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LSI-11 Systems Service Manual

Volume I

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CONTENTS

VOLUME I - SYSTEMS CONFIGURATIONS

| | |
|--|-----|
| GENERAL CONFIGURATION RULES..... | 1 |
| GENERAL CONFIGURATION RULES..... | 1 |
| MEMORY..... | 6 |
| REFRESH CONFIGURATION PROCEDURE..... | 11 |
| MICRO/PDP-11 SYSTEM..... | 21 |
| GENERAL..... | 21 |
| PDP-11V03 AND PDP-11T03 SYSTEMS..... | 35 |
| PDP-11V03..... | 35 |
| PDP-11T03..... | 43 |
| PDP-11T03-L AND PDP-11V03-L SYSTEMS..... | 49 |
| PDP-11T03-L..... | 49 |
| PDP-11V03-L..... | 54 |
| PDP-11V23 AND PDP-11T23 SYSTEMS..... | 63 |
| PDP-11V23 SYSTEM..... | 63 |
| PDP-11T23 SYSTEM..... | 73 |
| PDP-11/03-BASED MINC/DECLAB-11/MINC SYSTEMS..... | 81 |
| MODULAR INSTRUMENTATION COMPUTER (MINC)..... | 81 |
| DECLAB-11/MNC SYSTEM..... | 91 |
| PDP-11/23-BASED MINC/DECLAB-11/MINC SYSTEMS..... | 101 |
| MINC..... | 101 |
| DECLAB-11/MNC PDP-11/23-BASED SYSTEM..... | 112 |
| PDP-11/23 PLUS SYSTEM..... | 123 |
| GENERAL..... | 123 |
| COMPONENTS..... | 124 |
| PDP-11/23S SYSTEM..... | 135 |
| KDF11-B PROCESSOR MODULE (CPU) (M8189)..... | 137 |
| KDF11-B LED INDICATORS..... | 139 |
| MSV11-D MOS RAM MEMORY..... | 141 |
| EXPANSION RULES..... | 145 |

CONTENTS (Cont)

| | |
|---|-----|
| PDP-11/23 PLUS, MICRO/PDP-11 AND MicroVAX EXPANSION | 151 |
| GENERAL | 151 |
| VT103 LSI-11 VIDEO TERMINAL | 157 |
| GENERAL | 157 |
| LSI-11 BACKPLANE..... | 159 |
| CONFIGURATION | 160 |
| STANDARD TERMINAL PORT..... | 160 |
| VT1X3-MM MAINTENANCE MODULE (M8208) | 162 |
| 11MDS-A MICROCOMPUTER DEVELOPMENT SYSTEM | 165 |
| GENERAL | 165 |
| SPECIFICATIONS..... | 167 |
| CONFIGURATION | 169 |
| SYSTEM VERIFICATION PROGRAM | 185 |
| COMMERCIAL SYSTEMS | 189 |
| D315 DATASYSTEM | 189 |
| D322..... | 211 |
| D324 | 222 |
| D325..... | 232 |
| D333C | 235 |
| D335C | 237 |
| D336C | 239 |
| DPM23 DISTRIBUTED PLANT MANAGEMENT SYSTEM..... | 243 |
| LABORATORY SYSTEMS | 257 |
| PDP-11L03..... | 257 |
| TELEPHONE COMPANY SYSTEM | 269 |
| CC1A PDP-11V03 SYSTEM..... | 269 |
| | |
| OPTIONS | |
| GENERAL MODULE INFORMATION | 291 |
| BA11-M MOUNTING BOX | 292 |
| BA11-N MOUNTING BOX..... | 304 |
| CONFIGURATION | 306 |

CONTENTS (Cont)

| | |
|---|-----|
| BA11-S MOUNTING BOX | 325 |
| GENERAL | 325 |
| POWER SUPPLY | 328 |
| FRONT PANEL SWITCHES AND INDICATORS | 333 |
| FRONT PANEL BEZEL | 334 |
| H9276 BACKPLANE | 335 |
| EXPANSION | 338 |
| BA11-VA MOUNTING BOX | 341 |
| GENERAL | 341 |
| H349 DISTRIBUTION PANEL | 345 |
| GENERAL | 345 |
| H780 POWER SUPPLY | 347 |
| H786/H7861 POWER SUPPLIES | 352 |
| SPECIFICATIONS | 352 |
| H7864 POWER SUPPLY | 355 |
| SPECIFICATIONS | 355 |
| H9275 BACKPLANE | 358 |
| GENERAL | 358 |
| SPECIFICATIONS | 359 |
| CONFIGURATION | 360 |
| INSTALLATION | 362 |
| H9276 BACKPLANE | 364 |
| GENERAL | 364 |
| SPECIFICATIONS | 365 |
| CONFIGURATION | 366 |
| H9278-A BACKPLANE | 368 |
| GENERAL | 368 |
| MMV11-A CORE RAM MEMORY | 377 |

CONTENTS (Cont)

VOLUME II – MODULE OPTIONS

| | |
|---|-----|
| AAV11-A DIGITAL-TO-ANALOG CONVERTER | 381 |
| AAV11-C DIGITAL-TO-ANALOG CONVERTER | 386 |
| CONFIGURATION | 386 |
| PROGRAMMING THE AAV11-C..... | 388 |
| I/O INTERFACE..... | 390 |
| ADV11-A ANALOG-TO-DIGITAL CONVERTER | 392 |
| ADV11-C ANALOG-TO-DIGITAL CONVERTER | 397 |
| CONFIGURATION | 399 |
| CSR BITS | 402 |
| DATA BUFFER REGISTER..... | 403 |
| I/O INTERFACE..... | 404 |
| AXV11-C ANALOG INPUT/OUTPUT | 405 |
| CONFIGURATION | 407 |
| CSR BITS | 411 |
| DATA BUFFER REGISTER..... | 413 |
| DAC A AND DAC B REGISTERS..... | 414 |
| I/O INTERFACE..... | 414 |
| BCV1X BUS TERMINATOR, DIAGNOSTIC AND BOOTSTRAP MODULES | 415 |
| BDV11 BUS TERMINATOR, BOOTSTRAP AND DIAGNOSTIC ROM | 425 |
| BDV11 HALT/ENABLE, RESTART, AND BEVNT SWITCHES | 431 |
| DEQNA INTERFACE (ETHERNET)..... | 441 |
| GENERAL | 441 |
| PREINSTALLATION VERIFICATION | 444 |
| M7504 MODULE | 446 |
| DEQNA BOOT SEQUENCE | 450 |
| DHV11 8-LINE ASYNCHRONOUS MULTIPLEXER | 453 |
| GENERAL | 453 |
| MODULE INSTALLATION..... | 461 |
| CABLES AND CONNECTORS..... | 463 |
| DLV11 SERIAL LINE UNIT | 473 |

CONTENTS (Cont)

| | |
|---|-----|
| DLV11-E ASYNCHRONOUS SERIAL LINE INTERFACE | 483 |
| DLV11-F ASYNCHRONOUS SERIAL LINE INTERFACE | 498 |
| DLV11-J SERIAL LINE UNIT | 511 |
| DLV11-KA EIA TO 20 MA CONTROLLER | 533 |
| CONFIGURATION | 533 |
| DMV11 SYNCHRONOUS CONTROLLER | 539 |
| DMV11 OPTIONS | 539 |
| CONFIGURATION | 542 |
| CSR BITS | 556 |
| DPV11 SERIAL SYNCHRONOUS INTERFACE | 563 |
| CONFIGURATION | 565 |
| RECEIVE CONTROL STATUS REGISTER (RXCSR) | 568 |
| RECEIVE DATA AND STATUS REGISTER (RDSR)..... | 574 |
| PARAMETER CONTROL SYNC/ADDRESS REGISTER (PCSAR) | 579 |
| PARAMETER CONTROL AND CHARACTER LENGTH REGISTER (PCSCR)..... | 583 |
| TRANSMIT DATA AND STATUS REGISTER (RDSR)..... | 590 |
| DRV11 PARALLEL LINE UNIT | 595 |
| DRV11-B GENERAL PURPOSE DMA INTERFACES | 601 |
| DRV11-J GENERAL PURPOSE PARALLEL LINE INTERFACE | 605 |
| DRV11-P FOUNDATION MODULE..... | 619 |
| DUV11-DA SYNCHRONOUS SERIAL LINE INTERFACE | 632 |
| DZV11 ASYNCHRONOUS MULTIPLEXER | 644 |
| PPF11 FLOATING POINT PROCESSOR | 655 |
| GENERAL | 655 |
| CONFIGURATION | 655 |
| G7272/M8659 LSI-11 GRANT CARDS..... | 659 |
| IBV11-A LSI-11 INSTRUMENT BUS INTERFACE..... | 661 |
| KD11 LSI-11 PROCESSOR MODULES | 667 |

CONTENTS (Cont)

| | |
|--|-----|
| KDF11-AX 11/23-A MICROCOMPUTER | 680 |
| KDF11-BA 11/23-B MICROPROCESSOR..... | 692 |
| GENERAL | 692 |
| CONFIGURING THE KDF11-BA | 693 |
| FACTORY SWITCH AND JUMPER CONFIGURATIONS | 716 |
| KPV11-A POWER FAIL/LINE TIME CLOCK (LTC)..... | 720 |
| -B 120 Ω TERMINATOR | |
| -C 250 Ω TERMINATOR | |
| KUV11-AA WRITABLE CONTROL STORE..... | 725 |
| KWV11-A PROGRAMMABLE REAL-TIME CLOCK..... | 730 |
| KWV11-C PROGRAMMABLE REAL-TIME CLOCK..... | 740 |
| CONFIGURATION | 741 |
| CSR BITS | 747 |
| BUFFER/PRESET REGISTER | 751 |
| I/O INTERFACE..... | 751 |
| KXT11-A SBC-11/21 SINGLE-BOARD COMPUTER | 752 |
| GENERAL | 752 |
| CONFIGURATION | 753 |
| ODT ROMs | 761 |
| VOLUME III – MODULE OPTIONS | |
| LAV11 PRINTER INTERFACE | 767 |
| LPV11 LP05/LA180 INTERFACE MODULE..... | 772 |
| LSI-11/2 PROCESSOR MODULE DESIGNATIONS | 779 |
| MCV11-D CMOS READ/WRITE MEMORY | 783 |
| GENERAL | 783 |
| CONFIGURING THE MCV11-D MEMORY MODULE | 784 |
| MRV11-AA READ-ONLY MEMORY | 789 |
| MRV11-BA ULTRAVIOLET PROM-RAM..... | 793 |
| MRV11-C READ-ONLY MEMORY MODULE | 803 |

CONTENTS (Cont)

| | |
|---|-----|
| MRV11-D UNIVERSAL PROM MODULE | 815 |
| GENERAL | 815 |
| MSV11-B READ/WRITE MEMORY | 825 |
| MSV11-C MOS READ/WRITE MEMORY..... | 828 |
| MSV11-D,E MOS READ/WRITE MEMORY | 833 |
| MSV11-L MOS READ/WRITE MEMORY | 838 |
| GENERAL | 838 |
| MSV11-L POWER..... | 838 |
| CONFIGURATION | 841 |
| MSV11-P MOS MEMORY..... | 849 |
| GENERAL | 849 |
| CONFIGURATION | 851 |
| CONTROL STATUS REGISTER (CSR) BIT ASSIGNMENT | 857 |
| MXV11-AA,AC MULTIFUNCTION MODULE..... | 860 |
| CONFIGURING THE SERIAL LINE UNITS | 872 |
| MXV11-B MULTIFUNCTION OPTION MODULE | 884 |
| GENERAL | 884 |
| RKV11-D BUS INTERFACE FOR RKV11-D DISK DRIVE CONTROLLER..... | 914 |
| RLV11 CONTROLLER MODULES | 930 |
| RLV12 DISK CONTROLLER..... | 943 |
| CONFIGURATION | 945 |
| CONTROL STATUS REGISTER (CSR)..... | 949 |
| BUS ADDRESS REGISTER (BAR)..... | 952 |
| DISK ADDRESS REGISTER (DAR)..... | 953 |
| MULTIPURPOSE REGISTER (MPR)..... | 956 |
| BUS ADDRESS EXTENSION REGISTER (BAE) | 960 |
| RQDX1 AND EXTENDER CONTROLLER MODULE (RX50, RD51, RD52)..... | 961 |
| LOGICAL UNIT NUMBER SELECTION | 963 |
| RQDX1 EXTENDER MODULE INSTALLATION..... | 966 |
| RQDX1-E EXTENDER MODULE OPTION | 966 |
| RQDX1-E EXTENDER MODULE INSTALLATION | 966 |

CONTENTS (Cont)

| | |
|--|------|
| RXV11 FLOPPY DISK INTERFACE..... | 973 |
| RXV21 FLOPPY DISK CONTROLLER | 982 |
| TSV05 TAPE TRANSPORT AND BUS INTERFACE/CONTROLLER | 996 |
| GENERAL | 996 |
| VSV11 RASTER GRAPHICS SYSTEM..... | 1007 |
| GENERAL | 1007 |
| M7061-YA SYNC GENERATOR/CURSOR CONTROL BOARD..... | 1009 |
| M7062 MEMORY BOARD | 1016 |
| M7064 DISPLAY PROCESSOR MODULE..... | 1019 |
| PERIPHERAL OPTIONS | |
| RC25 8-INCH DISK DRIVE SUBSYSTEM..... | 1023 |
| GENERAL | 1023 |
| SPECIFICATIONS..... | 1029 |
| HOW TO MODIFY THE UNIT SELECT NUMBER PLUG | 1038 |
| RD51 11 Mb WINCHESTER DISK DRIVE SUBSYSTEM | 1043 |
| GENERAL | 1043 |
| VARIOUS CONFIGURATIONS FOR EXPANSION OF THE RD51..... | 1046 |
| RD52 31 Mb WINCHESTER DISK DRIVE SUBSYSTEM | 1053 |
| GENERAL | 1053 |
| RK05 DISK DRIVE SUBSYSTEM | 1064 |
| RL01/RL02 5.2/10.4 Mb CARTRIDGE DISK DRIVE UNIT | 1070 |
| RX01 FLOPPY DISK DRIVE..... | 1074 |
| RX02 FLOPPY DISK DRIVE..... | 1077 |
| RX50 FLOPPY DISK DRIVE SUBSYSTEM..... | 1082 |
| GENERAL | 1082 |
| SYSTEM AND EXTERNAL SUBSYSTEM INTERCONNECT | 1087 |

CONTENTS (Cont)

| | |
|--------------------------------------|------|
| TU58 TAPE CASSETTE UNIT | 1098 |
| GENERAL | 1098 |
| | |
| APPENDICES | |
| DIAGNOSTIC MEDIA AVAILABILITY | 1105 |
| FLOATING ADDRESSES/VECTORS | 1125 |
| LSI-11 BUS SPECIFICATION | 1127 |
| GENERAL | 1127 |
| DATA TRANSFER BUS CYCLES | 1137 |
| DATI | 1139 |
| DATOB | 1142 |
| DATIOB | 1145 |
| DMA PROTOCOL | 1148 |
| INTERRUPTS | 1151 |
| CONTROL FUNCTIONS | 1157 |
| BUS ELECTRICAL CHARACTERISTICS | 1160 |
| SYSTEM CONFIGURATIONS | 1164 |
| FCC INFORMATION | 1168 |
| GENERAL | 1168 |

GENERAL CONFIGURATION RULES

GENERAL CONFIGURATION RULES

The rules and considerations discussed in this section apply to all LSI-11 systems. Refer to subsequent sections for requirements peculiar to specific systems.

Backplanes

LSI-11 systems can be divided into two types: those that use only one backplane, and those that have multiple backplanes. Single backplane systems are viewed as lumped capacitance. Multiple backplane systems are regarded as transmission line systems. The characteristics of the two types differ enough to require separate sets of configuration rules. The rules are given in terms of power consumption, dc bus loading, and ac bus loading. DC loading is a measure of the leakage current a module's bus signal lines draw when high (undriven). One dc load is nominally 105 μA . AC loading is a measure of the capacitance a module adds to the bus signal lines. One ac load is 9.35 pF. Backplanes also add ac loading to the bus. The power consumption, dc loading, and ac loading is listed for each module in the "CPU/Options" section.

Configuring Single Backplane Systems

1. The bus can support up to 20 ac loads before additional termination is required. The processor has on-board termination for one end of the bus, and after 20 ac loads, the other end of the bus must be terminated with 120 Ω .
2. A terminated bus can support up to 35 ac loads.
3. The bus can support up to 20 dc loads.
4. The bus signal lines on the backplane can be up to 35.6 cm (14 in) long.

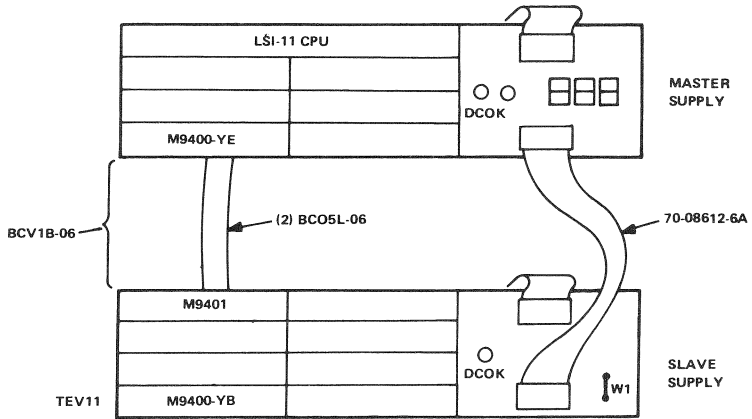
The preceding rules apply only to single backplane systems. The bus cannot be extended off the backplane in any way. If it is, the system is considered a multiple backplane system.

Configuring Multiple Backplane Systems

1. a. Up to three backplanes may be connected together.
 - b. The signal lines on each backplane can be up to 25.4 cm (10 in) long.
2. Each backplane can have up to 20 ac loads. Unused ac loads from one backplane may not be added to another backplane if the second backplane loading will exceed 20 ac loads. It is desirable to load backplanes equally or with the highest ac loads in the first and second backplanes.
3. Total dc loading of all three backplanes combined can be up to 20 loads.
4. Both ends of the transmission line should be terminated with 120 Ω . This means that the first backplane should have impedance of 120 Ω , and the last backplane should have a termination of 120 Ω .
5. a. The cable connecting the first two backplanes should be at least 1.83 meters (6 ft) long.
 - b. The cable connecting the second backplane to the third backplane must be at least 1.22 m (4 ft) longer or shorter than the cable connecting the first and second backplanes.
 - c. The combined length of the cables should not exceed 4.88 m (16 ft).
 - d. The cables used must have a characteristic impedance of 120 Ω .

Power Supplies

The "CPU/Options" section lists the typical power requirements for each module. For reliable operation, the sum of all typical current requirements should be less than 70 percent of the maximum rated current of the power supply. Refer to the appropriate power supply section for voltage and current ratings.



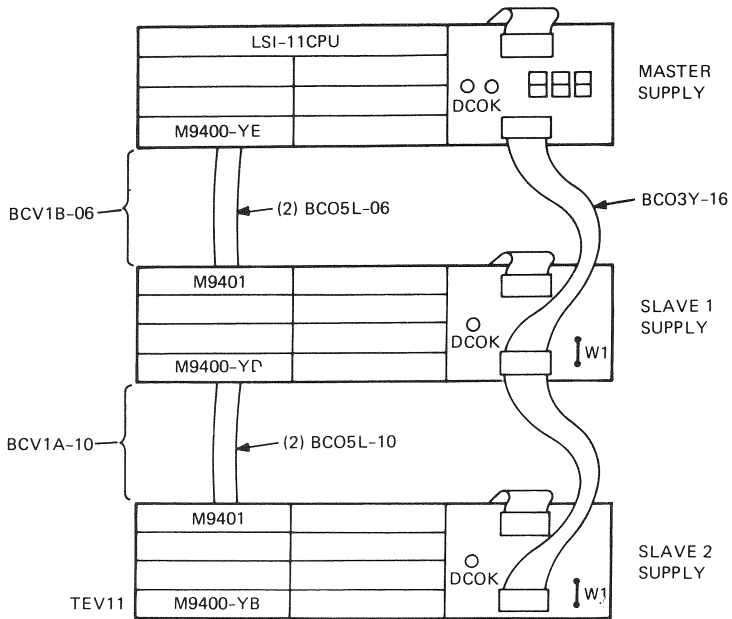
MR-0759

A Typical System Configuration Using BA11-M Boxes Showing Cables Needed for Expansion

NOTE

Expander boxes are normally shipped with W1 installed. This enables the slave power supply to be powered up and down without being cabled to the master supply. For system applications, however, it is recommended that W1 be removed. This will ensure that the slave supply does not power up unexpectedly if the cable is loosened.

Business Products systems (D322 and D324) do not use a PDP-11/03-J slave console. The two power supplies are connected by a cable (DEC part number (PN) 70-13371-00). No slave board is needed. In a standalone device, such as the RKV11-D disk drive controller, the W1 jumper must be installed and is not removed if it is added to a system.



NOTE:
 THE TWO (2) BCO5L-XX CABLE LENGTHS BETWEEN
 THE FIRST AND SECOND BOX SHOULD DIFFER
 FROM THE BCO5L-XX CABLE LENGTHS BETWEEN
 THE SECOND AND THIRD BOX BY AT LEAST FOUR
 FEET BECAUSE OF LSI-11 BUS REFLECTIONS.

MR-2370

**Typical System Configuration Using Three BA11-M Boxes
 Showing Cables Needed for Expansion**

Master/Slave Interface Cables

| Length | DEC PN |
|-----------------|-------------|
| 10.2 cm (4 in) | 70-08612-0D |
| 15 cm (6 in) | 70-08612-0F |
| 22.9 cm (9 in) | 70-08612-0K |
| 27.5 cm (11 in) | 70-08612-0M |
| 35.6 cm (14 in) | 70-08612-1B |
| 45.7 cm (18 in) | 70-08612-1F |
| 124 cm (49 in) | 70-08612-4A |
| 61.0 cm (2 ft) | 70-08612-02 |
| 1.83 m (6 ft) | 70-08612-6A |
| 3.05 m (10 ft) | 70-08612-10 |

Possible Problems Installing the 70-08612 or BC03Y-XX Cables

On a two box system, connect the remote sockets on the master console and the slave console with a 70-08612-XX cable.

NOTE

Some of the 70-08612 cables have been found with a connector on backwards. If the DCOK LED on the slave box does not come on when the master is turned on, the cable may be reversed.

If RT-11's clock does not update, the 70-08612 cable may be in upside down. The cable should be connected pin 1 to pin 1. The red line should be on the left of both J2 connectors.

Possible Problems Installing BC05L

Some BC05L-XX cables may have the "This Side Up" stickers on the wrong side of one end. The cables should be connected as follows.

- M9400-YE or YD pin AA (J1)
to
BC05L-XX pin 1
- BC05L-XX pin 1
to
M9401 pin AA (J1)

The pin markings on the BC05L cables are on the connector. The cables should be flat when run around the PDP-11/03 cable trays, and not twisted.

If the BC05L-XX is plugged in upside down, the bus DCOK line is grounded. The processor will not power up with this condition. Reverse the cables and try again.

