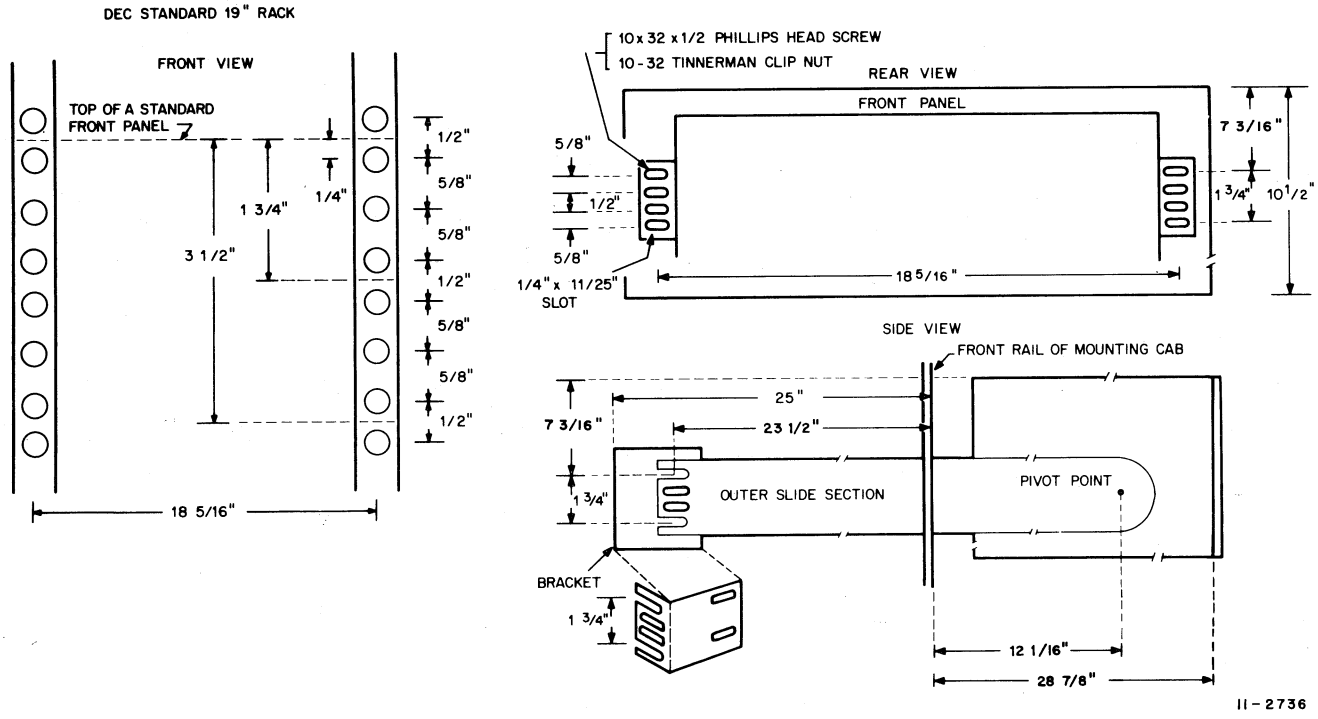


Figure 2-8 Chassis-Trak Slide Mounting Specification

CHAPTER 3
UNPACKING AND INSTALLATION

3.1 INTRODUCTION

This chapter provides information on the unpacking and installation of the BA11-K mounting box. Information on installation certification is also included.

3.2 UNPACKING

The BA11-K is shipped ready to operate in a protective box (Figure 3-1). Remove the BA11-K from the box and visually inspect for damage. Save the shipping cartons and packaging materials in case it is necessary to return the BA11-K for service. The slide mounts are attached to the BA11-K, but the mounting screws are packed in a bag placed in the shipping container.

3.3 INSTALLATION IN A CABINET

Refer to Paragraph 2.6 for cabinet and slide mounting specifications. The front of the fixed slide has an integral bracket and is mounted in the cabinet with two screws that are secured with captive (Tinnerman) nuts. The rear of the fixed slide is attached to a separate L-shaped bracket with two screws and nuts. The bracket is attached to the cabinet with two screws that are secured with captive nuts. Mount the fixed slides equidistant from and parallel to the floor.

Lift the BA11-K and slide it carefully into the fixed guides until the slide release engages. Unlock the slide release and push the BA11-K fully into the cabinet. Extend the BA11-K enough to allow access to the front mounting screws. Slightly loosen the front and rear slide mounting screws and slide the computer back and forth. This allows the slides to assume a position that causes minimum binding. Retighten the mounting screws.