MEMORY

Memory Refreshing Rules

All dynamic MOS RAM must be refreshed. Neither CORE RAM nor ROM/PROM memories need refreshing. Refreshing is available by three means: processor microcode, Direct Memory Access (DMA), and self-refreshing memory modules.

Processor Microcode Refresh – With processor microcode refresh, the processor must be strapped to enable the microcode refresh, and the memory module farthest from the processor on the bus must be configured to reply to refresh cycles. All other memory modules, including memory on the processor board itself, must have memory reply disabled. If only the 4K of RAM on the processor is being used, then that RAM must be strapped to respond to reply.

NOTE

Only quad-sized processor modules have microcode refresh capabilities. Double-sized processor modules do not. With double-sized processors, either DMA refresh or self-refreshing memory must be used.

DMA Refreshing – The REV11-A or REV11-C modules may be used to provide DMA memory refreshing. When using the REV11 to refresh memory, the REV11 refresh capability must be enabled via a strap on the REV11 board, and the processor microcode refreshing must be disabled. The memory module farthest from the REV11 should have reply to refresh enabled. If a quad-sized processor module with on-board RAM is used, usually that RAM will be the one strapped to reply to the refresh because it will be the farthest from the REV11 option.

DMA memory refreshing can be done by a customer's own module if that module makes sufficient memory accesses within the required time.

Self-Refreshing Memory – Self-refreshing memory does not use the bus to accomplish refreshing; therefore, no memory module need be strapped to reply to a memory refresh cycle.

Self-refreshing memory can be combined with nonself-refreshing memory on the same bus; however, when this is done, other refreshing techniques similar to processor microcode or DMA must be used to refresh the conventional memory. If an MSV11-C is used with a KD11-F or an MSV11-B, configure the MSV11-C for external refresh.

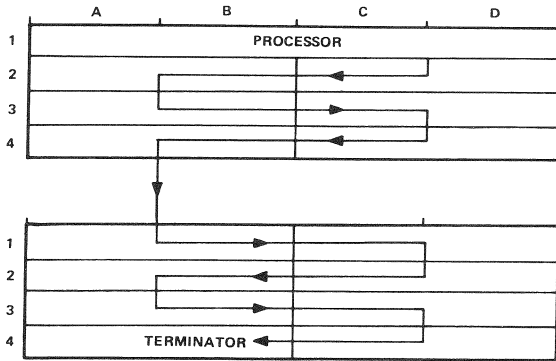
DMA Refresh Configuration

In systems that use a REV11-C for refresh and a TEV11 for bus termination, the REV11-C should be placed immediately after the memory modules.

DRV11-B or RKV11-D modules should follow the REV11-C in order to be lower in DMA priority.

Systems that use a REV11-A for both refresh and termination must have it in the last slot.

No open slots are permitted between the processor and the far-end bus terminator. The DMA and interrupt priority scheme is indicated in the following figure. The arrow indicates decreasing priority.



MR-0761

Q-Q Backplanes DMA/Interrupt Priority Scheme

Configuration Examples

If an LSI-11 system must be configured with memories other than the MSV11-CD, try to use one of the following engineering-approved examples.

Ex. 1

| | |
|-------------------------|-------------------------------------|
| M7264-0, -AB, -BB CPU | |
| M7944 MSV11-B 4K MEMORY | M7940 DLV11 SLU |
| M7944 MSV11-B 4K MEMORY | M9400-YA REV11-A BOOT/TERMINATOR |
| | |

MR-0798

In this type of configuration, use the M9400 (REV11) to perform refresh operations.

Jumpers would be as follows.

| | | | |
|----------|-----|-------------------|----------------------------------|
| M7264 | W4 | IN | Disable CPU controlled refresh. |
| | W9 | OUT | Enable reply from CPU memory. |
| | W10 | OUT | Enable CPU reply during refresh. |
| M7944 | W4 | IN (both modules) | Disable reply during refresh. |
| M9400-YA | W2 | IN | Enable DMA refresh. |

Ex. 2

| | |
|------------------------------|-------------------------------------|
| M7264-0, -AB, -BB CPU | |
| M7955-YD MSV11-CD 16K MEMORY | |
| M7944 MSV11-B 4K MEMORY | M9400-YA REV11-A BOOT/TERMINATOR |
| | |

MR-0799

In this type of configuration, use REV11 to control refresh operations.

Jumpers would be as follows.

| | | | |
|----------|-----|-----|-------------------------------|
| M7264 | W4 | IN | |
| | W9 | OUT | |
| | W10 | OUT | |
| M7955 | W7 | OUT | Disable internal refresh. |
| | W6 | IN | Disable reply during refresh. |
| M9400-YA | W2 | IN | |

Ex. 3

| | |
|------------------------------|-------------------------------------|
| M7264-YA, -YB CPU | |
| M7955-YD MSV11-CD 16K MEMORY | |
| M7944 MSV11-B 4K MEMORY | M9400-YA REV11-A BOOT/TERMINATOR |
| | |

MR-0800

In this type of configuration, use REV11.

Jumpers would be as follows.

| | | | |
|----------|-----|-----|---------------------------------------|
| M7264 | W4 | IN | Disable CPU refresh. |
| | W9 | IN | Disable reply from CPU memory. |
| | W10 | OUT | This is a "don't care" (if W9 is in). |
| M7955 | W7 | OUT | Disable internal refresh. |
| | W6 | OUT | Enable reply during refresh. |
| M7944 | W4 | IN | Disable reply during refresh. |
| M9400-YA | W2 | IN | Enable DMA refresh. |

Ex. 4

| | |
|------------------------------|--|
| M7264-0, -AB, -BB CPU | |
| M7955-YD MSV11-CD 16K MEMORY | |
| | |
| | |

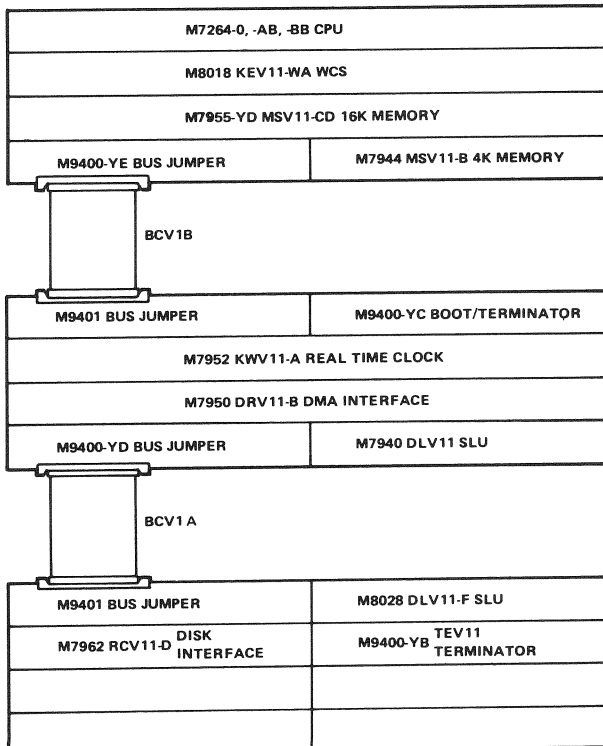
MR-0801

In this type of configuration, use CPU refresh.

Jumpers would be as follows.

| | | | |
|-------|-----|-----|-----------------------------------|
| M7264 | W4 | OUT | Enable CPU refresh. |
| | W9 | OUT | Enable reply from CPU memory. |
| | W10 | IN | Disable CPU reply during refresh. |
| M7955 | W7 | OUT | Disable internal refresh. |
| | W6 | OUT | Enable reply during refresh. |

Ex. 5



MR-0802

In this type of configuration, use the REV11-C (M9400-YC) to provide refresh.

Jumpers would be as follows.

| | | | |
|----------|-----|-----|----------------------------------|
| M7264 | W4 | IN | Disable CPU controlled refresh. |
| | W9 | OUT | Enable reply from CPU memory. |
| | W10 | OUT | Enable CPU reply during refresh. |
| M7955 | W7 | OUT | Disable internal refresh. |
| | W6 | IN | Disable reply during refresh. |
| M7944 | W4 | IN | Disable reply during refresh. |
| M9400-YC | W2 | IN | Enable DMA refresh. |

Do not use any configuration with DMA devices between the CPU and a REV11 performing DMA refresh.

The BDV11 (M8012) is always at end of the bus.

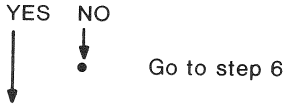
The preferred order of modules in systems is:

CPU
WCS
Memory
DMA refresh
Real time clock
INT fastest
↓
slowest
DMA fastest
↓
slowest
Program transfer (ROMs, D/As, etc.)
Terminator

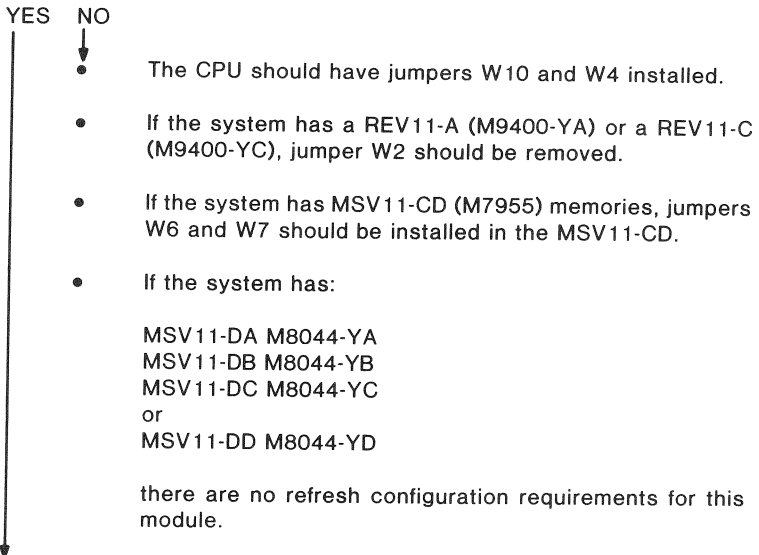
For later system configurations see BA11-N, BA11S for expansion.

REFRESH CONFIGURATION PROCEDURE

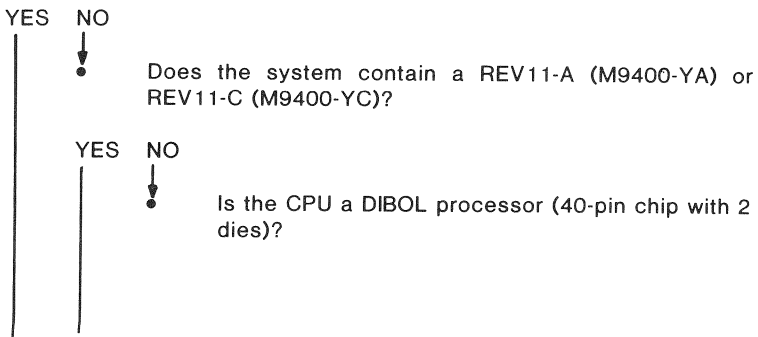
1 Is this CPU a KD11-H (M7264-YA)?



2 Does the system contain an MSV11-B (M7944) memory?



3 Does the system contain a DMA device other than the REV11-A (M7900-YA) or a REV11-C (M9400-YC), such as an RKV11-D (M7969) or DRV11-B (M7950)?



NO

YES

• You cannot configure this system without a REV11.

• The CPU (M7264-YA) should control refresh; jumper W4 removed and W10 installed.

• The MSV11-B (M7944) farthest from the CPU will reply; jumper W4 removed.

• All other MSV11-B memories should have W4 installed.

• If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.

• If the system has:

MSV11-DA M8044-YA
MSV11-DB M8044-YB
MSV11-DC M8044-YC
or
MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

• The REV11-A (M9400-YA) or REV11-C (M9400-YC) should control refresh; jumper W2 on the M9400 should be installed.

• The MSV11-B (M7944) farthest from the REV11 should reply to refresh; W4 removed.

• All other MSV11-B memories should have W4 installed.

• The CPU should not control refresh; jumpers W4 and W10 installed.

• If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.

• If the system has:

MSV11-DA M8044-YA
MSV11-DB M8044-YB

MSV11-DC M8044-YC
or
MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

4 Does the system contain a REV11-C (M9400-YC)?

NO YES

- The REV11-C (M9400-YC) should control refresh; W2 installed.
- The MSV11-B (M7944) farthest from the REV11 should reply to refresh; jumper W4 removed.
- All other MSV11-B (M7944) memories should have W4 installed.
- There should not be a DMA device placed between the CPU and REV11-C (M9400-YC).
- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:

MSV11-DA M8044-YA
MSV11-DB M8044-YB
MSV11-DC M8044-YC
or
MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

5 Is the CPU a DIBOL processor (40-pin chip with 2 dies)?

NO YES

- You cannot configure refresh on a system without a REV11-C.

- The CPU (M7264-YA) must control refresh; jumper W10 installed and W4 removed.

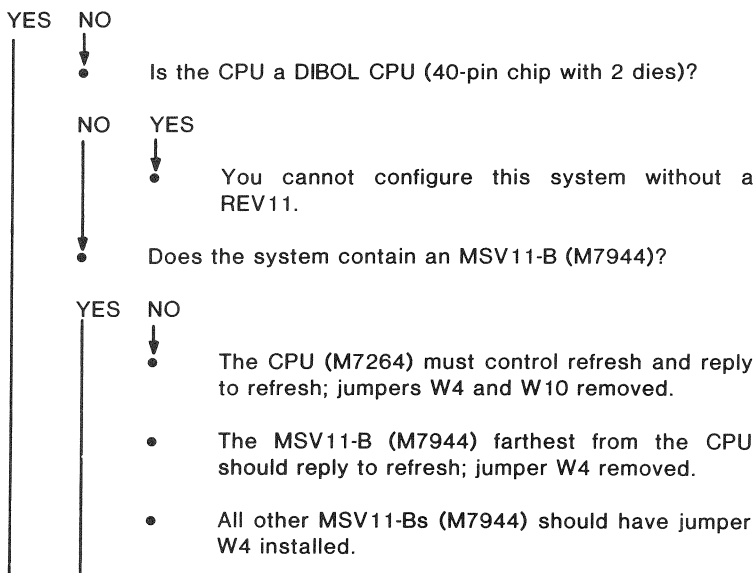
- If a REV11-A (M9400-YA) is present, its refresh must be disabled. This means jumper W2 must be removed.
- The MSV11-B (M7944) farthest from the CPU should respond to refresh; jumper W4 removed.
- All other MSV11-Bs (M7944) should have W4 installed.
- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:

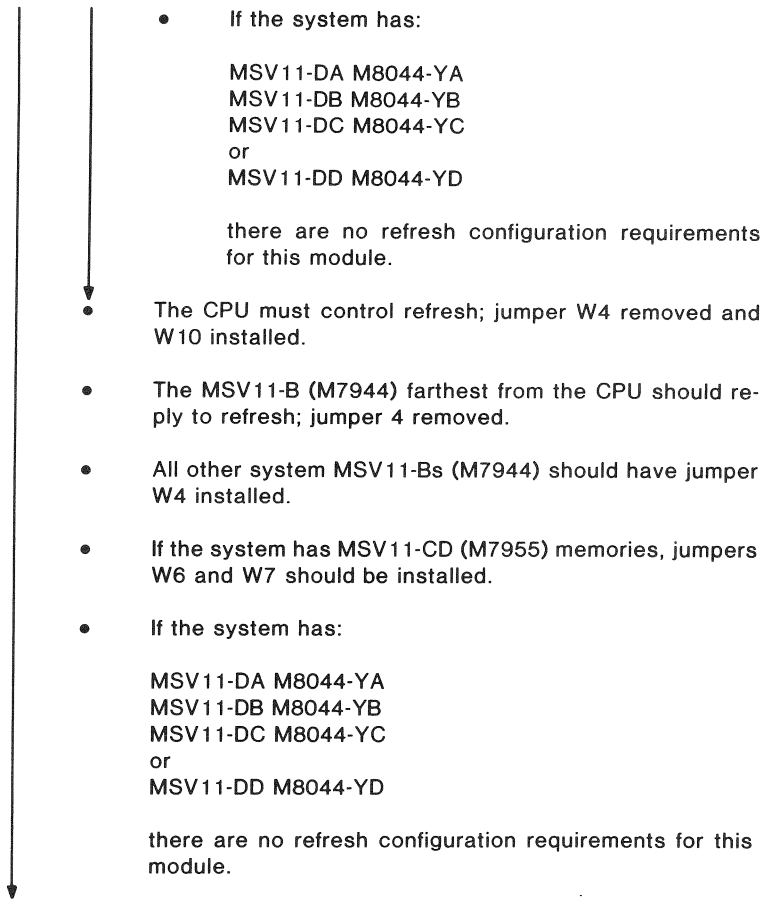
MSV11-DA M8044-YA
 MSV11-DB M8044-YB
 MSV11-DC M8044-YC
 or
 MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

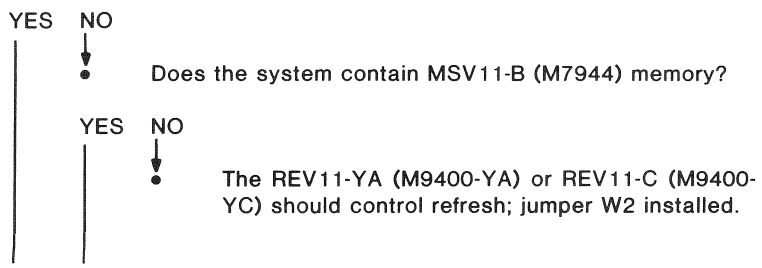
FROM 1, 5

- 6 Does the system contain a REV11-A (M9400-YA) or REV11-C (M9400-YC)?





7 Does the system contain a DMA device other than that of the REV11-A (M9400-YA) or a REV11-C (M9400-YC), such as RKV11-B (M7969) or DRV11-B (M7950)?



- The CPU should reply to refresh; jumper W4 installed and W10 removed.
- All MSV11-B (M7944) memories should have jumper W4 installed.
- If the system has MSV11-CD (M955) memories, jumpers W6 and W7 should be installed.

If the system has:

MSV11-DA M8044-YA
 MSV11-DB M8044-YB
 MSV11-DC M8044-YC
 or
 MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

- The REV11-A (M9400-YA) or REV11-C (M9400-YC) should control refresh; jumper W2 installed.
- The MSV11-B (M7944) farthest from the REV11-A (M9400-YA) or REV11-C (M9400-YC) should reply to refresh; jumper W4 removed.
- The CPU should not reply to refresh; jumper W4 installed and W10 installed.
- All remaining MSV11-B memories should have W4 installed.
- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:

MSV11-DA M8044-YA
 MSV11-DB M8044-YB
 MSV11-DC M8044-YC
 or
 MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

↓
8 Does the system contain a REV11-C (M9400-YC)?

YES NO

↓
• Is the CPU a DIBOL processor (40-pin chip with 2 dies)?

NO YES

↓
• You cannot configure this system without a REV11.

↓
• Does the system contain MSV11-B (M7944) memory?

YES NO

↓
• The CPU (M7264) should control refresh and re-
ply; jumpers W4 and W10 removed.

• If the system has a REV11-A (M9400-YA); jumper
W2 should be removed.

• If the system has MSV11-CD (M7955) memories,
jumpers W6 and W7 should be installed.

• If the system has:

MSV11-DA M8044-YA
MSV11-DB M8044-YB
MSV11-DC M8044-YC
or
MSV11-DD M8044-YD

there are no refresh configuration requirements
for this module.

↓
• The CPU (M7264) should control refresh; jumper W4.

• The MSV11-B (M7944) farthest from the CPU should re-
ply to refresh; jumper W4 removed.

• All remaining MSV11-Bs (M7944) should have jumper W4
installed.

• If the system has a REV11-A (M9400-YA), jumper W2
should be removed.

• If the system has MSV11-CD (M7955) memories, jumpers
W6 and W7 should be installed.

- If the system has:

MSV11-DA M8044-YA
 MSV11-DB M8044-YB
 MSV11-DC M8044-YC
 or
 MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

9 Does the system have MSV11-B (M7944) memory?

YES NO

- The REV11-C (M9400-YC) should control refresh; jumper W2 installed.
- The CPU (M7264) should reply to refresh; jumper W10 removed and W4 installed.
- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:

MSV11-DA M8044-YA
 MSV11-DB M8044-YB
 MSV11-DC M8044-YC
 or
 MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.

10 Is the CPU an M7264-EB, -FB, -HB, or -JB?

YES NO

- The REV11-C (M9400-YC) should control refresh; jumper W2 installed.
- The CPU should reply to refresh; jumper W10 removed and W4 installed.
- All MSV11-B (M7944) memories should have jumper W4 installed.

- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:
 - MSV11-DA M8044-YA
 - MSV11-DB M8044-YB
 - MSV11-DC M8044-YC
 - or
 - MSV11-DD M8044-YD

there are no refresh configuration requirements for this module.
- The REV11-C (M9400-YC) should control refresh; jumper W2 installed.
- The MSV11-B (M7944) farthest from the REV11-C should reply to refresh; jumper W4 removed.
- All other MSV11-Bs (M7944) should have jumper W4 installed.
- The CPU should have jumpers W4 and W10 installed.
- If the system has MSV11-CD (M7955) memories, jumpers W6 and W7 should be installed.
- If the system has:
 - MSV11-DA M8044-YA
 - MSV11-DB M8044-YB
 - MSV11-DC M8044-YC
 - or
 - MSV11-33 M8044-YD

there are no refresh configuration requirements for this module.

MICRO/PDP-11 SYSTEM

GENERAL

The MICRO/PDP-11 system is a general-purpose microcomputer system with integral mass storage. The system is PDP-11 processor based with 22-bit addressing capability. The system runs a variety of software such as the MICRO/RSX, RSX-11M, RSX-11M-PLUS, CTS-300, DSM, V7M-11 and MICRO/RSTS operating systems.

The MICRO/PDP-11 system is available in three packages: the rack mounted package, the table top package, and the floor mounted package.

Major components of the MICRO/PDP-11 system are as follows:

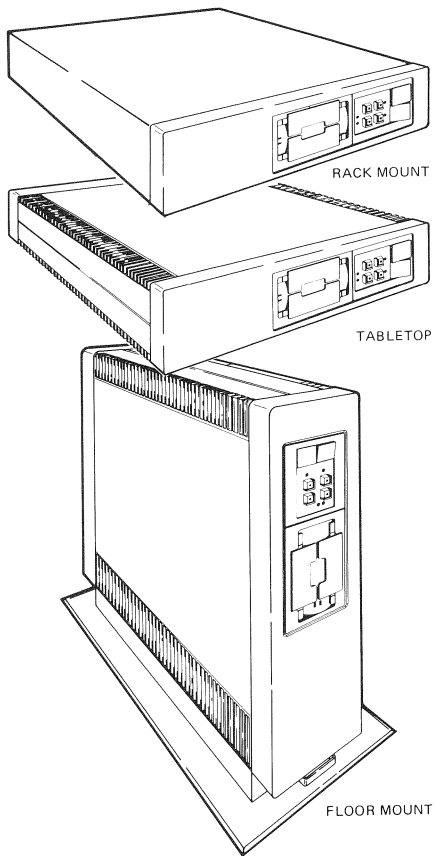
- KDF11-BP CPU (M8189 module with cables)
- MSV11-PK memory (M8067-KA module)
- RD51-A Winchester fixed disk drive
- RX50-AA dual 5-1/4 inch diskette drive
- RQDX1 disk drive controller (M8639 module)
- DZV11-CP asynchronous multiplexer (M7957 module)
- H9278-A backplane
- H7864 power supply
- BA23-A mounting box
- Patch and filter assembly
- Front panel

When troubleshooting the MICRO/PDP-11 system, you should try to isolate the problem to any of these components.

NOTE

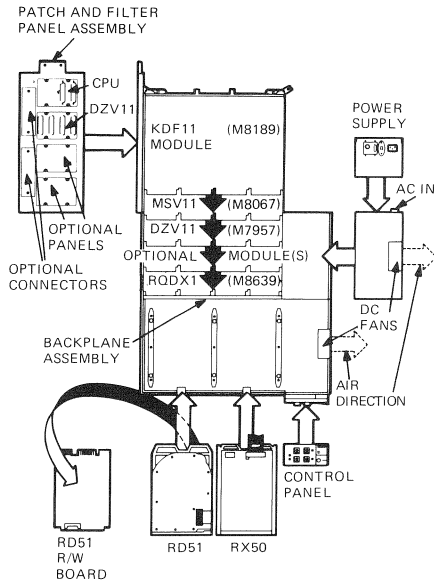
The KDF11-BP contains the KDF11-BE (CPU module only), associated cables, and the KDF11-B patch and filter panel.

MICRO/PDP-11



MR-9318

MICRO/PDP-11 System Packages



MR 9541

MICRO/PDP-11 Expanded View

Voltages

+5 Vdc @ 36 A

+12 Vdc @ 7 A

Diagnostic Programs

| | |
|-------------|----------------------------------|
| JKDB???.BIC | F-11 basic instruction |
| JKDA???.BIC | KDF-11 MMU test |
| JKL5???.BIC | KDF-11B CPU cluster test |
| VM8AF?.BIN | Boot/ROM test* |
| VMSA???.BIC | Q-Bus 22-bit address memory test |
| VDZA???.BIC | DZV-11 test part one |
| VDZB???.BIC | DZV-11 test part two |
| VDZC???.BIC | DZV-11 loopback test |
| ZRQ???.BI? | RDRX performance exerciser |

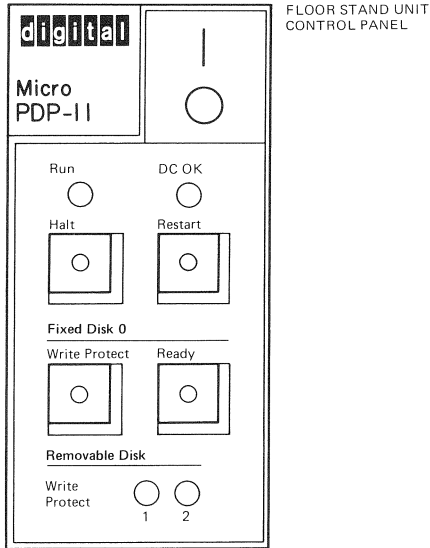
*Must be version F or later.

MICRO/PDP-11

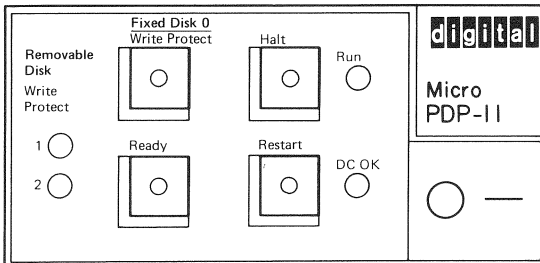
Related Documentation

MICRO/PDP-11 System Option Manual (EK-OLCP5-OD)
MICRO/PDP-11 System Site Preparation and Verification Guide (EK-OLCP5-SP)
MICRO/PDP-11 System Unpacking and Installation Guide (EK-OLCP5-IN)
MICRO/PDP-11 System Technical Manual (EK-OLCP5-TM)
MICRO/PDP-11 System Owner's Manual (EK-OLCP5-OM)
PDP-11 Microcomputer Interfaces Handbook (EB-23144)
MICRO/PDP-11 Illustrated Parts Breakdown (EK-OLCP5-IP)
MICRO/PDP-11 Assembly Drawings (70-20442)
BA23-A Unit Assembly Drawings (BA23-A-DBP)
11C23 Unit Assembly Drawings (11C23-0-DBP)
11A23 Unit Assembly Drawings (11A23-0-DBP)
Microcomputer Interfaces Handbook (EB-21344-18)
Microcomputer and Memories Handbook (EB-20912-20)
PDP-11 MICRO/PDP-11 Handbook (EB-24944)
PDP-11 Architecture Handbook (EB-23657-18)
PDP-11 Software Handbook (EB-08687-20)
KDF11-BA CPU Module User's Guide (EK-KDFEB-UG)
KDF11-B Field Maintenance Print Set (MP-01236)
MSV11-P User's Guide (EK-MSVOP-UG)
DZV11 Asynchronous Multiplexer Technical Manual (EK-DZV11-TM)
RQDX1 Controller Module User's Guide (EK-RQDX1-UG)
Boot/ROM Diagnostic Listing (microfiche) (AH-T578A-MC)
Boot/ROM Diagnostic Listing (paper copy) (AC-T577A-MC)

MICRO/PDP-11



FLOOR STAND UNIT CONTROL PANEL



TABLETOP/RACK MOUNT UNIT CONTROL PANEL

MR 9310

MICRO/PDP-11 System Control Panel

MICRO/PDP-11

MICRO/PDP-11 System Control Panel Switches

| Switch | Position | Function |
|-------------------------------|------------------|---|
| Power 1,0 (rocker switch) | 1 | Turns on the system power. This switch glows red when the system is on. |
| | 0 | Turns off the system power. |
| HALT | IN (LED lit) | The CPU halts and responds to console on-line debugging technique (ODT) commands. The basic ODT commands and their functions are listed in Appendix B. Refer to the <i>Microcomputers and Memories Handbook</i> (EB-18451-20) for additional ODT information. |
| | OUT (LED off) | Enables the processor to run. |
| RESTART (momentary switch) | IN | When the halt switch is out (LED off), the CPU restarts by carrying out a power-up sequence and displaying the bootstrap dialog. |
| | | When the halt switch is in (LED lit), the restart switch will single-step the current program, executing a single instruction each time the switch is pressed. |
| Fixed Disk 0 Protect Write | IN (LED lit) | Write protects the RD51 fixed disk drive. |
| | OUT (LED off) | Enables writing to the RD51 fixed disk drive. |
| Fixed Disk 0 Ready | OUT (LED lit) | Places the RD51 fixed disk drive on-line. |
| | IN (LED off) | Places the RD51 fixed disk drive off-line. |

MICRO/PDP-11 System Control Panel Indicator LEDs

| Indicator LED | Function |
|----------------|---|
| RUN | This LED is lit when the CPU is operating; the LED goes off when the CPU is not executing instructions. |
| DC OK | This LED is lit when the power supply is generating correct dc power output voltages. |
| Removable Disk | |
| Write Protect* | |

Indicator LED

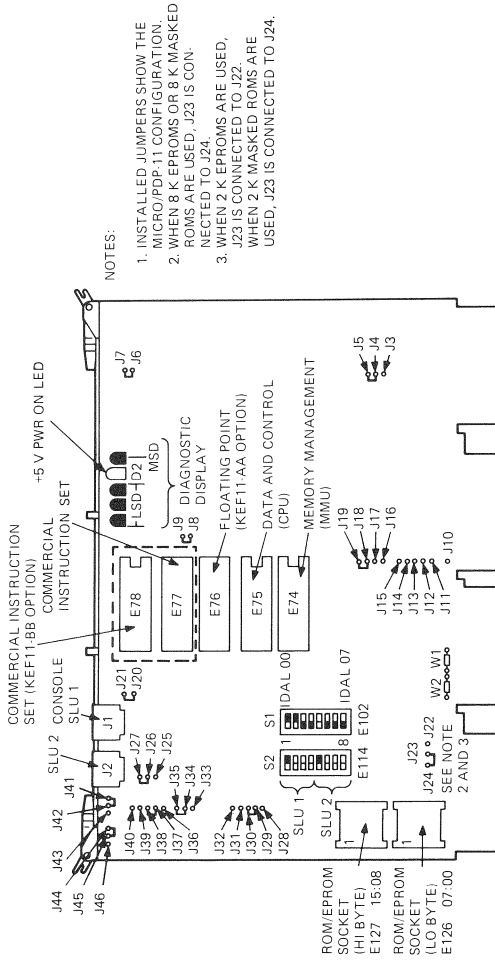
| | |
|---|---|
| 1 | When this LED is lit, the diskette in RX50 diskette drive 1 is write-protected. |
| 2 | When this LED is lit, the diskette in RX50 diskette drive 2 is write-protected. |

* Removable disk write-protect is selected by placing an adhesive label over the write-protect slot of the diskette.

Each module in the H9278-A backplane is assigned a location, depending on its importance in the MICRO/PDP-11 system.

| Slot | Module |
|--------|--|
| Slot 1 | M8189 CPU module (KDF11-B) |
| Slot 2 | M8067-Kx memory module (MSV11-P) |
| Slot 3 | Additional memory (if present), or M7957 (if present), or M8639 controller module* |
| Slot 4 | M8639 controller module* (if not in slot 3) or other optional modules |

* The M8639 controller module must be placed in the last used slot, because of the length and location of the 50-conductor MASSBUS cable. All direct memory access (DMA) modules must be installed in front of the M8639 controller module, in the bus priority structure.



NOTES:

1. INSTALLED JUMPERS SHOW THE MICRO/PDP-11 CONFIGURATION.
2. WHEN 8 K EPROMS OR 8 K MASKED ROMS ARE USED, J23 IS CONNECTED TO J24.
3. WHEN 2 K EPROMS ARE USED, J23 IS CONNECTED TO J22. WHEN 2 K MASKED ROMS ARE USED, J23 IS CONNECTED TO J24.

MR 9422

H8189 Jumper and Switch Locations

M8189 Miscellaneous Jumpers and Switch Configurations

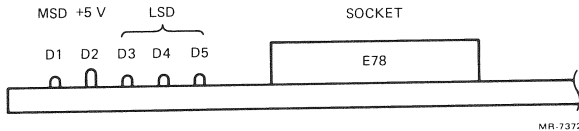
The jumpers used by manufacturing and field service for testing the M8189 module are listed.

NOTE

The baud rate switches (S2-1 through S2-8) on the M8189 module should be left at their original factory settings. These switches do not control the baud rate. Because of external clocking, the baud rate is adjusted from the KDF11-B patch and filter panel.

All other jumpers on the M8189 module are OUT.

Refer to Appendix B for information on other applications of the KDF11-BA.



KDF11-B LEDs

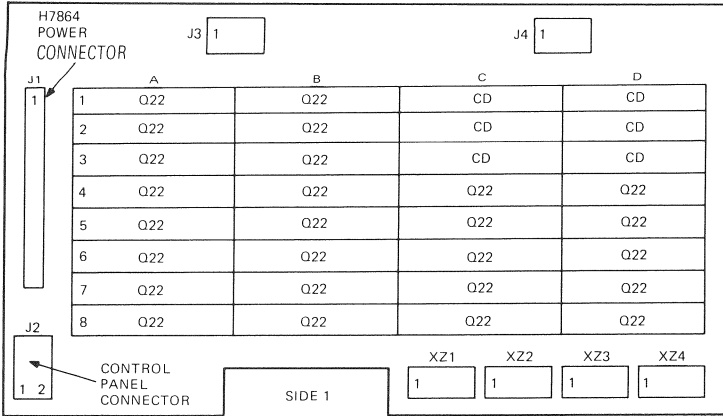
NOTE

The light pattern indicates that the corresponding test is in progress or has failed. Some tests retry (DECnet), and others will halt the CPU (CPU, memory, non-DECnet boots.)

The PDP-11/23+ system uses a KDF11-BA CPU, while the MICRO/PDP-11 system uses a KDF11-BP CPU. The difference between them are the ROM chips and the jumpers on the module. The PDP-11/23+ uses a 23-339E2 chip and a 23-340E2 chip, while the MICRO/PDP-11 uses a 23-157E4 chip and a 23-158E4 chip. When troubleshooting the KDF11-B (M8189) module, make sure the correct ROMs are installed.

The MICRO/PDP-11 system is shipped with switches S1-1, S1-2, S1-3, S1-4, S1-7, and S1-8 on. Switches S1-5 and S1-6 are off.

MICRO/PDP-11

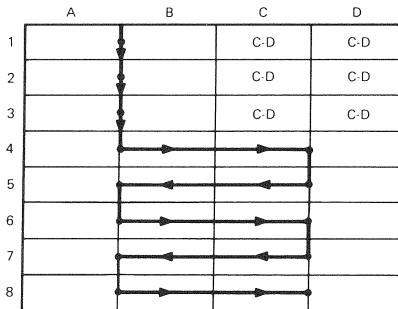


NOTES:
 CONNECTORS J1, J2, J3, AND J4 ARE MOUNTED ON SIDE 2.
 XZ1-4 ARE BACKPLANE TERMINATOR SOCKETS. THE SIP TERMINATION RESISTORS MOUNTED IN XZ1-4 MUST BE REMOVED WHEN EXPANDING BEYOND THIS BACKPLANE.

J3 AND J4 ARE NOT POWER SOURCES. THEY ARE USED TO SUPPLY POWER TO THE BACKPLANE WHEN THE RD51-A FIXED DISK DRIVE OR RX50-AA DISKETTE DRIVE IS NOT INSTALLED.

MR 9449

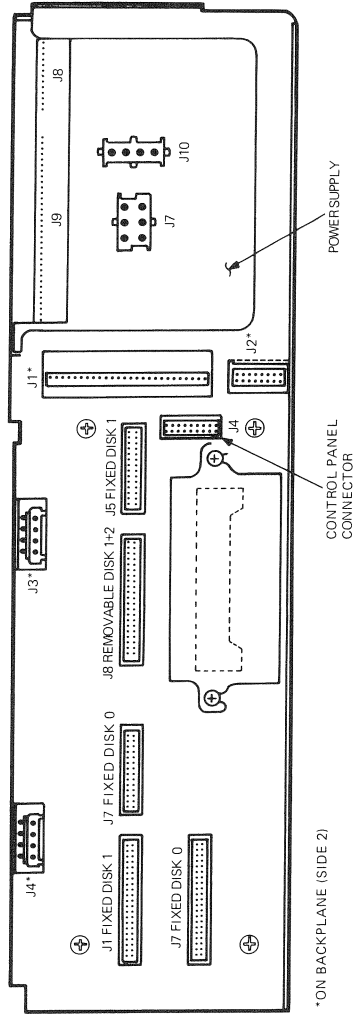
MICRO/PDP-11 Connector Locations



NOTE:
 C+D (1-3) = CD INTERCONNECT
 OTHERS = Q22 FORMAT

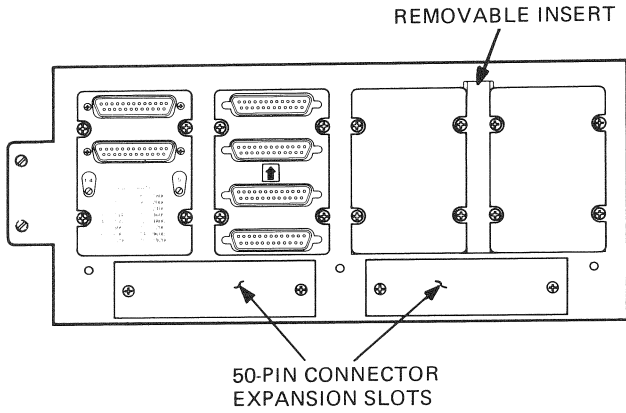
MR 9416

H9278-A Backplane Layout



Signal Distribution Board Layout

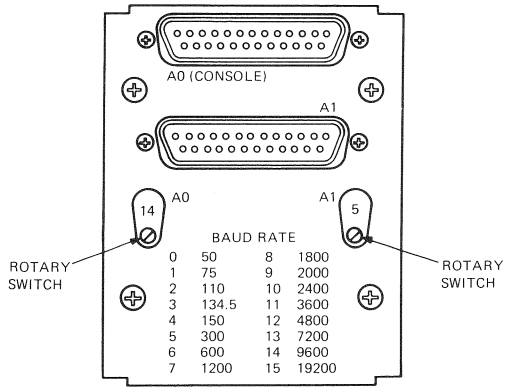
MICRO/PDP-11



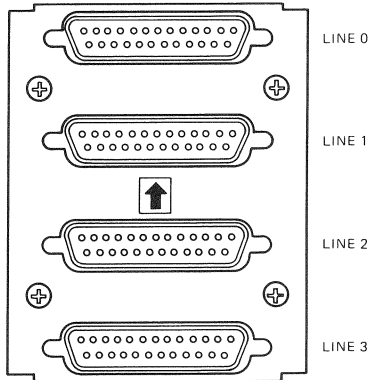
MR-9533

MICRO/PDP-11 Patch and Filter Panel

MICRO/PDP-11



MR-9407



MR-9409

MICRO/PDP-11 Bulkhead Filter Connector Assembly

MICRO/PDP-11

MICRO/PDP-11 Configuration Information

| Module | Option | Dist Panel Insert | Priority | Power +5 Vdc | Power +12 Vdc | Bus Load AC | Bus Load DC |
|------------|-----------|-------------------------|-----------|-----------------|------------------|-------------------|-------------------|
| Chip Set | KEF11-A | N/A | N/A | 0 | 0 | 0 | 0 |
| Chip Set | KEF11-BB | N/A | N/A | 0 | 0 | 0 | 0 |
| M8189** | KDF11-BP | 2x3 | Highest | 6.4 A | 0.7 A | 2.00 | 1.00 |
| M8188** | FPF11-A | N/A | High | 7.5 A | 0 | - | - |
| M8067-KA** | MSV11-PK | N/A | Very High | 3.45 A | 0 | 2.00 | 1.00 |
| M8067-LA** | MSV11-PL | N/A | Very High | 3.60 A | 0 | 2.00 | 1.00 |
| M8059-FA* | MSV11-LF | N/A | Very High | 3.90 A | | 2.00 | 1.00 |
| M8631-AA* | MCV11-DAN | N/A | High | 1.20 A | - | 2.00 | 1.00 |
| M8631-CA* | MCV11-DCN | N/A | High | 1.20 A | - | 2.00 | 1.00 |
| M7941* | DRV11-LP | Two 1x3 | High | 0.90 A | - | 1.40 | 1.00 |
| M7950**+ | DRV11-BP | Two 1x3 | High | 1.90 A | - | 3.30 | 1.00 |
| M8049* | DRV11-JP | Two 1x3 | High | 1.60 A | - | 2.00 | 1.00 |
| M7954* | IBV11-JP | 1x3 | High | 0.80 A | - | 1.80 | 1.00 |
| M7952* | KWV11-CP | 1x3 | High | 1.75 A | 0.01 A | 3.40 | 1.00 |
| M8017*& | DLV11-EP | 1x3 | High | 1.00 A | 0.18 A | 1.60 | 1.00 |
| M8043* | DLV11-JP | 1x3 | High | 1.00 A | 0.25 A | 0 | 1.00 |
| N/A\$ | DLV11-KP | N/A | N/A | - | 0.28 A | - | - |
| M7957** | DZV11-CP | 2x3 | High | 1.15 A | 0.39 A | 3.95 | 1.00 |
| M8053** | DMV11-AP | 1x3 | Low | 3.40 A | 0.38 A | 2.00 | 1.00 |
| M8053** | DMV11-BP | 1x3 | Low | 3.40 A | 0.38 A | 2.00 | 1.00 |
| M8064** | DMV11-CP | 1x3 | Low | 3.35 A | 0.26 A | 2.00 | 1.00 |
| M8053** | DMV11-FP | 1x3 | Low | 3.40 A | 0.38 A | 2.00 | 1.00 |
| M8020** | DPV11-DP | 1x3 | Low | 1.20 A | 0.30 A | 1.00 | 1.00 |
| M7951** | DUV11-CP | 1x3 | Low | 1.20 A | 0.32 A | 1.00 | 1.00 |
| M8061** | RLV12 | 1x3 | Low | 5.00 A | 0.10 A | 3.00 | 1.00 |
| M8029-YA* | RXV21+ | 1x3 | Low | 1.80 A | - | 2.00 | 1.00 |
| A6001* | AAV11-C | | | 1.50 A | 0.40 A | 1.90 | 1.00 |
| A012* | ADV11-C | | | 2.00 A | 0.45 A | 3.25 | 1.00 |
| A026* | AXV11-C | | | 1.50 A | - | 1.30 | 1.00 |
| M8027* | LPV11-CP | 1x3 | Low | 0.80 A | - | 1.40 | 1.00 |
| N/A | TU58-EB | N/A\$ | N/A | 0.75 A | 1.20 A | - | - |
| N/A | RX50-AA | N/A | N/A | 0.80 A | 1.80 A | - | - |
| ST-412 | RD51-A | N/A | N/A | 1.00 A | 4.50 A | - | - |
| ** | TSV05-CP | Two 1x3 | | | | | |
| M8639** | RQDX1 | | Low | 5.80 A | 0.25 A | 2.00 | 1.00 |
| G7272* | N/A | N/A | - | - | - | - | - |

* Dual-height printed circuit board.

** Quad-height printed circuit board.

+ Use on systems with 256Kb or less.

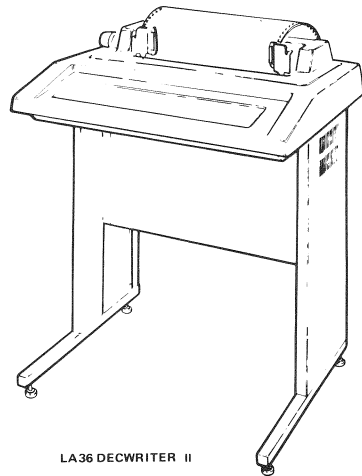
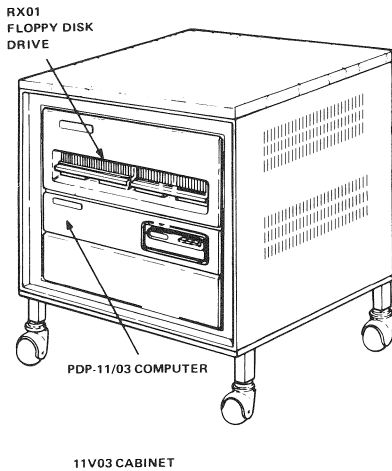
\$ Connects to existing option.

& Can share 1/4 of a DLV11-J panel insert (DIGITAL part no. 70-16436-01).

PDP-11V03 AND PDP-11T03 SYSTEMS

PDP-11V03

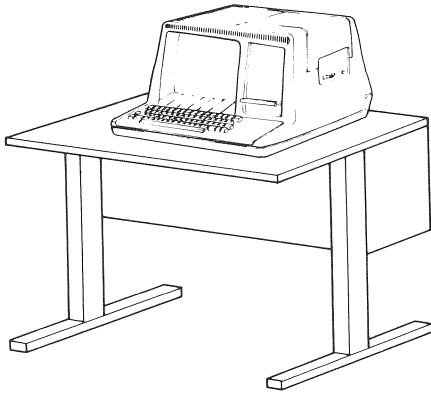
The PDP-11V03 includes a PDP-11/03 computer, an RX01 dual floppy disk drive, and either a VT52 DECscope or an LA36 DECwriter II. Early models have 8K of memory, while later models have 16K. All models are configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the models, specifications, and components.