3.4 AC POWER SUPPLY CONNECTION

3.4.1 Connecting to 115 Vac or 230 Vac

The BA11-KE/KF, designed for use on 115 Vac/230 Vac circuits, is equipped with a three-prong connector, which, when inserted into a properly wired 115 Vac or 230 Vac outlet, grounds the chassis. It is unsafe to operate the BA11-K unless the chassis is grounded, since normal leakage current from the power supply flows into metal parts of the chassis.

If the integrity of the ground circuit is questionable, the user is advised to measure the potential between the computer case and a known ground with an ac voltmeter.

The BA11-KE/KF operates at voltages ranging from 90 V to 132 V/180 V to 264 V (47 Hz–63 Hz). The plug configuration and specifications are shown in Figure 3-2.

For installations outside of the United States or where the National Electric Code does not govern building wiring, the user is advised to proceed with caution.

3.4.2 Quality of AC Power Source

If the BA11-K is to be installed in an electrically noisy environment, it may be necessary to condition the ac power line. Digital Field Service engineers can assist customers in determining if their ac line is satisfactory.

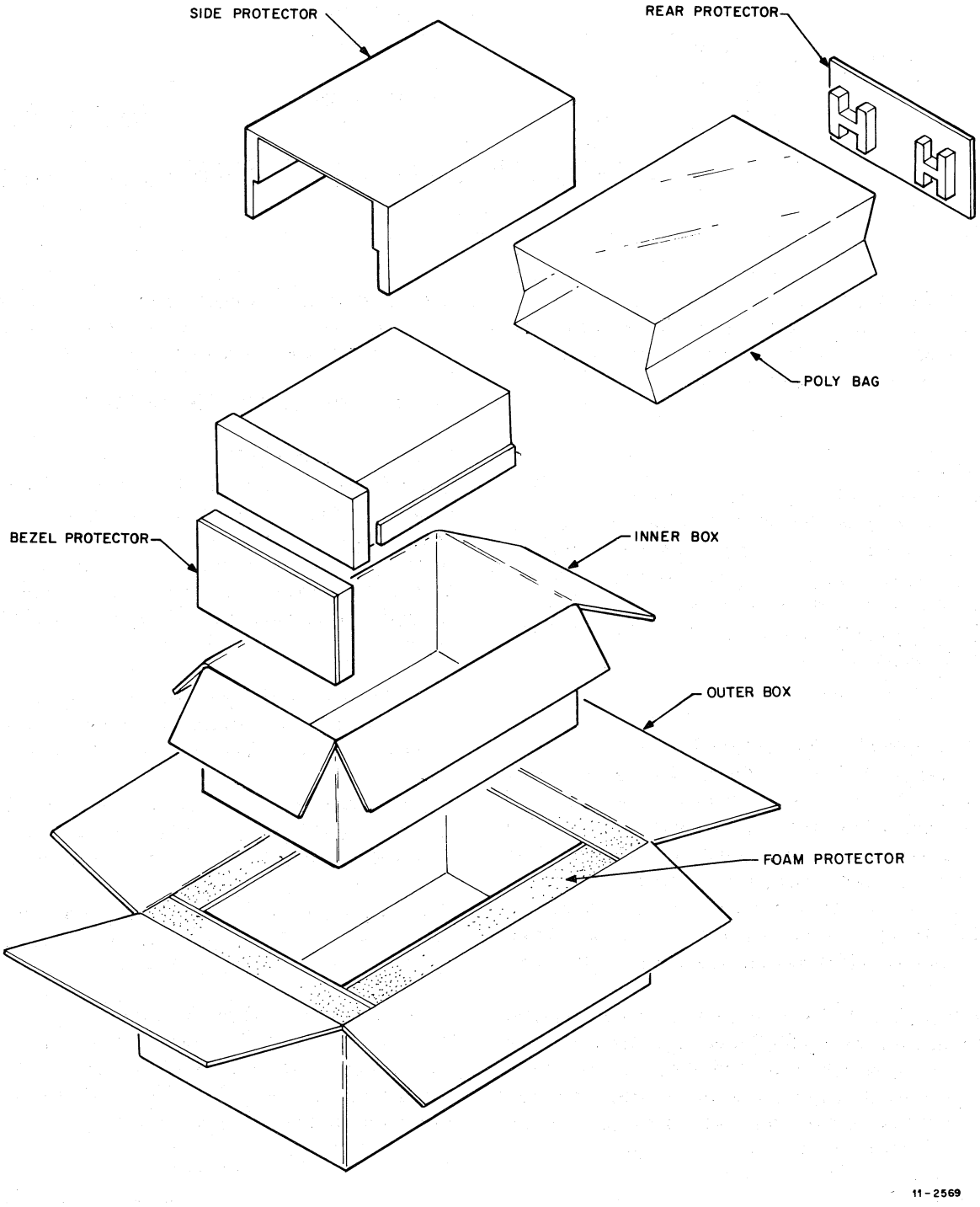
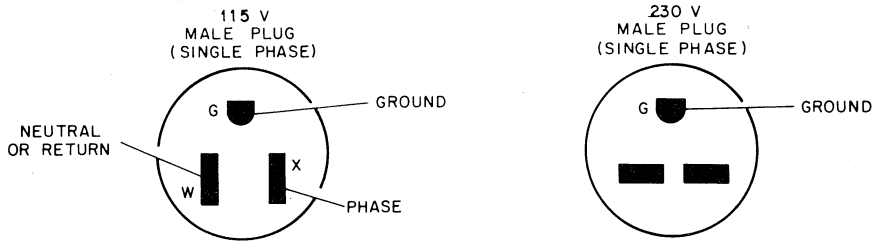