MR-0835

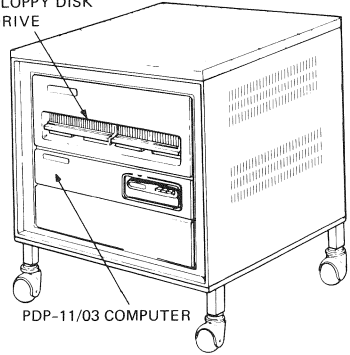
PDP-11V03-E/H

PDP-11V03



VT52 DECSCOPE

RX01
FLOPPY DISK
DRIVE

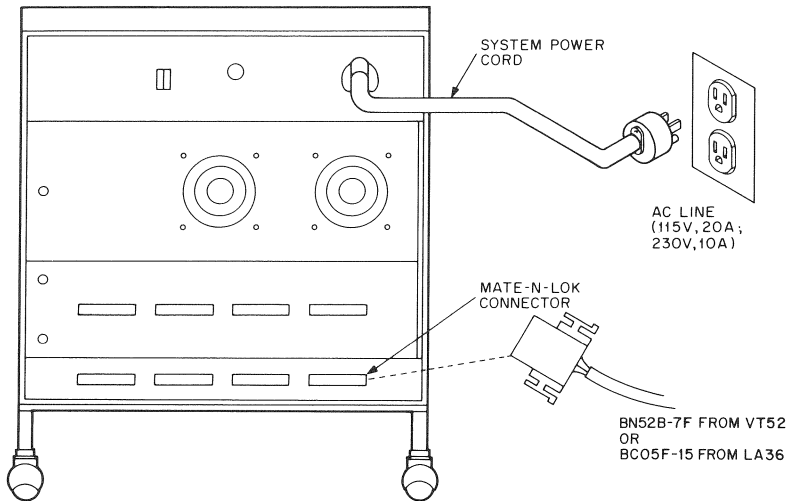


PDP-11/03 COMPUTER

11V03 CABINET

MR-0836

PDP-11V03-A/F



MR-0837

PDP-11V03 System Model Designations





| | LA36 | VT52 |
|-----------|----------------|----------------|
| 8K words | EA ED | AA AD |
| 16K words | HA HB HC | FA FB FC |

8K System Component Model Designations

| System Requirements | PDP-11V03 System Model Designations | | | |
|--|-------------------------------------|-----|-----|-----|
| | AA | AD | EA | ED |
| Input Power (V) | 115 | 230 | 115 | 230 |
| Frequency (Hz) | 60 | 50 | 60 | 50 |
| PDP-11/03 Computer | EA | EB | EA | EB |
| LA36 | | | DE | DJ |
| VT52 | AA | AB | | |
| RXV11 (RX01 Floppy with Interface) | BA | BD | BA | BD |
| H984 (Cabinet) | BA | BB | BA | BB |

16K System Component Model Designations

| System Requirements | PDP-11V03 System Model Designations | | | | | |
|--|-------------------------------------|-----|-----|-----|-----|-----|
| | FA | FB | FC | HA | HB | HC |
| Input Power (V) | 115 | 230 | 115 | 115 | 230 | 115 |
| Frequency (Hz) | 60 | 50 | 50 | 60 | 50 | 50 |
| PDP-11/03 Computer | KA | KB | KA | KA | KB | KA |
| LA36 | | | | DE | DJ | DH |
| VT52 | AA | AB | AC | | | |
| RXV11 (RX01 Floppy with Interface) | BA | BD | BC | BA | BD | BC |
| H984 (Cabinet) | BA | BB | BA | BA | BB | BA |

| POWER CONNECTOR | 115 V 50/60 Hz | | | 230 V 50 Hz | | |
|--------------------------------|---|--|---------------------|---|--|---------------------|
| | PLUG  NEMA # 5-15P DEC # 90-08938 | RECEPTACLE  5-15R 12-05351 | | PLUG  NEMA # 6-15P DEC # 90-08853 | RECEPTACLE  6-15R 12-11204 | |
| | CPU CABINET | LA36 | VT52 | CPU CABINET | LA36 | VT52 |
| AMPERAGE TYPICAL MAXIMUM | 9.6 10.8 | 2.0 | 1.0 | 4.7 5.3 | 1.0 | 0.5 |
| WATTAGE TYPICAL MAXIMUM | 800 940 | 160 300 | 118 118 | 820 960 | 160 300 | 118 118 |
| BTU/HOUR TYPICAL MAXIMUM | 2730 3210 | 550 1020 | 400 400 | 2800 3280 | 550 1020 | 400 400 |
| WEIGHT | 81.6 Kg (180 lbs) | 46.3 Kg (102 lbs) | 20.0 Kg (44 lbs) | 81.6 Kg (180 lbs) | 46.3 Kg (102 lbs) | 20.0 Kg (44 lbs) |

MR-0838

Specifications

Modules Included in the Basic System

Processor

KD11-F (M7264) in PDP-11V03-A/E

Resident memory addressed as bank 0
CPU refresh disabled
Powers up to 173000

KD11-R (M7264-YA) in PDP-11V03-F/H

No resident memory
CPU refresh disabled
Powers up to 173000

Memory

MSV11-B (M7944) in PDP-11V03-A/E

4K RAM
Refreshed by REV11-A
Addressed as bank 1

MSV11-CD (M7955-YD) in PDP-11V03-F/H

16K RAM
Internal refresh
Addresses start at bank 0
Part of the KD11-R processor option

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
300 baud in PDP-11V03-E/H (LA36)
9600 baud in PDP-11V03-A/F (VT52)
20 mA active transmitter and active receiver
One stop bit, eight data bits, no parity
Framing error (BREAK) asserts BHALT

PDP-11V03

Floppy Disk Interface

RXV11 (M7946)

First device address (disk 0) 177170
First vector 264
Second device address (disk 1) 177150
Second vector 270

Bootstrap/Diagnostic/Terminator

REV11-A (M9400-YA)

Bootstrap enabled
Diagnostics enabled
Refresh enabled in PDP-11V03-A/E
Refresh disabled in PDP-11V03-F/H
120 Ω terminator

PDP-11V03-A/E Module Utilization

| A | B | C | D | |
|---|------------------------------|--------------------|---|---|
| ① | M7264 PROCESSOR (KD11-F) | | ② | 1 |
| ④ | M7944 (MSV11-B) | M7940 (DLV11) | ③ | 2 |
| ⑤ | M7946 FLOPPY CONTROL (RXV11) | M9400-YA (REV11-A) | ⑥ | 3 |
| ⑧ | EMPTY | EMPTY | ⑦ | 4 |

NOTE: CIRCLED NUMBERS ① THROUGH ⑧ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

MR5919

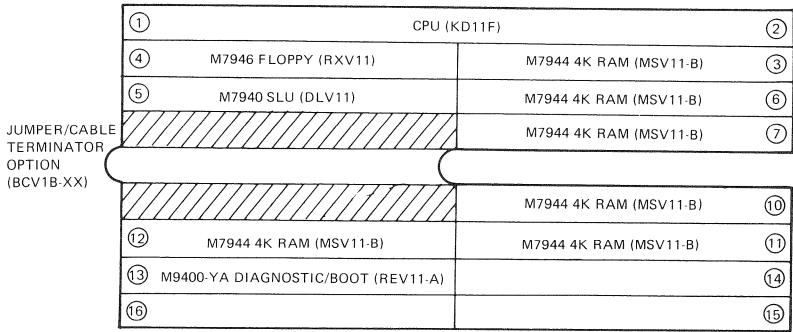
Basic 8K System

| A | B | C | D | |
|---|------------------------------------|--------------------------------------|---|---|
| ① | M7264 PROCESSOR (KD11-F) | | ② | 1 |
| ④ | M7944 4K MEMORY (MSV11-B) | M7944 4K MEMORY (MSV11-B) | ③ | 2 |
| ⑤ | M7944 4K MEMORY (MSV11-B) | M7940 SERIAL LINE UNIT (DLV11) | ⑥ | 3 |
| ⑧ | M9400-YA BOOT/TERMINATOR (REV11-A) | M7946 FLOPPY DISK CONTROLLER (RXV11) | ⑦ | 4 |

NOTE: CIRCLED NUMBERS ① THROUGH ⑧ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

MR-0839

16K System

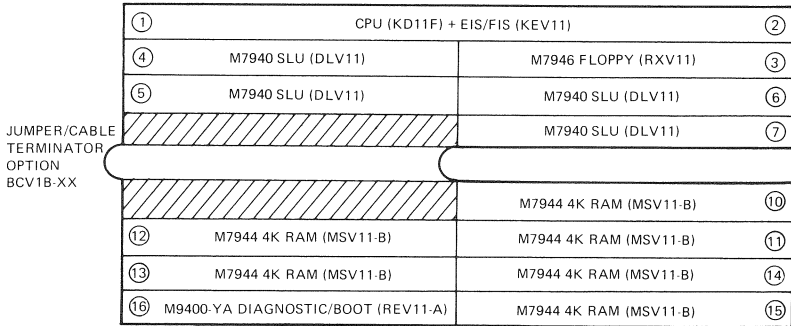


EXPANDER BOX

NOTE: CIRCLED NUMBERS ① THROUGH ⑯ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

11 - 3720

One-User 28K System



EXPANDER BOX

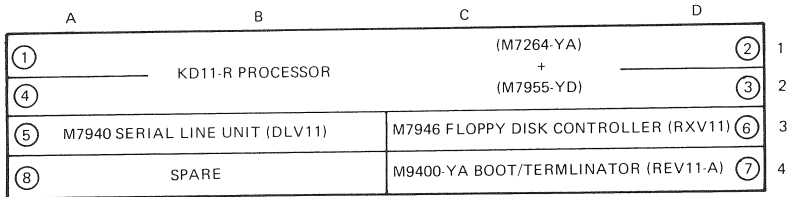
NOTE: CIRCLED NUMBERS ① THROUGH ⑯ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

11 - 3719

Four-User 28K System with EIS/FIS

PDP-11V03

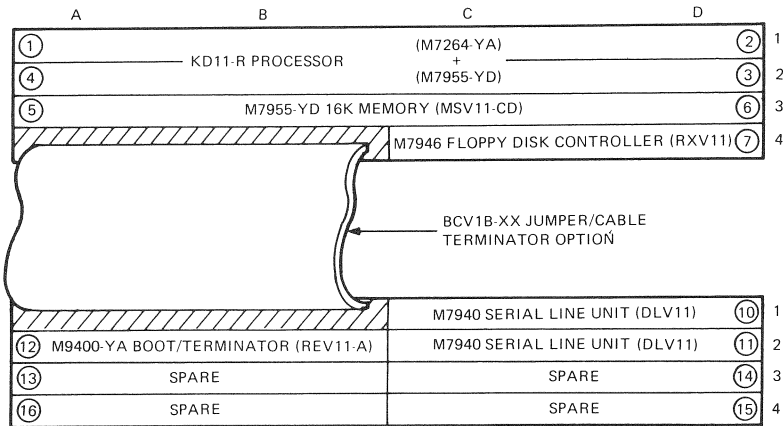
PDP-11V03-F/H Module Utilization



NOTE: CIRCLED NUMBERS ① THROUGH ⑧ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

MR-0840

Basic 16K System



NOTE: CIRCLED NUMBERS ① THROUGH ⑯ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

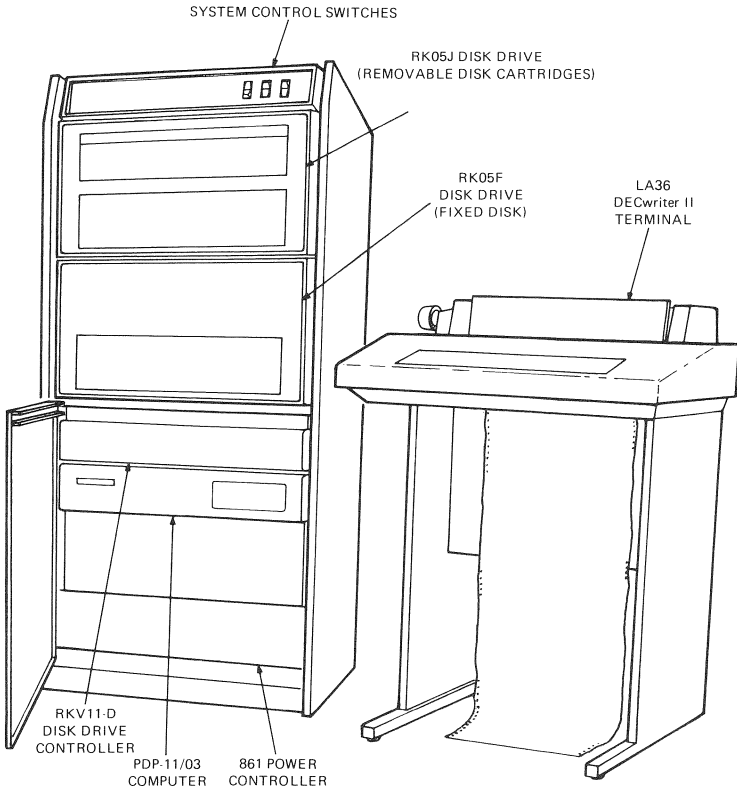
MR-5918

Two-User 28K System

PDP-11T03

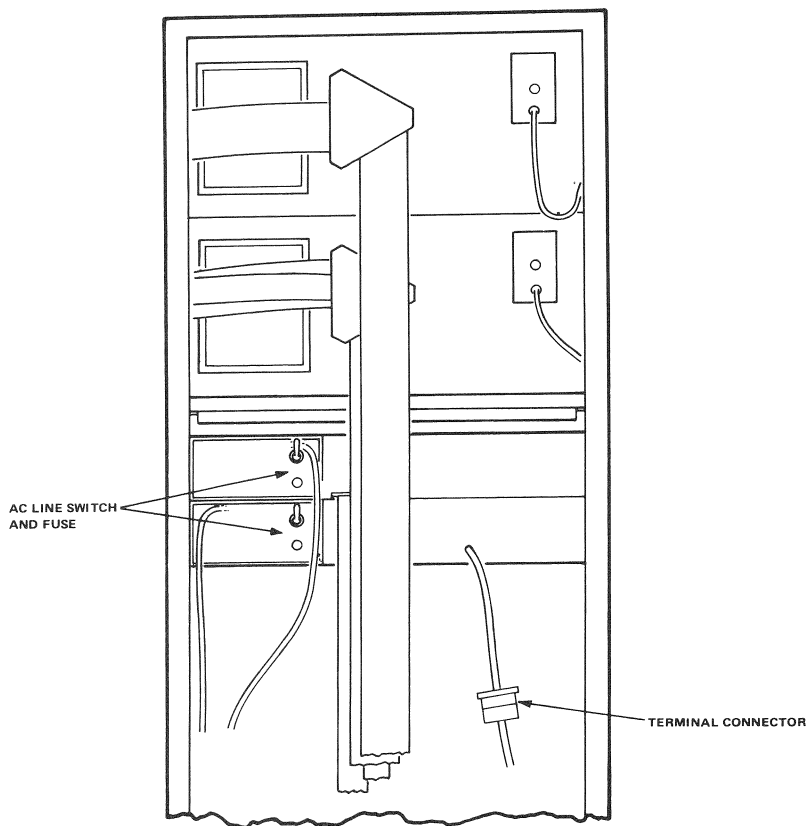
PDP-11T03

The PDP-11T03 comprises a PDP-11/03 computer, two RK05 disk drives, and an LA36 DECwriter II. The basic system includes 16K of memory. The system may be ordered without the LA36. All models are configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the models, specifications, and components.



MR-0131

PDP-11T03











MR-0140

PDP-11T03 (Rear View)

System Component Model Designations

| System Requirements | PDP-11T03 System Model Designation | | | | | | | |
|---------------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| | AA | AB | AC | AD | BA | BB | BC | BD |
| Input Power (V) | 115 | 230 | 115 | 230 | 115 | 230 | 115 | 230 |
| Frequency (Hz) | 60 | 60 | 50 | 50 | 60 | 60 | 50 | 50 |
| PDP-11/03 Computer | KA | KB | KA | KB | KA | KB | KA | KB |
| LA36 | DE | DF | DH | DJ | | | | |
| RKV11-D | A | B | A | B | A | B | A | B |
| RK05 | AA | AB | BA | BB | AA | AB | BA | BB |

| | CPU CABINET | | LA36 | |
|-------------------|--|---|---|--|
| POWER CONNECTORS | PLUG | RECEPTACLE | PLUG | RECEPTACLE |
| 115 V 50/60 HZ |  NEMA # L5-30P DEC # 12-11193 |  L5-30R 12-11194 |  NEMA # 5-15P DEC # 90-08938 |  5-15R 12-0535T |
| 230 V 50/60 HZ |  NEMA # L6-20P DEC # 12-11192 |  L6 20R 12 11191 |  NEMA # 6-15P DEC # 90-08853 |  6-15R 12-11204 |
| WATTS | 860 | | 300 | |
| BTU/HOUR | 2940 | | 1020 | |
| WEIGHT | 294.8 KG (650 LBS) | | 46.4 (102 LBS) | |

Specifications

MR-0764

PDP-11T03

Modules Included in the Basic System

Processor

KD11-S (M7264-YA)

No resident memory
KEV11 EIS/FIS option included
CPU refresh disabled
Powers up to 173000

Memory

MSV11-CD (M7955-YD)

16K RAM
Internal refresh
Addresses start at bank 0
The memory is part of the KD11-R processor option

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
300 baud
20 mA active transmitter and active receiver
One stop bit, eight data bits, no parity
Framing error (BREAK) asserts BHALT

Disk Drive Interface

RKV11-D (M7269 plus box)

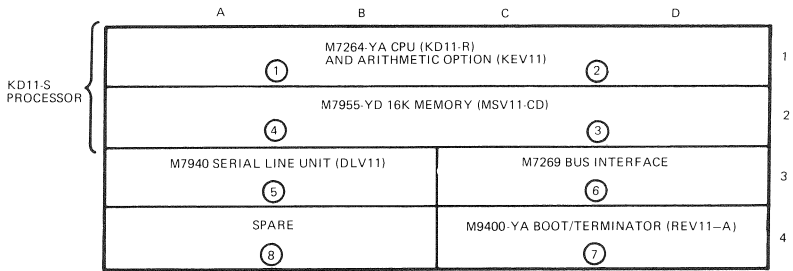
First device address (drive 0/1) 177170
First vector 264
Second device address (drive 2) 177150
Second vector 270

Bootstrap/Diagnostic/Terminator

REV11-A (M9400-YA)

Bootstrap enabled
 Diagnostics enabled
 Refresh disabled
 120 Ω terminator

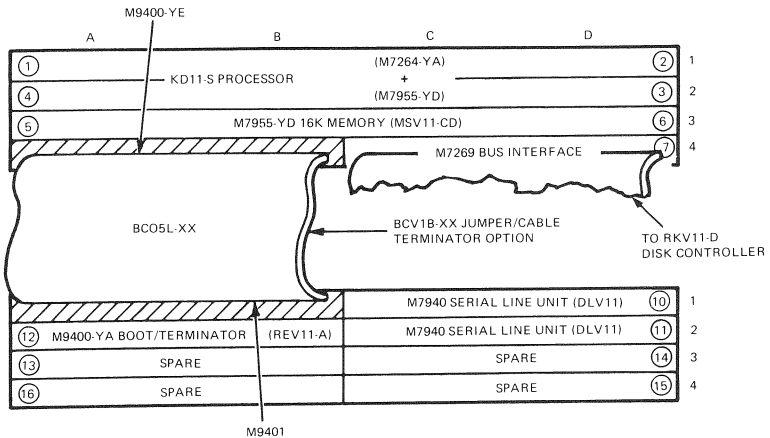
Module Utilization



NOTE: CIRCLED NUMBERS ① THROUGH ⑧ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

MR-0154

Basic 16K System



NOTE: CIRCLED NUMBERS ① THROUGH ⑯ REFER TO DMA AND INTERRUPT PRIORITY SEQUENCE.

MR-0153

Two-User Expanded 28K System

PDP-11T03-L AND PDP-11V03-L SYSTEMS

PDP-11T03-L

The PDP-11T03-L is a general purpose computer system that can be used for developing and executing programs in a variety of applications. RT-11 software provides a single user foreground and background system; it can support a real time application job execution in the foreground and an interactive or batch program development job in the background. RT-11 is also available for a single job configuration.

The PDP-11T03-L system consists of the following equipment.

PDP-11/03-LC (115 Vac) or PDP-11/03-LD (230 Vac) minicomputer with:

KD11-H microcomputer plus 16K words (32K bytes) of MOS memory (MSV11-CD)

BA11-NC (-ND) box with an H9273 backplane and an H786 power supply

BDV11-AA bootstrap/diagnostic/terminator and ROM option.

MSV11-CD configured as an additional 12K words (24K bytes) of MOS memory

KEV11 Extended Instruction Set/Floating Point Instruction Set (EIS/FIS)

RLV11 disk controller

RL01 five-megabyte dual disk drive units and cartridges

DLV11-F serial line unit

H9612-AC cabinet

Power controller

| | | | |
|-------|-------|------|----------|
| 871-A | 110 V | 12 A | 50/60 Hz |
| 871-B | 220 V | 8 A | 50/60 Hz |
| 871-C | 110 V | 16 A | 50/60 Hz |

PDP-11T03-L

In addition to the preceding items, one RT-11 system software kit and one RLDP+ diagnostic kit are shipped with the system.

The following optional terminals are available for the system.

LA36 DECwriter
VT52 DECscope (with or without copier)
VT100 Alphanumeric Video Terminal

PDP-11T03-L Operator Switch Panel

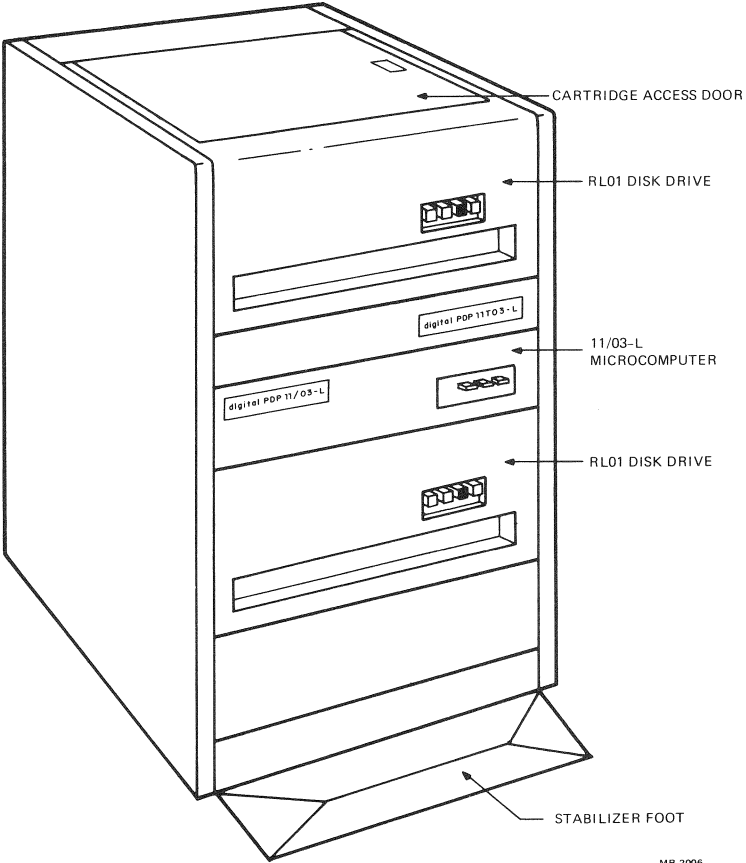
Communication between the user and the processor is provided by switches on the front panel of the PDP-11/03-L or by the terminal connected to the system. The operator switch panel contains three switches: AUX ON/OFF, HALT, and RESTART. The functions and positions of the switches are as follows.

| Switch | Position | Function |
|------------|----------------------------|--|
| AUX ON/OFF | OFF | As configured at the factory, this switch, when turned off, removes ac power to the system. |
| | ON | As configured at the factory, it turns on ac power. If the automatic bootstrap is selected and the HALT switch is up, the system boots. |
| HALT | Up (Enable) | This enables the processor to run. |
| | Down (HALT) | This halts the processor, which responds to console ODT commands. Refer to the <i>Microcomputer Processor Handbook</i> , EB-18451-20, for ODT instructions. |
| RESTART | RESTART (Momentary Switch) | When this switch is activated, the processor carries out a power-up sequence. As shipped, the system presents the bootstrap dialog as: 28 START? The HALT switch must be up (enable). |

PDP-11T03-L

The switch panel also contains two indicators that provide the following information.

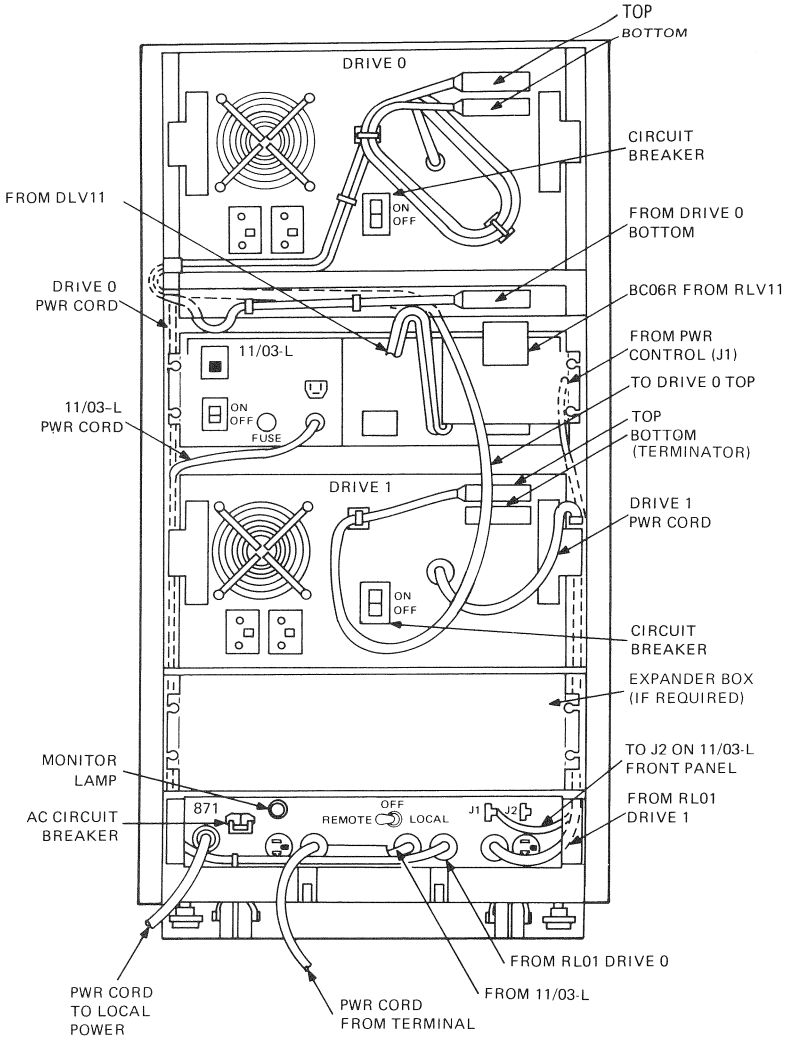
| LED | Condition | Indication |
|--------|-----------|---|
| PWR OK | ON | This LED lights when the proper dc output voltages are being generated by the H786 power supply. |
| RUN | ON | This LED lights when the processor is in the run state. It goes out when the processor is not executing instructions. |



MR-2006

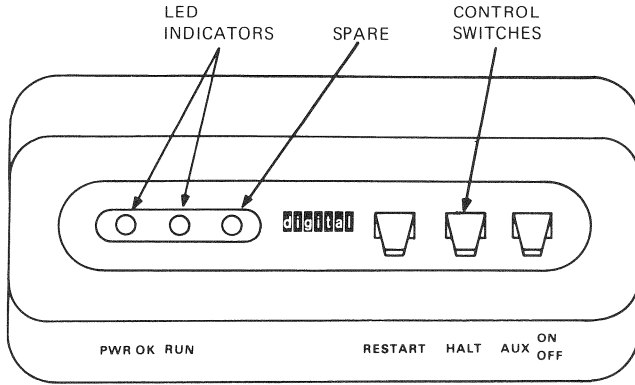
PDP-11T03-L Computer System

PDP-11T03-L



MR-1871

PDP-11T03-L (Rear Panel Removed)



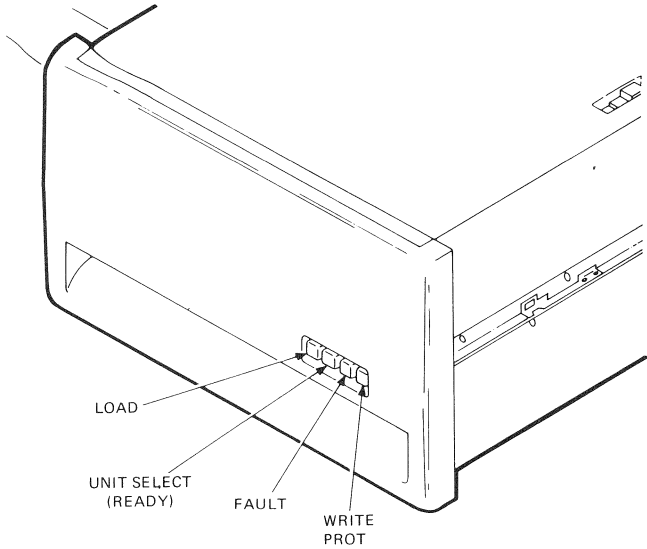
MR 4891

Front Panel Switches and Indicators

RL01 Disk Drives

The RL01 disk drive is a random access mass storage device with a removable, top-loading disk cartridge. Access to the disk is provided by a lift-up cover. The RL01 has four indicators on its front panel. Their functions are as follows.

| Indicator | Function |
|-----------------------------|--|
| LOAD (Push Button) | Lights to indicate that the spindle has stopped and a cartridge may be loaded. |
| UNIT SELECT (READY) | Lights to indicate that drive 0 or 1 is ready to read, write, or receive controller commands. |
| FAULT | Lights to indicate that a drive error condition exists. |
| WRITE PROT (Push Button) | Lights to indicate that the cartridge currently mounted is protected from having data written on it. |



MR 1860

RL01 Disk Drive (Front View)

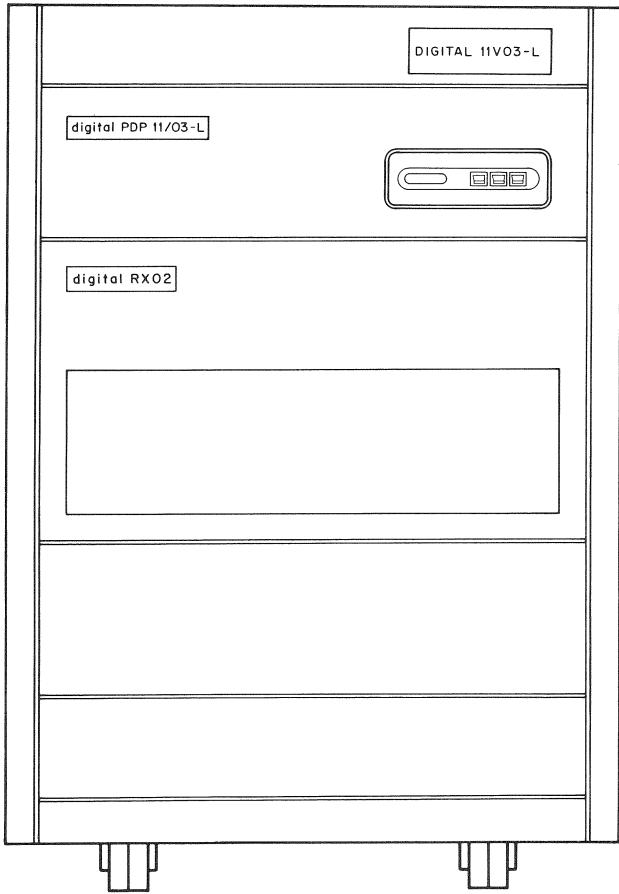
PDP-11V03-L

The PDP-11V03-L includes a PDP-11/03-L computer and an RX02 dual floppy disk system. The system also has 64K bytes or 32K words of RAM memory. Earlier systems have 32K bytes or 16K words of RAM memory that is expandable to 32K words. The system has the following optional terminals.

- LA36 DECwriter
- VT52 DECscope
- VT100 DECscope

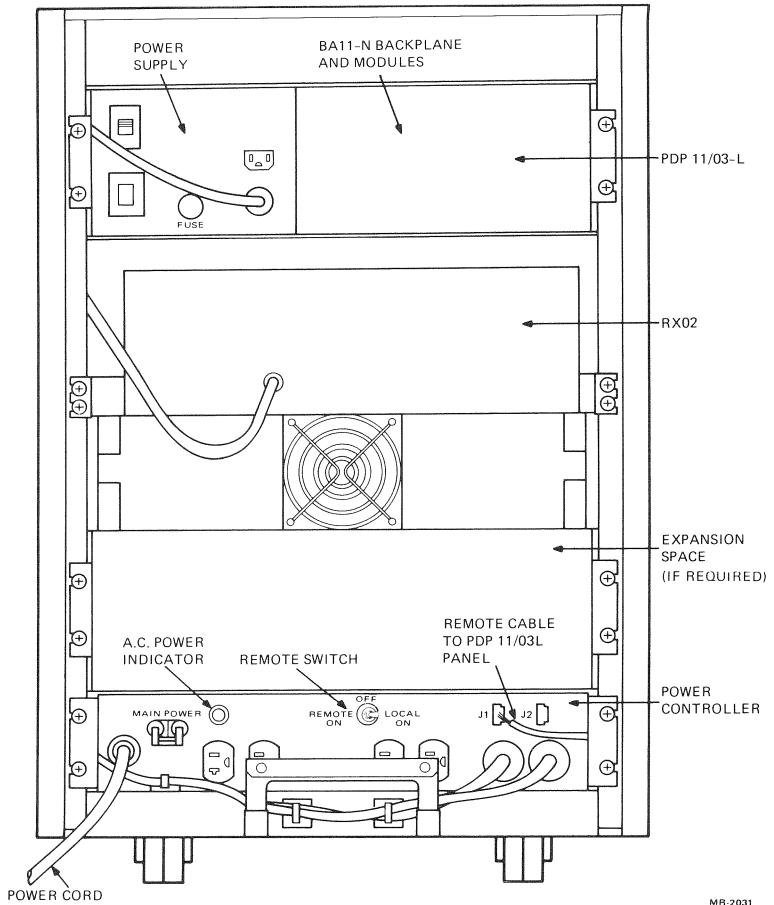
The figures and tables that follow describe the models, specifications, and components.

PDP-11V03-L









PDP-11V03-L System

PDP-11V03-L



MR-2031

PDP-11V03-L System (Backpanel Removed)

| LOCAL POWER | POWER CONTROLLER | |
|---------------------------------------|--|--|
| | PLUG | RECEPTACLE |
| <p>871-A 115V 15A 50/60HZ</p> | <p>871-A  NEMA # 5-15P DEC # 90-08938</p> | <p> 5-20R 12-12265</p> |
| <p>871-B 230V 10A 50/60HZ</p> | <p>871-B  NEMA # 6-15P DEC # 90-08853</p> | <p> 6-15R 12-11204-01</p> |
| <p>871-C 115V 20A 50/60HZ</p> | <p>871-C  HUBBELL # 5366-C DEC # 12-15183</p> | <p> NEMA # 5-20R 12-12265</p> |

MR-2406

Power Connectors

PDP-11V03-L

16K System Components

| System Requirements | Models | | |
|----------------------|--------|-------|-------|
| | LA | LC | LD |
| Input Power (V) | 115 | 115 | 230 |
| Frequency (Hz) | 60 | 50 | 50 |
| PDP-11/03-L Computer | -LC | -LC | -LD |
| RX02 Floppy Disk | -BA | -BC | -BD |
| Power Controller | 871-A | 871-A | 871-B |

32K System Components

| System Requirements | Models | | |
|----------------------|--------|-------|-------|
| | LE | LH | LJ |
| Input Power (V) | 115 | 115 | 230 |
| Frequency (Hz) | 60 | 50 | 50 |
| PDP-11/03-L Computer | -LK | -LK | -LL |
| RX02 Floppy Disk | -BA | -BC | -BD |
| Power Controller | 871-A | 871-A | 871-B |

11V03-L System (LE, LH, and LJ)

The PDP-11V03-L system consists of the following equipment.

A PDP-11/03LK-LL microcomputer consisting of:

- KD11-HA (M7270) a microcomputer board
- MSV11-DD (M8044D) a 32K word RAM
- BA11-N a mounting box with an H9273 backplane and an H786 power supply
- BDV11-A a bootstrap/diagnostic/terminator with expandable ROM space for the user (M8012-YA).

PDP-11V03-L

| | |
|--------------|--|
| KEV11 | A chip, mounted on the KD11-H microcomputer, that provides the system with the Extended Instruction Set (EIS) and Floating Point Instruction Set (FIS) features. |
| RXV21 | The RX02 floppy disk controller module (M8029) interfaces the RX02 disk to the LSI-11 bus. |
| DLV11-J | The asynchronous four-channel line interface module (M8043) interfaces the terminal to the LSI-11 bus. |
| RX02 | The dual floppy disk system. |
| H9610 | The cabinet in which the hardware is mounted. |
| 871 | The primary power controller for the 11V03-L system. |
| Floppy Disks | The operational and diagnostic software programs are stored on floppy disks and are shipped as part of the system. |

11V03-L Early Systems (LA, LC, and LD)

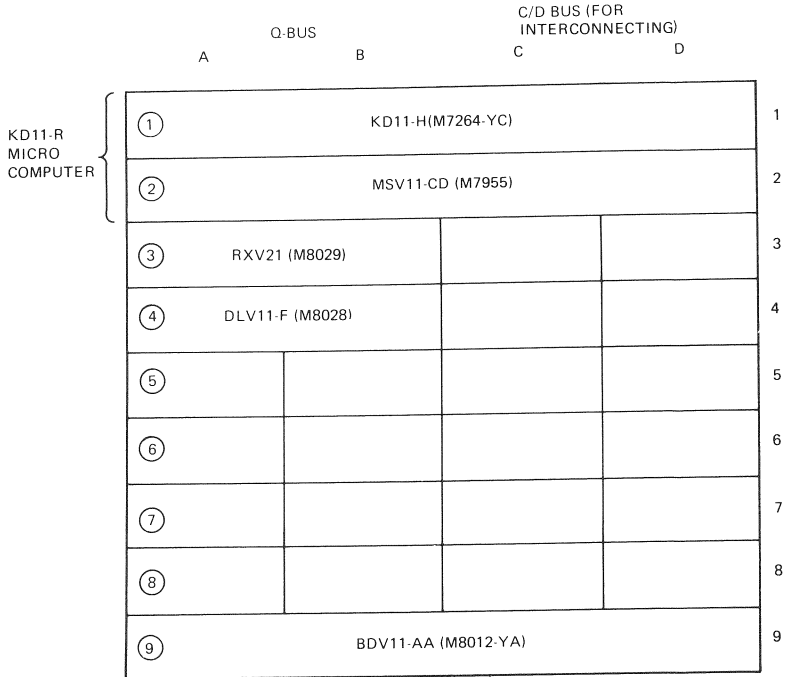
The PDP-11V03-L system consists of the following equipment.

A PDP-11/03LC-LD microcomputer consisting of:

| | |
|---------|--|
| KD11-R | a KD11-H (M7264-YC) microcomputer board and a MSV11-CD (M7955) 16K MOS memory board |
| BA11-N | a mounting box with an H9273 backplane and an H786 power supply |
| BDV11-A | a bootstrap/diagnostic/terminator with expandable ROM space for the user (M8012-YA). |
| KEV11 | A chip mounted on the KD11-H microcomputer that provides the system with the Extended Instruction Set (EIS) and Floating Point Instruction Set (FIS) features. |
| RXV21 | The RX02 floppy disk controller module (M8029) interfaces the RX02 disk to the LSI-11 bus. |
| DLV11-F | The asynchronous line interface module (M8028) interfaces the terminal to the LSI-11 bus. |
| RX02 | The dual floppy disk system. |

PDP-11V03-L

- H9610 The cabinet in which the hardware is mounted.
- 871 The primary power controller for the 11V03-L system.
- Floppy Disks The operational and diagnostic software programs are stored on floppy disks and are shipped as part of the system.



NOTE: CIRCLED NUMBERS ① THROUGH ⑨ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR-2022

PDP-11V03-LA, -LC, and -LD Configuration

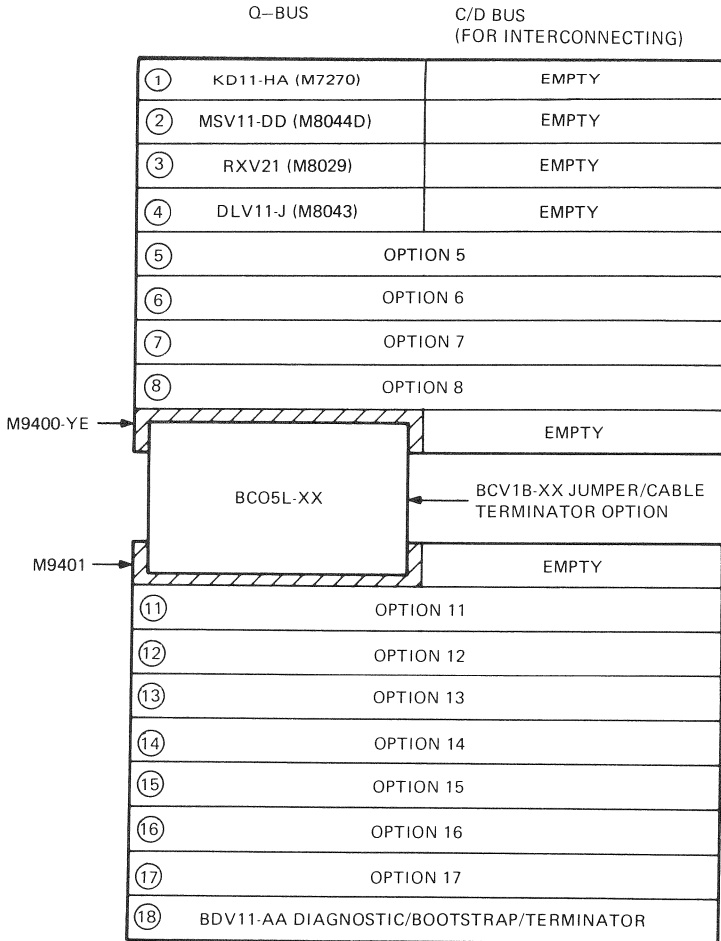
| Q-BUS | | C/D BUS (FOR INTERCONNECTING) | | |
|-------|---|----------------------------------|-------|---|
| A | B | C | D | |
| ① | M7270 CPU (KD11-HA) AND OPTION (KEV11) | | EMPTY | 1 |
| ② | M8044D 32K MEMORY (MSV11-DD) | | EMPTY | 2 |
| ③ | M8029 RX02 INTERFACE (RXV21) | | EMPTY | 3 |
| ④ | M8043 SERIAL LINE UNIT (DLV11-J) | | EMPTY | 4 |
| ⑤ | OPTION 5 | | EMPTY | 5 |
| ⑥ | OPTION 6 | | EMPTY | 6 |
| ⑦ | OPTION 7 | | EMPTY | 7 |
| ⑧ | OPTION 8 | | EMPTY | 8 |
| ⑨ | M8012-YA BOOTSTRAP/DIAGNOSTIC/TERMINATOR (BDV11-AA) | | | 9 |

NOTE: CIRCLED NUMBERS ① THROUGH ⑨ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL LEVELS.

MR 2407

PDP-11V03-LE, -LH, and -LJ Backplane Configuration

PDP-11V03-L



NOTE: CIRCLED NUMBERS ① THROUGH ⑱ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR-2408

PDP-11V03-LE, -LH, and -LJ System Expansion

PDP-11V23 AND PDP-11T23 SYSTEMS

PDP-11V23 SYSTEM

The PDP-11V23 is a general purpose computer system that can be used for developing and executing programs for a variety of applications.

Optional hardware and software is available for applications such as high-level language program development support, foreground/background real time support, multiprogramming, and the ability to monitor and control equipment.

The PDP-11V23 can support a real time application job execution in the foreground and an interactive or batch program development in the background. RT-11 is also available for a single job configuration. The PDP-11V23 system contains the following equipment.

A PDP-11/23 minicomputer with:

KDF11-AA microprocessor module (M8186) contained on a double-height module

MSV11-DD (M8044D) two double-height modules with 128K bytes of MOS RAM (on two modules) expandable to 256K bytes (four modules)

BA11-N mounting box with an H9273 backplane, an H786 power supply, and H403-A ac input box and a front bezel panel (54-12985)

BDV11-AA bootstrap/diagnostic/terminator with expandable user ROM option (M8012-YA).

DLV11-J Asynchronous four-channel serial line interface unit (M8043). (Must be CS revision "E" or higher.)

RXV21 The RX02 floppy disk controller module (M8029) interfaces the RX02 to the LSI-11 bus. (Must be at CS revision "E1" or higher.)

RX02 The dual drive floppy disk system.

H9610 Free-standing 76.8 cm (30 in) high cabinet.

PDP-11V23

Power controller

| | | | |
|--------|---------|------|----------------------------------|
| 871-A* | 120 Vac | 12 A | 50/60 Hz (early 120 Vac systems) |
| 871-B | 230 Vac | 8 A | 50/60 Hz |
| 871-C* | 120 Vac | 16 A | 50/60 Hz (later 120 Vac systems) |

In addition to the preceding configuration, the following items are shipped with the PDP-11V23 system.

RT-11 system software package

DYDP+ diagnostic kit

Floppy disk set. Disks contain the RT-11 operating system software and DYDP diagnostic programs.

Option terminals available for the system configuration include the following.