Figure 3-1 BA11-K Packaging



CONNECTOR SPECIFICATIONS

DESCRIPTION	NEMA* CONFIGURATION	POLES	WIRES	PLUG	RECEPTACLE
				DEC PART NO.	DEC PART NO.
115V, 15 AMP	5-15	2	3	90-08938	12-05351
230V, 15 AMP	6-15	2	3	90-08853	12-11204

*ADD P SUFFIX FOR PLUG
ADD R SUFFIX FOR RECEPTACLE

11-2572

Figure 3-2 Connector Specifications

3.5 REMOTE POWER CONTROL

Power control (Figure 3-3) of the BA11-K can be accomplished by the following three methods:

1. A key switch can be utilized to control the BA11-K. This is accomplished by connecting the proper cable to J2 or J3 on the ac input box.

2. Mate-N-Loks J1, J2, or J3 on the ac input box can be configured to enable a power controller to control application of ac power.

3. CB1 on the ac input box can be used as an on/off switch, only if pins 1 and 3 of J3 are shorted together.

3.6 INSTALLATION CERTIFICATION

Once the BA11-K has been installed, it is strongly recommended that a system diagnostic be run to ensure that the equipment operates correctly and that installation has been properly performed. Because system configurations vary widely, no one diagnostic will completely exercise all the attached devices.

The user's manual that comes with the diagnostic package should be consulted for the appropriate diagnostic to be run. The user's manual lists the devices that each diagnostic will exercise. Once the diagnostic is selected, the respective diagnostic write-up should be consulted for specific operating instructions. If the user is not familiar with console operation and/or procedures for loading paper tapes, he or she should read the applicable manual.

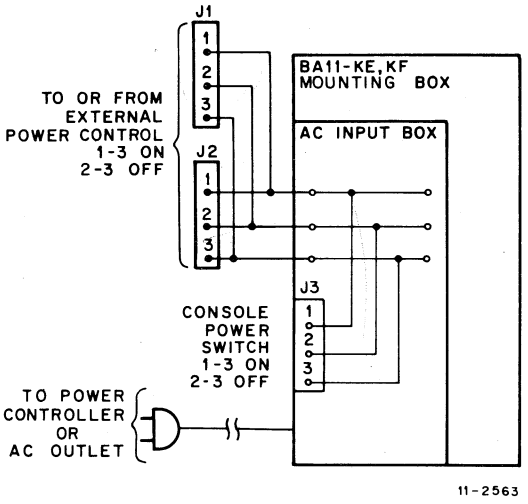


Figure 3-3 Power Control

Reader's Comments

BA11-K Mounting Box User's Manual
EK-BA11K-OP-001

Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of our publications.

What is your general reaction to this manual? In your judgment is it complete, accurate, well organized, well written, etc.? Is it easy to use? _____

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What features are most useful? _____

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Does this manual satisfy the need you think it was intended to satisfy? _____

Does it satisfy *your* needs? _____ Why? _____

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Would you please indicate any factual errors you have found. _____

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