LA38 DECwriter IV

LA120 DECwriter III

VT100 Alphanumeric Video Terminal

PDP-11V23 Operator Switch Panel

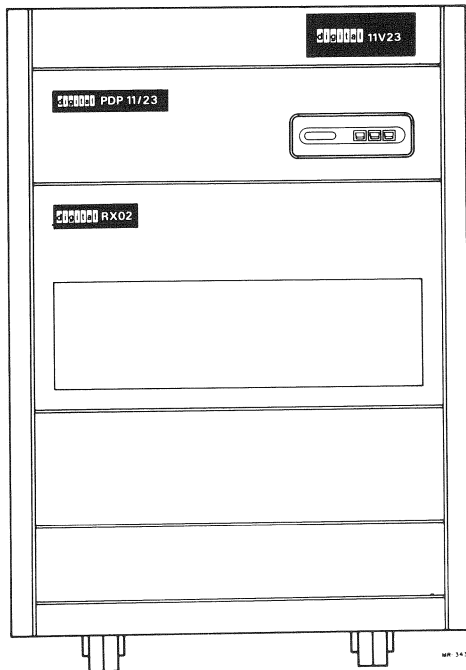
Three control switches on the front of the PDP-11/23 provide a communication link between the operator and the microcomputer system.

The switches labeled AUX ON/OFF, HALT, and RESTART provide power, stop, and bootstrap control for the PDP-11/23. The switch functions are defined as follows.

| Switch | Position | Function |
|------------|----------|---|
| AUX ON/OFF | OFF | In the normal factory configuration, turning this switch off removes ac power from the system. |
| | ON | In the normal factory configuration, turning this switch on applies ac power to the system. If the HALT switch is up, the system is automatically booted. |

*Systems built before April 1980 use 871-A power controllers. Systems built after April 1980 use 871-C power controllers.

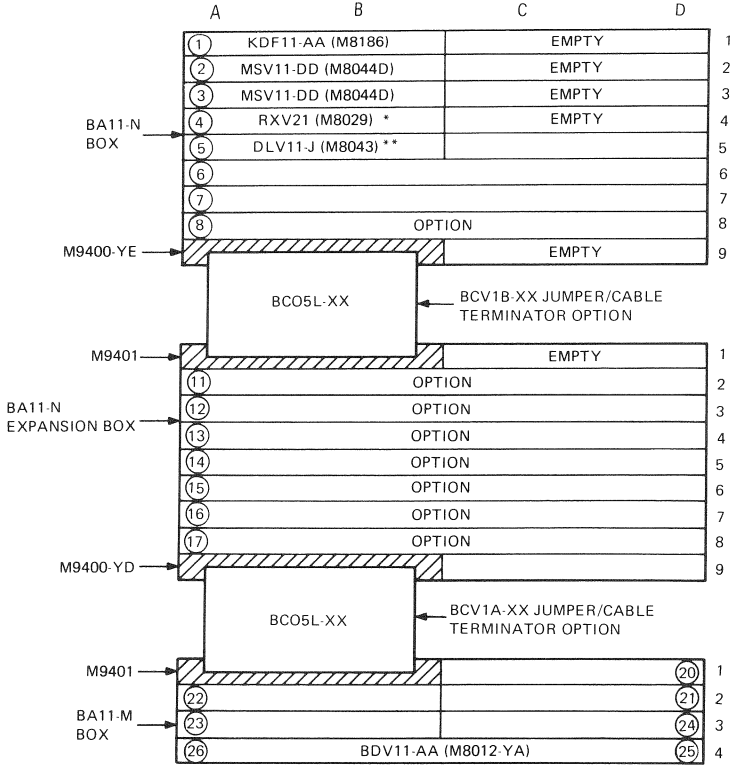
| Switch | Position | Function |
|---------|----------------------------|---|
| HALT | Up (Enable) | This switch enables the processor to run. |
| | Down (HALT) | The HALT switch, when down, halts the processor, which responds to console ODT commands. Refer to the <i>Micro-computer Processor Handbook</i> , EB-18451-20, for ODT instructions. |
| RESTART | RESTART (Momentary Switch) | When this switch is activated, and when the HALT switch is up, the processor carries out a power-up sequence and displays the bootstrap dialog as: 28* START? |



PDP-11V23 (Front View)

*The BDV11 software automatically sizes the available memory in the system and prints the number 28. The 28 is the present limit for the BDV11 ROM software. The actual available memory maximum is 124K words. The user should be aware of the actual memory and not depend on the print-out. The memory-sizing software will be updated and eventually print out the actual memory size up to the addressing limit of the CPU.

PDP-11V23



*NOTE: MUST BE AT CS REVISION 'E1' OR HIGHER

** NOTE: MUST BE AT CS REVISION 'E' OR HIGHER

NOTE: CIRCLED NUMBERS ① THROUGH ㉔ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS

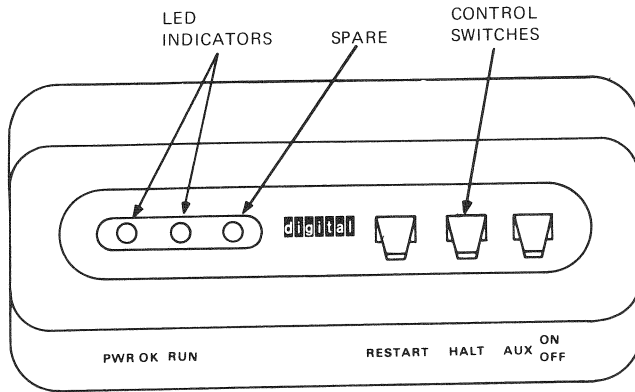
MR-4874

PDP-11V23 System Expansion Example

The PDP-11/23 front switch panel also contains two indicators that provide the following information.

| LED | Function |
|--------|---|
| PWR OK | Illuminated when the proper dc output voltages are being generated by the microcomputer system. |
| RUN | Illuminated when the processor is operating; turned off when the processor is not executing instructions. |

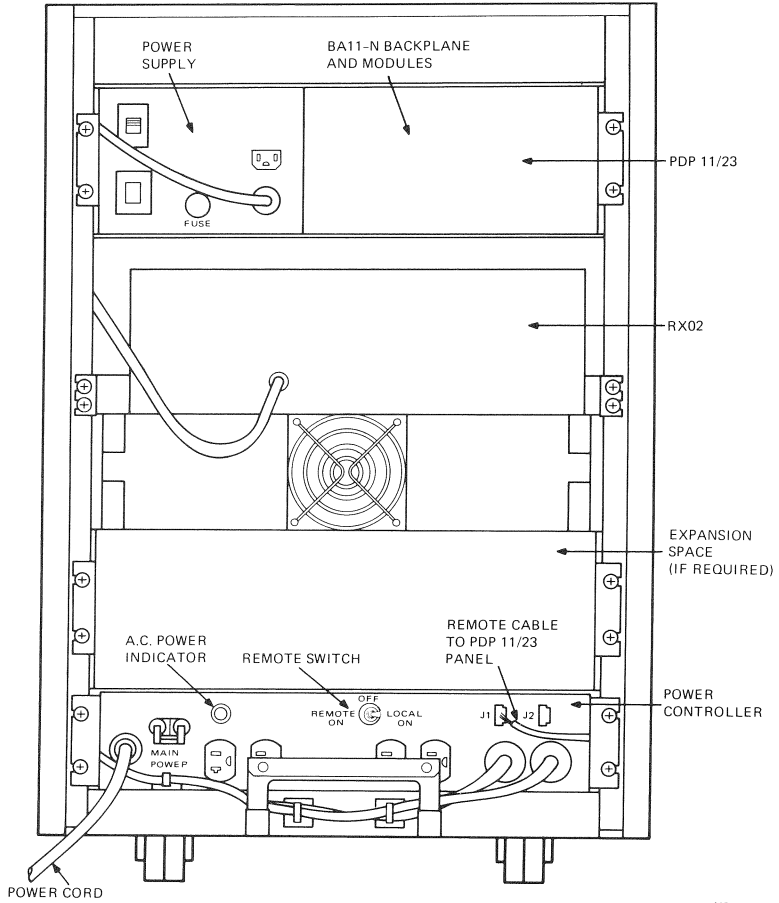
The following is an expanded PDP-11V23 configuration example using both the BA11-N and BA11-M boxes.



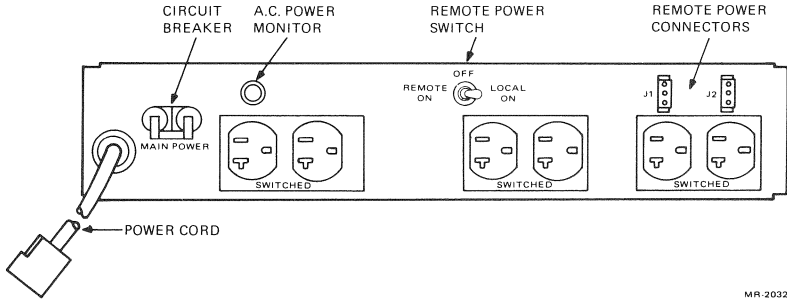
MR-4891

Front Panel Switches and Indicators

PDP-11V23

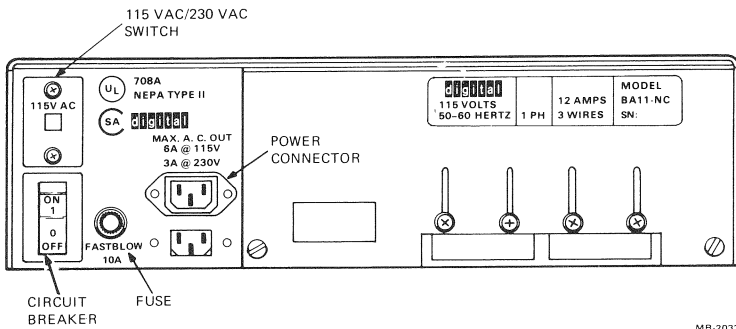


PDP-11V23 with Backpanel Removed



MR-2032

Power Controller (Rear View)



MR-2033

PDP-11/23 Microcomputer (Rear View)

PDP-11V23

| Q-BUS | | C/D BUS (FOR INTERCONNECTING) | | |
|-------|---------------------|----------------------------------|---|---|
| A | B | C | D | |
| ① | KDF11-AA (M8186) | | | 1 |
| ② | MSV11-DD (M8044D) | | | 2 |
| ③ | MSV11-DD (M8044D) | | | 3 |
| ④ | RXV21 (M8029) * | | | 4 |
| ⑤ | DLV11-J (M8043) ** | | | 5 |
| ⑥ | | | | 6 |
| ⑦ | | | | 7 |
| ⑧ | | | | 8 |
| ⑨ | BDV11-AA (M8012-YA) | | | 9 |

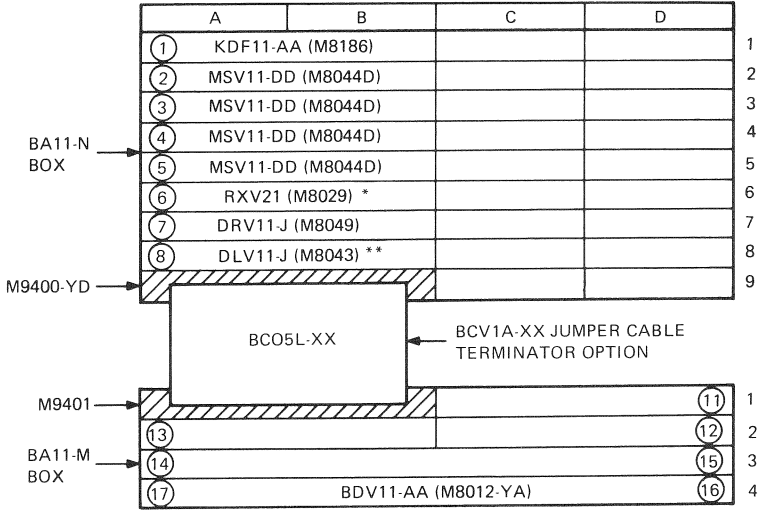
*NOTE: MUST BE AT CS REVISION 'E1' OR HIGHER

**NOTE: MUST BE AT CS REVISION 'E' OR HIGHER

NOTE: CIRCLED NUMBERS ① THROUGH ⑨ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR 4873

PDP-11V23 Module Configuration



*NOTE: MUST BE AT CS REVISION 'E 1' OR HIGHER







**NOTE: MUST BE AT CS REVISION 'E' OR HIGHER

NOTE: CIRCLED NUMBERS ① THROUGH ⑰ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR 4875

PDP-11V23 Expansion Example

PDP-11V23

| LOCAL POWER | POWER CONTROLLER | |
|------------------------------|---|--|
| | PLUG | RECEPTACLE |
| 871-A 115V 15A 50/60HZ | <p>871-A</p>  <p>NEMA # 5-15P DEC # 90-08938</p> |  <p>5-20R 12-12265</p> |
| 871-B 230V 10A 50/60HZ | <p>871-B</p>  <p>NEMA # 6-15P DEC # 90-08853</p> |  <p>6-15R 12-11204-01</p> |
| 871-C 115V 20A 50/60HZ | <p>871-C</p>  <p>HUBBELL # 5366-C DEC # 12-15183</p> |  <p>NEMA # 5-20R 12-12265</p> |

MR-2405

Power Connectors

| System Requirements | Model | | |
|---------------------|-----------------------|-----------------------|-------|
| | AA | AC | AD |
| Input Power (V) | 120 | 120 | 240 |
| Frequency | 60 | 50 | 50 |
| Current | 12 | 12 | 8 |
| PDP-11V23 Computer | AA | AA | AB |
| RX02 Floppy Disk | BA | BC | BD |
| Power Controller | 871-A* or 871-C | 871-A* or 871-C | 871-B |

*Systems built before April 1980 use 871-A power controllers. Systems after April 1980 use 871-C power controllers.

PDP-11T23 SYSTEM

The PDP-11T23 is a general purpose computer system that can be used for developing and executing programs for a variety of applications.

Optional hardware and software are available for applications such as high-level language program development, foreground/background real time support, multiprogramming, and equipment monitoring and control capability.

PDP-11T23 can support a single user with a foreground/background system. It can support a real time application job execution in the foreground and an interactive or batch program development in the background. RT-11 is also available for a single job configuration.

The PDP-11T23 system contains the following equipment.

A PDP-11/23 minicomputer with:

KDF11-AA microprocessor module (M8186) contained on a double-height module

MSV11-DD (M8044D) two double-height modules with 128K bytes of MOS RAM (on two modules) expandable to 256K bytes (four modules)

BA11-N mounting box with an H9273 backplane, an H786 power supply, and H403-A ac input box and a front bezel panel

BDV11-AA bootstrap/diagnostic/terminator with expandable user ROM option (M8012-YA).

DLV11-J Asynchronous four-channel serial line interface unit (M8043). (Must be at CS revision "E" or higher.)

RL01 Five-megabyte dual disk drive units and cartridges

H9612 105 cm (42 in) high cabinet

Power controller

| | | | |
|--------|---------|------|----------|
| 871-A* | 120 Vac | 12 A | 50/60 Hz |
| 871-B | 230 Vac | 8 A | 50/60 Hz |
| 871-C* | 120 Vac | 16 A | 50/60 Hz |

In addition to the preceding configuration, the following items are shipped with the system.

1 RT-11 or RSX-11M system software kit
1 DLDP+ diagnostic kit

*Systems built before April 1980 use 871-A power controllers. Systems built after April 1980 use 871-C power controllers.

PDP-11T23

Optional terminals available for the system include the following.

LA38 DECwriter IV
LA120 DECwriter III
VT100 Alphanumeric Video Terminal

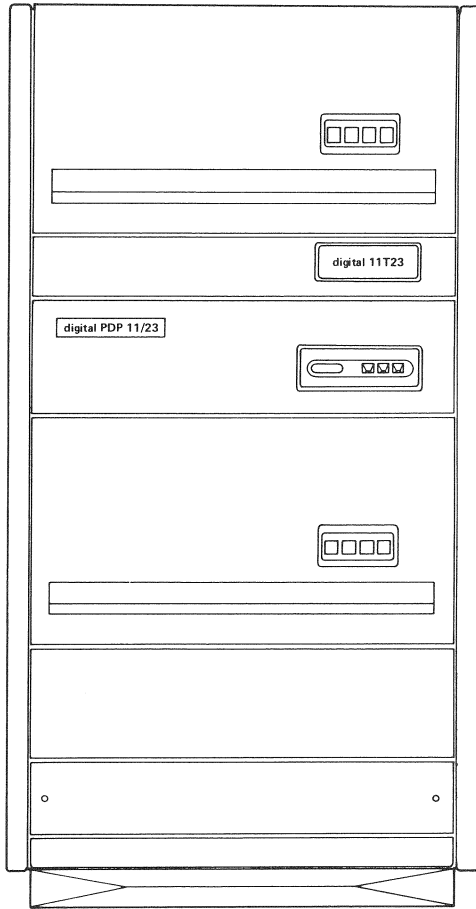
PDP-11T23 Operator Switch Panel

Three control switches on the front of the PDP-11T23 provide a communication link between the operator and the microcomputer system.

The switches labeled AUX ON/OFF, HALT, and RESTART provide power, stop, and bootstrap control, respectively. The switch functions are defined as follows.

| Switch | Position | Function |
|------------|----------------------------|---|
| AUX ON/OFF | OFF | In the normal factory configuration, this removes ac power from the system. |
| | ON | In the normal factory configuration, this applies ac power to the system. If the HALT switch is up, the system is automatically booted. |
| HALT | Up (Enable) | This enables the processor to run. |
| | Down (HALT) | This halts the processor, which will respond to console ODT commands. Refer to the <i>Microcomputer Processor Handbook</i> , EB-18451-20, for ODT instructions. |
| RESTART | RESTART (Momentary Switch) | When this switch is activated, and when the HALT switch is up, the processor carries out a power-up sequence and displays the bootstrap dialog as: 28* START? |

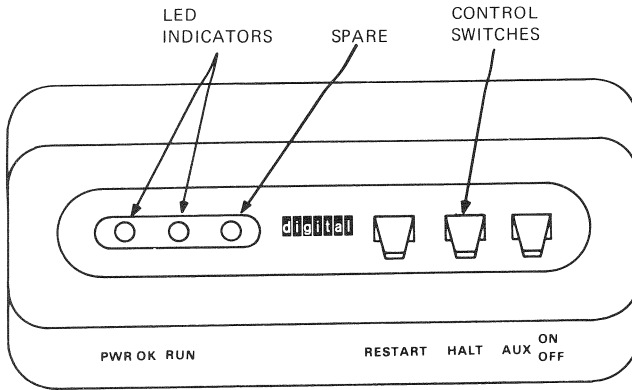
*The BDV11 software automatically sizes the available memory in the system and prints the number 28. The 28 is the present limit for the software. The actual available memory maximum is 124K words. The user should be aware of the actual memory and not depend on the printout. The memory-sizing software will be updated and eventually print out the actual memory size up to the addressing limit of the CPU.



MR-3799

PDP-11T23 Computer System

PDP-11T23



MR 4891

Front Panel Switches and Indicators

The PDP-11T23 front switch panel also contains two indicators that provide the following information.

| LED | Function |
|--------|---|
| PWR OK | Illuminated when the proper dc output voltages are being generated by the microcomputer system. |
| RUN | Illuminated when the processor is operating; turned off when the processor is not executing instructions. |

RL01 Disk Drives

The RL01 disk drive is a random access mass storage device with a removable, top-loading disk cartridge. Access to the disk is provided by a lift-up cover. The RL01 has four indicators on its front panel. Their functions are as follows.

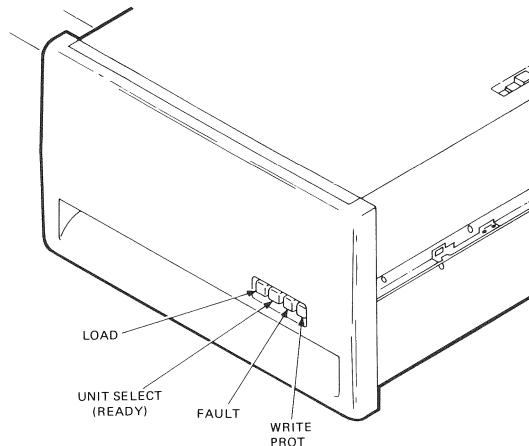
| Indicator | Function |
|------------------------|---|
| LOAD (Push Button) | Lights to indicate that the spindle has stopped and a cartridge may be loaded. |
| UNIT SELECT (READY) | Lights to indicate that drive 0 or 1 is ready to read, write, or receive controller commands. |

| Indicator | Function |
|-----------------------------|--|
| FAULT | Lights to indicate that a drive error condition exists. |
| WRITE PROT (Push Button) | Lights to indicate that the cartridge currently mounted is protected from having data written on it. |

The following is an example of the PDP-11T23 microcomputer with an expanded configuration using both the BA11-N and BA11-M boxes.

| System Requirements | Models | | |
|---------------------|-----------------------|-------|--------|
| | AA | AB | AC |
| Input Power (V) | 120 | 240 | 120 |
| Frequency | 50/60 | 50/60 | 50/60 |
| Current | 12 A | 8 A | 16 A |
| PDP-11T23 Computer | AA | AB | AA |
| RL01 Disk | AK | AK | AK |
| Power Controller | 871-A* or 871-C | 871-B | 871-C* |

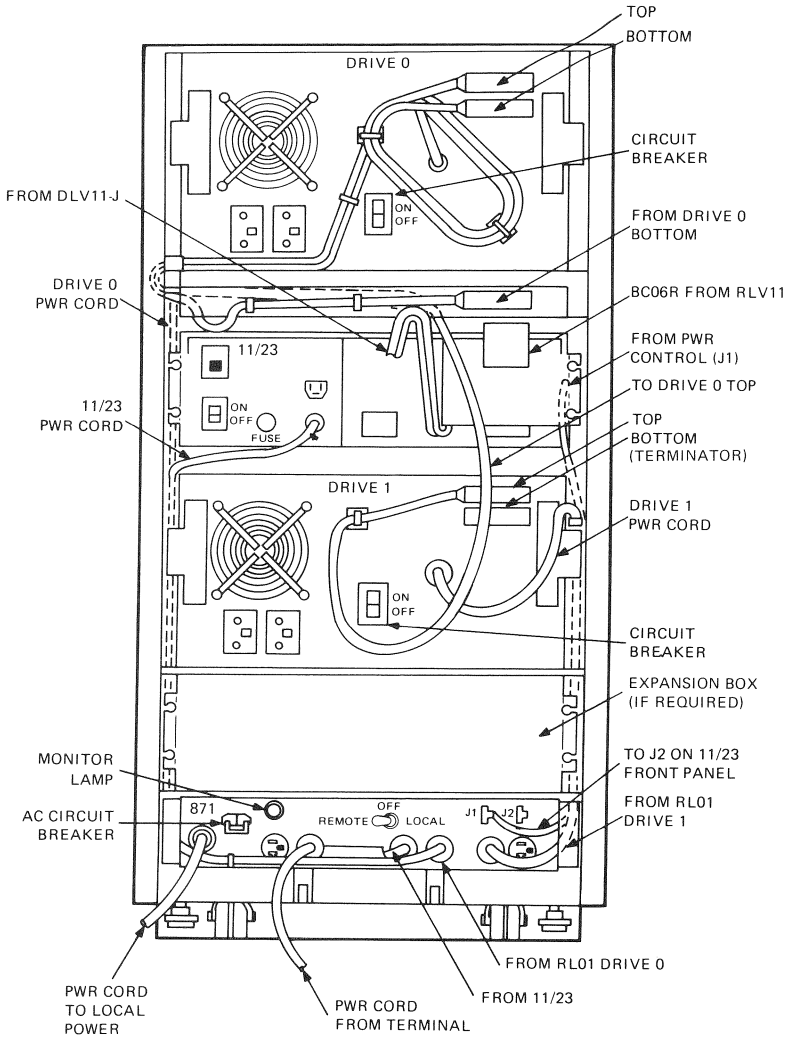
* Systems built before April 1980 use 871-A power controllers. Systems built after April 1980 use 871-C power controllers.



MR-1860

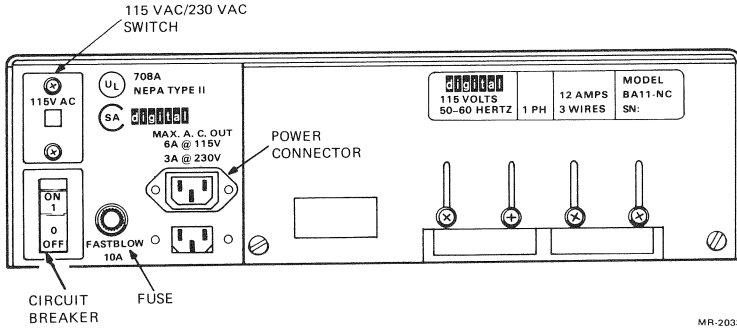
RL01 Disk Drive (Front View)

PDP-11T23



MR-3794

PDP-11T23 (Rear Panel Removed)



PDP-11/23 Microcomputer (Rear View)

| Q-BUS | | C/D BUS (FOR INTERCONNECTING) | | |
|-------|----------------------------|----------------------------------|---|---|
| A | B | C | D | |
| ① | KDF11-AA (M8186) | | | 1 |
| ② | MSV11-DD (M8044D) | | | 2 |
| ③ | MSV11-DD (M8044D) | | | 3 |
| ④ | RLV11 (M8013) DISK CONTROL | | | 4 |
| ⑤ | RLV11 (M8014) BUS CONTROL | | | 5 |
| ⑥ | DLV11-J (M8043) * | | | 6 |
| ⑦ | | | | 7 |
| ⑧ | | | | 8 |
| ⑨ | BDV11-AA (M8012-YA) | | | 9 |

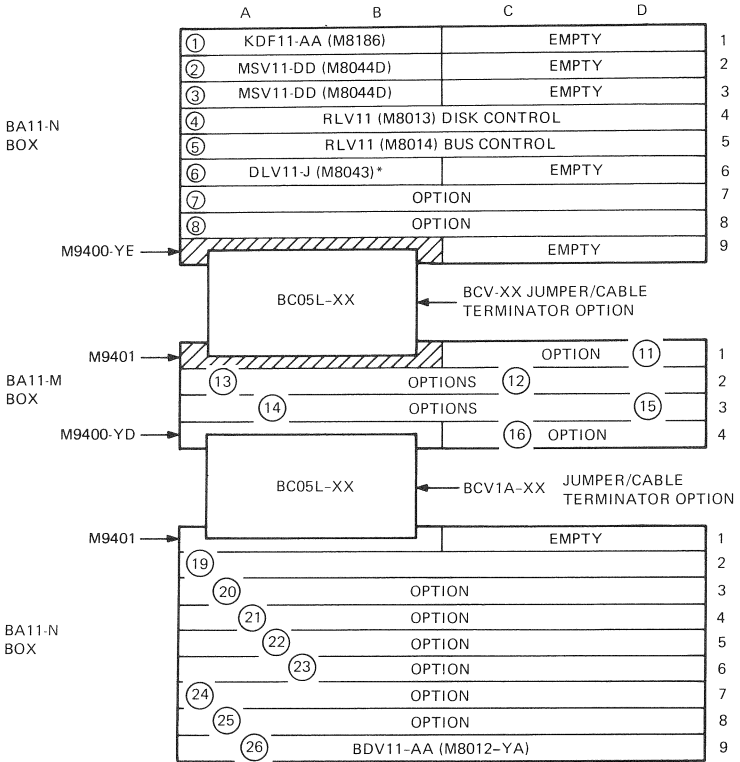
*NOTE: MUST BE AT CS REVISION 'E' OR HIGHER

NOTE: CIRCLED NUMBERS ① THROUGH ⑨ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR-4877

Typical PDP-11T23 Module Configuration

PDP-11T23



*NOTE: MUST BE AT CS REVISION 'E' OR HIGHER

NOTE: CIRCLED NUMBERS ① THROUGH ⑳ REFER TO THE DMA PRIORITY SEQUENCE AND THE PHYSICAL INTERRUPT PRIORITY ON EACH OF THE INDIVIDUAL INTERRUPT LEVELS.

MR 4878

PDP-11T23 Module Expansion Example

PDP-11/03-BASED MINC/DECLAB-11/MINC SYSTEMS

MODULAR INSTRUMENTATION COMPUTER (MINC)

The Modular Instrumentation Computer (MINC) is a real time operating system featuring on-line data storage and BASIC software with graphics, scientific, and laboratory subroutine packages. Each system consists of a MINC chassis, an RX02 dual floppy disk drive, and a VT105 terminal mounted on a roll-around cart. The MINC chassis houses a power supply, CPU and related modules, and up to eight MINC laboratory options.

The physical components of a MINC system are grouped into two categories: items common to all MINC systems, and those that can be purchased as options either when the system is first acquired or at some later time as add-ons. Each MINC system is configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the modules, specifications, and components.

All PDP-11/03 MINC systems include the following standard items.

MINC cart, which provides support and transport for:

1. Dual diskette drive (RX02M)
2. MINC chassis (MNCBA) with power supply (H786). This contains:
 - KD11-NA - LSI-11 processor with EIS/FIS
 - MSV11-DD - Memory (64K bytes) single board
 - RXV21 - Diskette drive interface
 - DLV11-J - Four-channel serial ASCII interface
 - IBV11-A - IEEE bus interface
 - BDV11-A - Bus terminator/diagnostic/bootstrap module.
3. VT105 terminal with built-in graphics capability.

MINC systems can include some or all of the following lab modules.

- Analog-to-digital converter (MNCAD)
- Preamplifier (MNCAG)
- Dual multiplexer (MNCAM)
- Clock (MNCKW)

11/03-BASED MINC

Digital-to-analog converter (MNCAA)

Digital input unit (MNCDI)

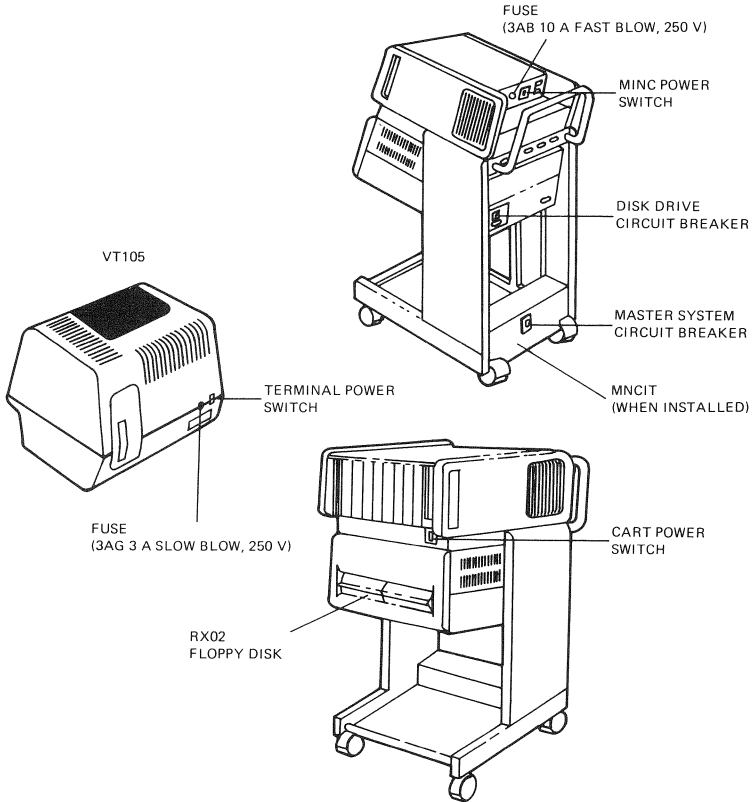
Digital output unit (MNCDO)

MINC systems can also include:

Dot matrix printer (LA35)

Isolation transformer (MNCIT)

110 baud, 20 mA serial line interface (DLV11-KC).



MR 1529

MINC System

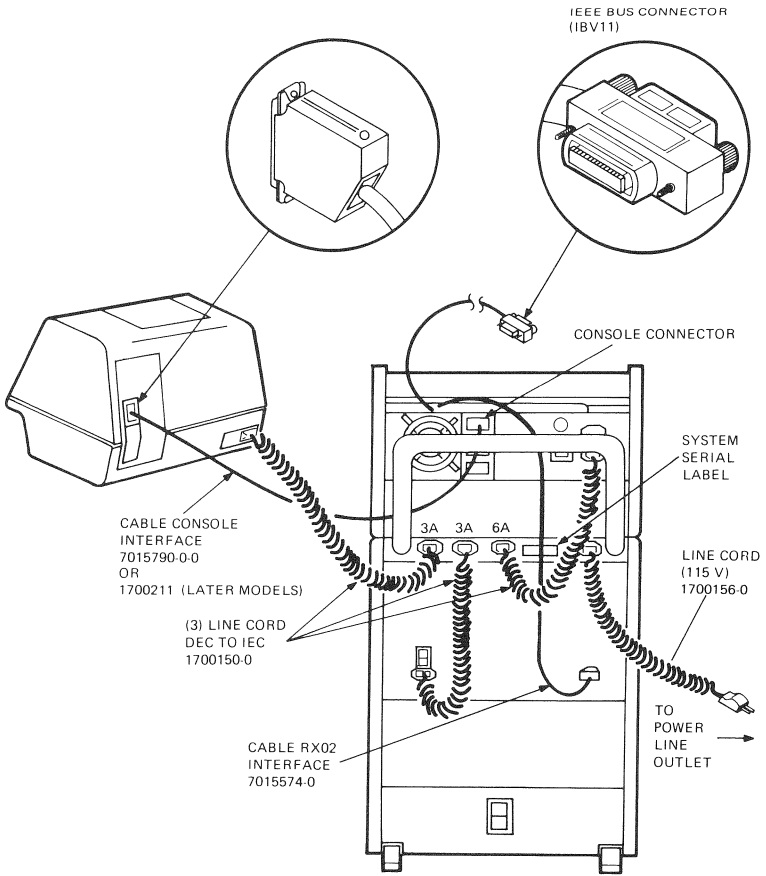
MINC System Model Designation

| System Requirements | MNC11 | | | | | | |
|-----------------------------|-------|-----|-----|-----|-------|-------|-----|
| | -AA | -BA | -BC | -BD | -CA | -CC | -CD |
| Input Power (V) | 115 | 115 | 115 | 230 | 115 | 115 | 115 |
| Frequency (Hz) | 60 | 60 | 50 | 50 | 60 | 60 | 50 |
| | | 1 | 1 | | 1 | 1 | |
| MNC11- | | AA | AA | | AA/BA | AA/AC | BID |
| Chassis MNC BA | 1 | | | | | | |
| KD11-NA (M7270) | 1 | | | | | | |
| MSV11D (M8044) | 1 | | | | | | |
| RXV21 (M8029) | 1 | | | | | | |
| IBV11-A (M7954) | 1 | | | | | | |
| BDV11-A (M8012) | 1 | | | | 1 | 1 | 1 |
| MINC Cart | | 1 | 1 | 1 | 1 | 1 | 1 |
| RX02 | | MA | MC | MD | MA | MC | MC |
| VT105 | | MA | MA | MB | MA | MA | MB |
| LA35 | | | | | HE | HH | HS |
| | | | | | 1 | 1 | |
| MNC11-AB | | | | 1 | | | |
| MNCAD | | * | * | * | 1 | 1 | 1 |
| MNCAA | | * | * | * | 1 | 1 | 1 |
| MNCAM | | * | * | * | 1 | 1 | 1 |
| MNCDI | | * | * | * | 1 | 1 | 1 |
| MNCDO | | * | * | * | 1 | 1 | 1 |
| MNCKW | | * | * | * | 1 | 1 | 1 |
| MNCAG | | * | * | * | 1 | 1 | 1 |
| Cable Console Interface | 1 | | | | 1 | 1 | 1 |
| Software Kit (English) | | 1 | 1 | 1 | | | |
| Blank Control Panel (MNCBL) | | ** | ** | ** | ** | ** | ** |

*User's options

**As required to fill MNCBA plus one extra

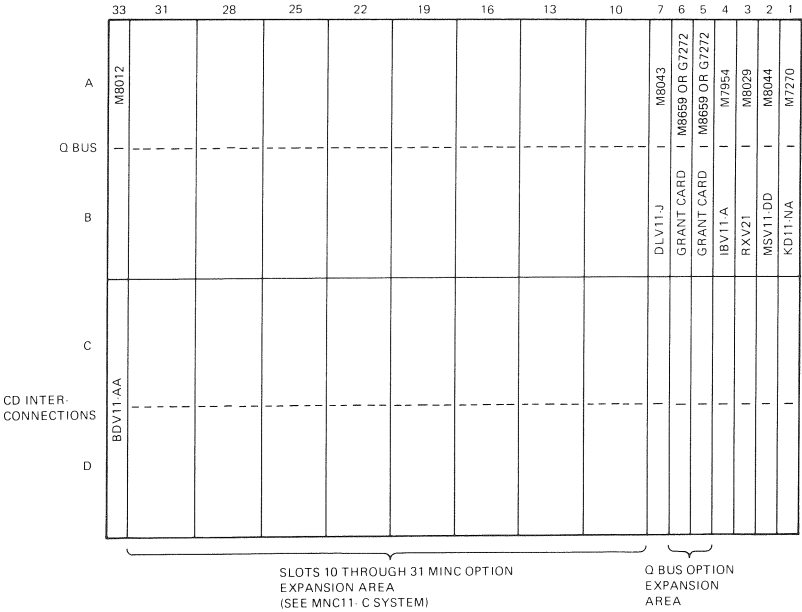
11/03-BASED MINC



MR-1533

MINC System Cable Connections

11/03-BASED MINC



MR-4880

PDP-11/03 Module Utilization (MINC)

DECLAB/MINC Specifications

| | | 115 V, 50/60 Hz | | 230 V, 50 Hz | |
|---------------------------------|-------------------------------------|-------------------|------------------------------------|-------------------|-------------|
| | Plug | Receptacle | Plug | Receptacle | |
| Power Connector | NEMA No. 5-15P DEC No. 90-089 38 | 5-15R 12-05351 | NEMA No. 6-15P DEC No. 90-08853 | 6-15R 12-11204 | |
| | MINC Chassis* | VT105 LA35 | MINC Chassis | VT105 LA35 | |
| Amperage Typical Maximum | 19 | 3.0 | 8 | 1.5 | 1.0 |
| Wattage Typical Maximum | 500 1200 | 300 250 300 | | 250 300 | 160 |
| Btu/Hour Typical Maximum | | | | | 550 1020 |
| Weight Kilograms Pounds | | 16.3 36 | | 34.02 75 | 16.3 36 |

*Includes MNCBA chassis with MINC lab modules and RX02 and VT105.

NOTE

MINC option expansion area is to be used only for MINC lab module add-ons. No Qbus add-ons should be inserted in this expansion area. No backplane expansion of the MINC system is possible. All Qbus add-ons must be inserted in either slot 5 or 6 (A and B only for double-height options).

System-Level Diagnostics

Two diagnostic chains are contained on the diagnostic floppy for system troubleshooting. The diagnostic chain MINC11.CCC provides the required diagnostics for testing the CPU and related modules including the BDV11, the VT105 option, and MINC lab modules. This chain requires turnaround connectors on SLU 0, SLU 1, SLU 2. For detailed operational information, refer to Book 7, *Working with MINC Devices*, AA-D572A-TC. The contents of file MINC11.CCC is as follows.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | MINC-AA option sizer program |
| R VKAA??/1 | CPU test |
| R VKAB??/1 | Extended instruction test |
| R VKAC??/1 | Floating point instruction set test |
| R VKAL??/1 | Traps test |
| R VIBB??/1 | IBV11 test |
| R VDLA??/1 | DLV11-J test |
| R VMNC??/1 | Clock test |
| R VMNB??/1 | MNC DI test |
| R VMNE??/1 | MNCOO (digital out) diagnostic |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R ZVTN??/1 | VT105 test |
| R VMNG??/1 | Termination program |

The second diagnostic chain MNC11.CCC provides the required diagnostics for performing a quick check of the MINC lab modules only. The contents of file MNC11.CC are listed below.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | Startup/sizer program |
| R VMNC??/1 | Floating point instruction set test |
| R VMNB??/1 | MNC DI test |
| R VMNE??/1 | MNC DO test |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R VMNG??/1 | Termination program |

Both programs are stored on the MINC diagnostic disk, available from the Software Distribution Center (SDC).

| | |
|---------|--|
| Kit No. | ZJ281 - RZ (hard-copy documents) |
| | ZJ281 - PX (RX02 floppy) |
| | ZJ281 - RX (hard-copy/RX02 floppy kit) |

11/03-BASED MINC

Modules in the Basic System

MNC11-AA (115 V, 60 Hz) and MNC11-AB (230 V, 50 Hz)

Processor KD11-NA (M7270)

With Extended Instruction Set/Floating Point Instruction Set (KEV11-A, 23-003B5)

Jumper W1 installed - crystal clock
Jumper W3 removed - enable event line
Jumper W6 installed - } power-up to 173000 (BDV11)
Jumper W5 removed - }

Memory – MSV11-DD (M8044)

64K byte MOS RAM without parity
On-board memory refresh
Jumper configuration

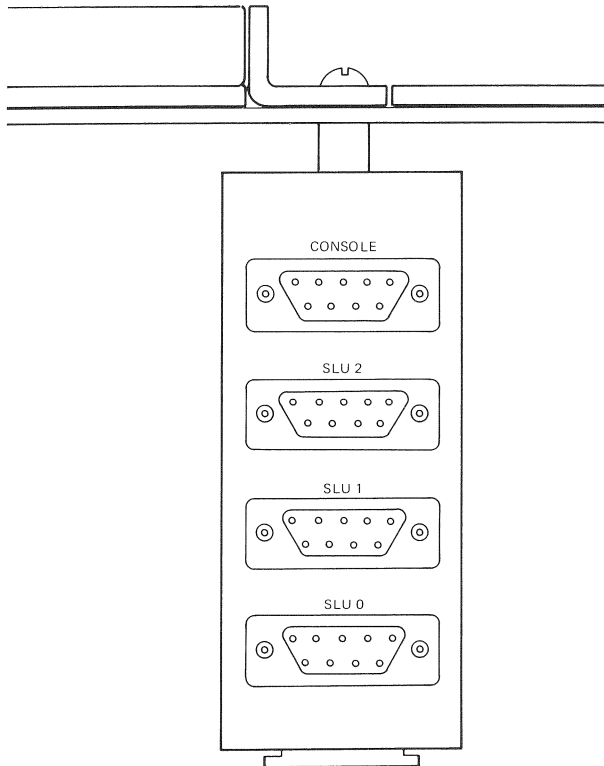
| Jumper | Jumper State | Function Implemented |
|------------------------------|---------------|------------------------------------|
| Pin 1 to 3 Pin 1 to 2 | OUT } IN } | Enable 2K I/O page option |
| W2 | IN | Enable normal system power (+5 V) |
| W3 | IN | Enable normal system power (+12 V) |
| W4 | OUT | Disable battery power (+12 V) |
| W5 | OUT | Disable battery power (+5 V) |
| Pin 10 to 14 Pin 16 to 15 | IN } IN } | Select memory size of 64K bytes |
| S1 through S5 | ON | Starting address bank 0 |

Serial Line Interface – DLV11-J (M8043)

Number of serial lines: 4

Factory-set address and vector switches

| Device | Address | Vector | Baud Rate |
|---------|---------|--------|-----------|
| Console | 777560 | 60 | 9600 |
| SLU 2 | 776520 | 320 | 300 |
| SLU 1 | 776510 | 310 | 1200 |
| SLU 0 | 776500 | 300 | 9600 |



MR 4980

MINC Terminal Distribution Panel

11/03-BASED MINC

Bus Terminator/Diagnostic/Bootstrap BDV11-A (M8012)

Diagnostic/bootstrap conditions are factory-selected using switch packs.

| Switch A (E15) | RX02 Bootstrap |
|-------------------|-------------------|
| A1 | ON |
| A2 | ON |
| A3 | OFF |
| A4 | OFF |
| A5 | OFF |
| A6 | ON |
| A7 | OFF |
| A8 | OFF |

| Switch B (E21) | RX02 Bootstrap |
|-------------------|-------------------|
| B1 | OFF |
| B2 | OFF |
| B3 | OFF |
| B4 | OFF |
| B5 | ON |

IEEE Bus Interface – IBV11-A (M7954)

Address and vector switch settings:

| | |
|-------------------------|---------------------|
| Address 171420 | Vector 420 |
| S2-1, 4 and 5 = ON only | S-1 and 5 = ON only |

Floppy Disk Interface – RXV21 (M8029)

Address and vector switch settings:

| | |
|----------------------|--------------------------|
| Address 177170 | Vector 264 |
| A7 and A8 = OUT only | V3, V6 and V7 = OUT only |

DECLAB-11/MNC SYSTEM

The DECLAB-11/MNC is a real time operating system featuring on-line data storage, and FORTRAN software with graphics, scientific, and laboratory subroutine packages. Each system contains as its main components an MNC chassis, dual RL01 disk drives, and a terminal (VT105 or LA36). The MNC chassis houses a power supply, CPU, and related modules, and up to eight MNC- series options.

The physical components of the DECLAB system are grouped into two categories: items common to all MNC systems, and those that can be purchased as options, either when the system is first acquired or at some later time. Each DECLAB system is configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the modules, specifications, and components.

All DECLAB systems include the following standard items.

Mass storage device containing two RL01 disk drives

MNC chassis (MNCBA) with power supply (H786). This contains:

- KD11-NA - LSI-11 processor with EIS/FIS
- MSV11-DD - Memory (32K word) single board
- RLV11 - Controller (disk)
- DLV11-J - Four-channel serial ASCII interface
- IBV11-A - IEEE bus interface (optional)
- BDV11-A - Bus terminator/diagnostic/bootstrap module.

VT105 terminal with built-in graphics capability

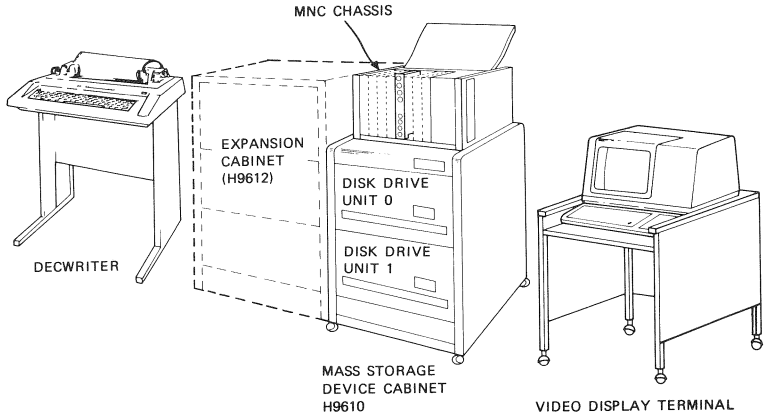
DECLAB systems can include some or all of the following lab modules.

- Analog-to-digital converter (MNCAD)
- Preamplifier (MNCAG)
- Dual multiplexer (MNCAM)
- Clock (MNCKW)
- Digital-to-analog converter (MNCAA)
- Digital input unit (MNCDI)
- Digital output unit (MNCDO)

DECLAB systems can also include:

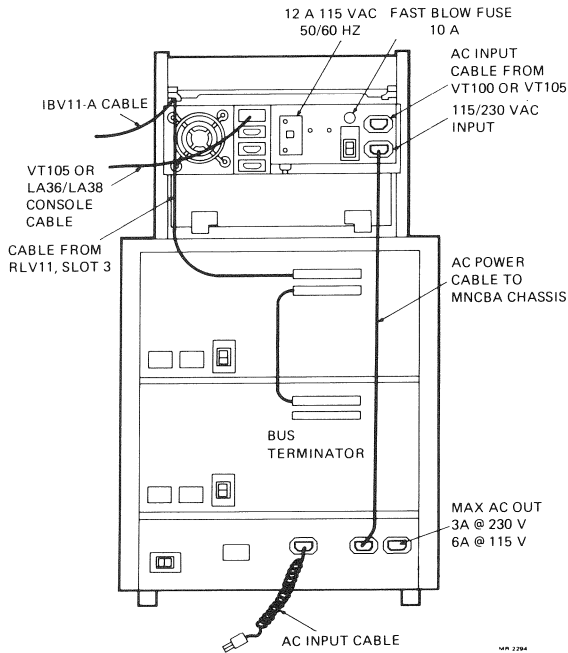
- Dot matrix printer (LAV11 + LA180 or LA35)
- 110 baud, 20 mA serial line interface (DLV11-KC).

DECLAB-11/MNC



MR-2261

DECLAB-11/MNC System with Optional Units



MR-2264

DECLAB-11/MNC Cable Connections

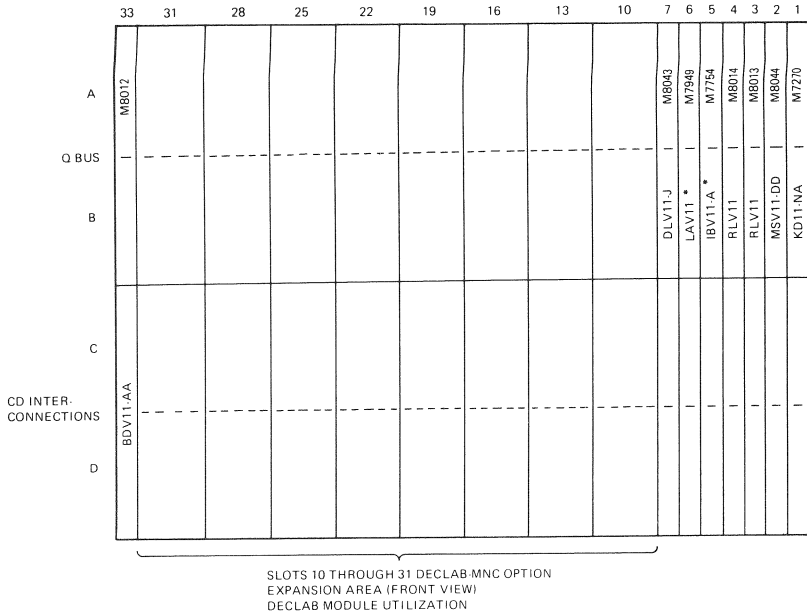
DECLAB-11/MNC System Model Designation

| System Requirements | MNC11 | | | |
|----------------------------------|-------|-------|-------|-----|
| | -D | -J | -K | -L |
| Input Power (V) | 115 | 115 | 115 | 115 |
| Frequency (Hz) | 60 | 60 | 60 | 60 |
| Cabinet/Power Controller (H9610) | | BB/BC | BB/BC | |
| MNC11- | | D | D | K |
| Chassis (MNCBA) | 1 | | | |
| KD11-NA (M7270) | 1 | | | |
| MSV11D (M8044) | 1 | | | |
| DLV11-J (M8043) | 1 | | | |
| IBV11-A (M7954) | | | | 1 |
| BDV11-A (M8012) | 1 | | | |
| RLV11- (M8013) | 1 | | | |
| RLV11- (M8014) | 1 | | | |
| LAV11-LA180 Printer | | | | 1 |
| VT105 Terminal | | | MA | |
| LA36 | | HE | | |
| RL01 Disk Drive | | 2 | 2 | |
| MNC11-AD | | * | * | 1 |
| MNC11-AA | | * | * | 1 |
| MNC11-AM | | * | * | 1 |
| MNC11-DI | | * | * | 1 |
| MNC11-DO | | * | * | 1 |
| MNC11-KW | | * | * | 1 |
| MNC11-AG | | * | * | 1 |
| Cable Console Interface | 1 | | | |
| Software Kit (English) | 1 | 1 | 1 | 1 |
| Blank Control Panel (BNCBL) | | ** | ** | ** |
| Installation Kit (MNCIK) | | | | |

*User's options

**As required to fill MNCBA plus one extra

DECLAB-11/MNC



* REPLACE THESE OPTIONS WHEN NOT REQUIRED WITH M8659 GRANT CARD OR G7272

MR 4890

PDP-11/03 DECLAB Module Utilization

NOTE

DECLAB-MNC option expansion area is to be used only for MNC-series module add-ons. No Qbus add-ons should be installed in this expansion area. No backplane expansion of the MNC system is possible.

System-Level Diagnostics

Two diagnostic chain files are contained on the RL01 diagnostic disk for system troubleshooting. The diagnostic chain MNC11A.CCC provides the required diagnostics for testing the CPU and related modules and MNC-series modules. This program does not test the BDV11 or VT105 options. The contents of file MNC11A.CCC are as follows.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | MINC-11 option sizer program |
| R VKAA??/1 | CPU test |
| R VKAB??/1 | Extended instruction test |
| R VKAC??/1 | Floating point instruction set test |
| R VKAL??/1 | Traps test |

| | |
|------------|--------------------------------|
| R VIBB??/1 | IBV11 test |
| R VDLA??/1 | DLV11-J test |
| R VMNC??/1 | Clock test |
| R VMNB??/1 | MNCDI test |
| R VMNE??/1 | MNCOO (digital out) diagnostic |
| R VMND??/1 | |
| R VMNA??/1 | A/D test |
| R ZVTN??/1 | VT105 test |
| R VMNG??/1 | Terminator program |

The second diagnostic chain MNC11.CCC provides the required diagnostics for performing a quick check of the MNC-series modules only. The contents of file MNC11.CCC are as follows.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | Start-up/sizer program |
| R VMNC??/1 | Floating point instruction set test |
| R VMNB??/1 | MNCDI test |
| R VMNE??/1 | MNCDO test |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R VMNG??/1 | Termination program |

Both programs are stored on the MNC diagnostic disk, Software Distribution Center (SDC) kit no. AX-E380EMC.

Modules in the Basic System

MNC11-AA (115 V, 60 Hz) and MNC11-AB (230 V, 50 Hz)

Processor KD11-NA (M7270)

With Extended Instruction Set/Floating Point Instruction Set (KEV11-A 23-003B5).

Jumper W1 installed - crystal clock
Jumper W3 removed - enable event line
Jumper W6 installed - } power-up to 173000
Jumper W5 removed - }

Memory - MSV11-DD (M8044)

64K byte MOS RAM without parity
On-board memory refresh
Jumper configuration

DECLAB-11/MNC

| Jumper | Jumper State | Function Implemented |
|------------------------------|---------------------|------------------------------------|
| Pin 1 to 3 Pin 1 to 2 | OUT IN | Enable 2K I/O page option |
| W2 | IN | Enable normal system power (+5 V) |
| W3 | IN | Enable normal system power (+12 V) |
| W4 | OUT | Disable battery power (+12 V) |
| W5 | OUT | Disable battery power (+5 V) |
| Pin 10 to 14 Pin 16 to 15 | IN IN | Select memory size of 64K bytes |
| S1 through S5 | ON | Starting address = bank 0 |

Serial Line Interface – DLV11-J (M8043)

Number of serial lines: 4

Factory-set address and vector switches

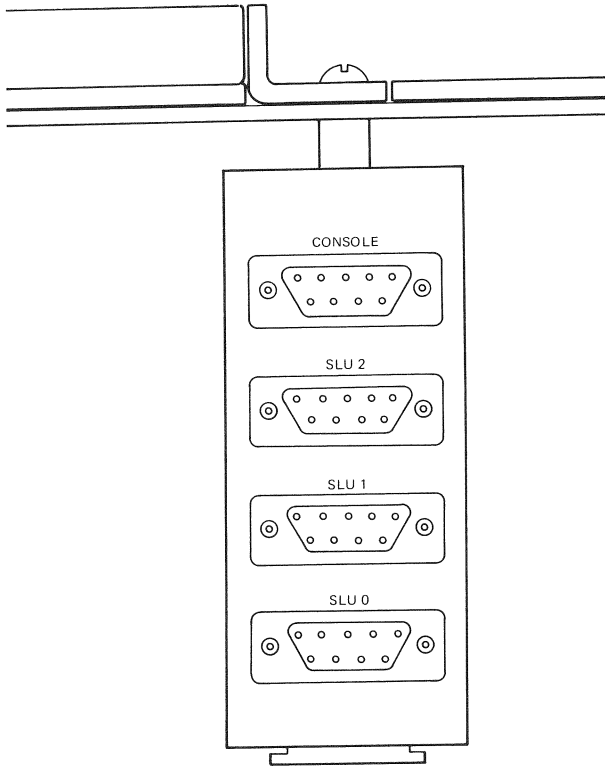
| Device | Address | Vector | Baud Rate |
|---------------|----------------|---------------|------------------|
| Console | 777560 | 60 | 9600/300* |
| SLU 2 | 776520 | 320 | 300 |
| SLU 1 | 776510 | 310 | 1200 |
| SLU 0 | 776500 | 300 | 9600 |

*Varies depending on type of terminal.

DECLAB System Specifications

| | | 115 V, 50/60 Hz | | 230 V, 50 Hz | |
|---|-------------------------------------|-------------------|------------------------------------|-------------------|-------------------|
| | Plug | Receptacle | Plug | Receptacle | |
| Power Connector | NEMA No. 5-15P DEC No. 90-089 38 | 5-15R 12-05351 | NEMA No. 6-15P DEC No. 90-08853 | 6-15R 12-11204 | |
| | DECLAB/ MNC System* | RL01 | DECLAB/ MNC System | RL01 | VT105 LA36 |
| Amperage Typical Maximum | 19 3.5 | 3.0 2.0 | 19 2.5 | 1.5 1.0 | |
| Wattage Typical Maximum | 500 1200 | 160 300 | 500 1200 | 160 300 | |
| Btu/Hour Typical Maximum | 600 | 550 1020 | 600 | 550 1020 | |
| Weight Kilograms Pounds | 134 295 | 16.3 36 | 134 295 | 16.3 36 | 46.3 102 |

*Includes MNCBA chassis with MNC-series module and two RL01 drives.



MR 4980

MINC Terminal Distribution Panel

Bus Terminator/Diagnostic/Bootstrap BDV11-A (M8012)

| Switch A (E15) | RL01 Bootstrap |
|---------------------------|---------------------------|
| A1 | ON |
| A2 | ON |
| A3 | OFF |
| A4 | OFF |
| A5 | OFF |
| A6 | OFF |
| A7 | ON |
| A8 | OFF |

| Switch B (E22) | RL01 Bootstrap |
|---------------------------|---------------------------|
| B1 | OFF |
| B2 | OFF |
| B3 | OFF |
| B4 | OFF |
| B5 | ON |

IEEE Bus Interface – IBV11-A (M7954) (Optional)

Address and vector switch settings:

| | |
|-------------------------|----------------------|
| Address 171420 | Vector 420 |
| S2-1, 4 and 5 = ON only | S1-1 and 5 = ON only |

Disk Interface – RLV11 (M8014, M8013)

Address and vector switch settings on M8014 bus module:

| | |
|----------------|------------|
| Address 174400 | Vector 160 |
|----------------|------------|

M8014 Switch Setting

| Switch | Position | Function |
|-------------------------|----------|-----------|
| Bus Address (174400) | ON | A12 (MSB) |
| | ON | A11 |
| | OFF | A10 |
| | OFF | A09 |
| | ON | A08 |
| | OFF | A07 |
| | OFF | A06 |
| | OFF | A05 |
| | OFF | A04 |
| | OFF | A03 (LSB) |
| Vector Switch (160) | OFF | V8 (MSB) |
| | OFF | V7 |
| | ON | V6 |
| | ON | V5 |
| | ON | V4 |
| | OFF | V3 |
| | OFF | V2 (LSB) |

NOTE

Additional MINC/DECLAB information can be found in the following manuals.

MINC/DECLAB Service Manual **EK-MNC11-SV**
DECLAB-11/MNC User's Guide **EK-MNC11-UG**

PDP-11/23-BASED MINC/DECLAB-11/MINC SYSTEMS

MINC

The **M**odular **I**Nstrumentation **C**omputer (MINC) is a real time operating system featuring on-line data storage, and BASIC software with graphics, scientific, and laboratory subroutine packages. Each system consists of a MINC chassis, an RX02 dual floppy disk drive, and a VT105 terminal mounted on a roll-around cart. The MINC chassis houses a power supply, CPU and related modules, and up to eight MINC laboratory options.

The physical components of a MINC system are grouped into two categories: items common to all MINC systems, and those that can be purchased as options, either when the system is first acquired or at some later time as add-ons. Each MINC system is configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the modules, specifications, and components.

All PDP-11/23 MINC systems include the following standard items.

MINC cart, which provides support and transport for:

Dual diskette drive (RX02M)

MINC chassis (MNCBA) with power supply (H786). This contains:

- KDF11-AB - LSI-11 processor with memory management EIS/FIS
- MSV11-DD - Memory (64K words) on two modules
- RXV21 - Diskette drive interface
- DLV11-J - Four-channel serial ASCII interface
- IBV11-A - IEEE bus interface
- BDV11-A - Bus terminator/diagnostic/bootstrap module.

VT105 terminal with built-in graphics capability.

MINC systems can include some or all of the following lab modules.

- Analog-to-digital converter (MNCAD)
- Preamplifier (MNCAG)
- Dual multiplexer (MNCAM)
- Clock (MNCKW)
- Digital-to-analog converter (MNCAA)
- Digital input unit (MNCDI)
- Digital output unit (MNCDO)

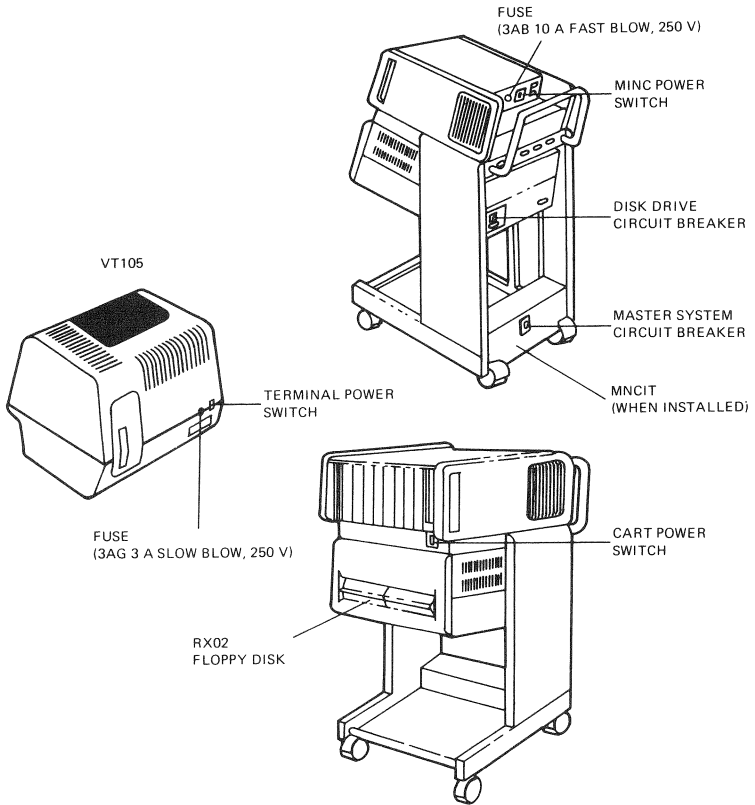
11/23-BASED MINC

MINC systems can also include:

Dot matrix printer (LA35)

Isolation transformer (MNCIT)

110 baud, 20 mA serial line interface (DLV11-KC).



MR-1529

MINC System

MINC System Model Designation

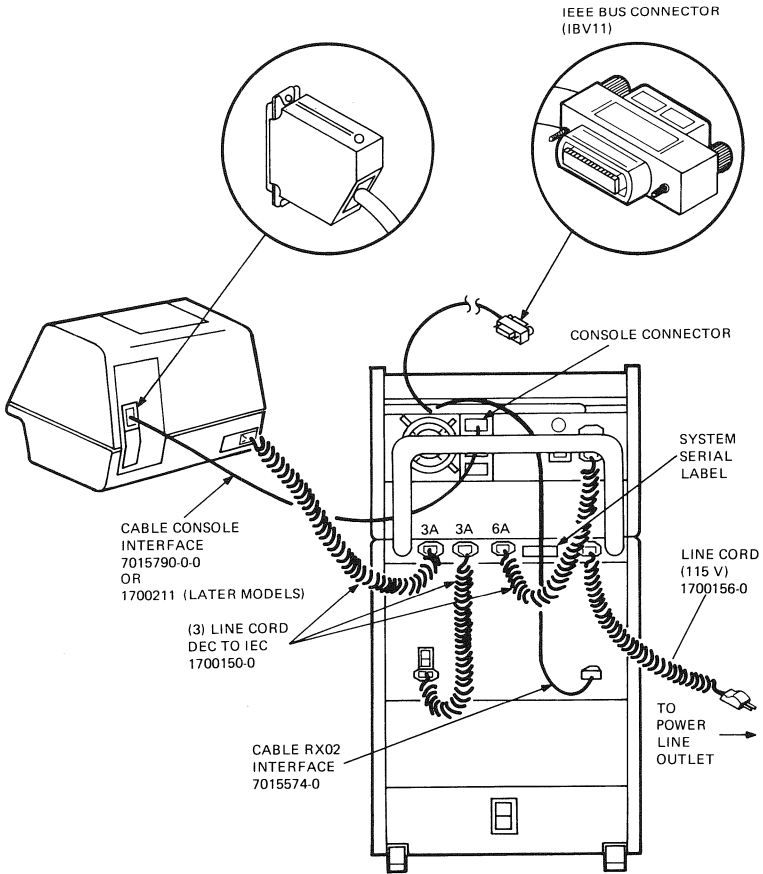
| System Requirements | MNCFA | | | | | | |
|---|-------------|-----|-----|-----|-------|-------|-----|
| | -AA | -BA | -BC | -BD | -CA | -CC | -CD |
| Input Power (V) | 115 | 115 | 115 | 230 | 115 | 115 | 115 |
| Frequency (Hz) | 60 | 60 | 50 | 50 | 60 | 60 | 50 |
| MNCFA- Chassis MNC BA | | AA | AA | | AA/BA | AA/AC | BID |
| KDF11-AB (M8186) | 1 | | | | | | |
| MSV11D (M8044) | 1 | | | | | | |
| RXV21 (M8029- IBV11-A (M7954) BDV11-A (M8012) | 2 1 1 | | | | 1 | 1 | 1 |
| MINC Cart | | 1 | 1 | 1 | 1 | 1 | 1 |
| RX02 | | MA | MC | MD | MA | MC | MC |
| VT105 | | MA | MA | MB | MA | MA | MB |
| LA35 | | | | | HE | HH | HS |
| MNCFA-AB | | | | 1 | | | |
| MNCAD | | * | * | * | 1 | 1 | 1 |
| MNCAA | | * | * | * | 1 | 1 | 1 |
| MNCAM | | * | * | * | 1 | 1 | 1 |
| MNCDI | | * | * | * | 1 | 1 | 1 |
| MNCDO | | * | * | * | 1 | 1 | 1 |
| MNCKW | | * | * | * | 1 | 1 | 1 |
| MNCAG | | * | * | * | 1 | 1 | 1 |
| Cable Console Interface | 1 | | | | 1 | 1 | 1 |
| Software Kit (English) | | 1 | 1 | 1 | .. | .. | .. |
| Blank Control Panel (MNCBL) | | .. | .. | .. | .. | .. | .. |

*User's options

**As required to fill MNCBA plus one extra

QJV35-AX (RX02) diagnostic package supplied

11/23-BASED MINC



MINC System Cable Connections

11/23-BASED MINC

| MINC System Specifications | | | |
|-----------------------------------|-------------------------------------|---------------------|------------------------------------|
| 115 V, 50/60 Hz | | 230 V, 50 Hz | |
| | Plug | Receptacle | Plug |
| Power Connector | NEMA No. 5-15P DEC No. 90-089 38 | 5-15R 12-05351 | NEMA No. 6-15P DEC No. 90-08853 |
| | MINC Chassis* | VT105 LA35 | MINC Chassis RX02 |
| Amperage Typical | 19 | 3.0 | 8 |
| Amperage Maximum | 4.0 | 2.0 | 2.0 |
| Wattage Typical | 500 | 250 | 460 |
| Wattage Maximum | 1200 | 300 300 | 250 300 |
| Bitu./Hour Typical | 225 | 550 | 225 |
| Bitu./Hour Maximum | | 1020 | 550 1020 |
| Weight Kilograms | | 16.3 | 16.3 |
| Weight Pounds | | 36 | 36 |
| | | | VT105 LA35 |

* Includes MINCBA chassis with MINC lab modules and RX02 and VT105.

NOTE

MINC option expansion area is to be used only for MINC lab module add-ons. No Qbus add-ons should be inserted in this expansion area. No backplane expansion of the MINC system is possible. All Qbus add-ons must be inserted in either slot 5 or 6 (A and B only for double-height options).

System-Level Diagnostics

Two diagnostic chain files are contained on the diagnostic floppy for system troubleshooting. The diagnostic chain MNC11F.CCC provides the required diagnostics for testing the CPU and related modules including the BDV11, the VT105 option, and MINC lab modules. This chain requires turn-around connectors on SLUs 0, 1, and 2. For detailed operational information, refer to Book 7 of *Working with MINC Devices*, AA-D572A-TC. The contents of file MNC11F.CCC are as follows.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | MINC-11 option sizer program |
| R JKDA??/1 | CPU test |
| R JKDB??/1 | Extended instruction test |
| R JKDC??/1 | Floating point instruction set test |
| R JKDD??/1 | Traps test |
| R VIBB??/1 | IBV11 test |
| R VDLA??/1 | DLV11-J test |
| R VMNC??/1 | Clock test |
| R VMNB??/1 | MNCDI test |
| R VMNE??/1 | MNCOO (digital out) diagnostic |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R ZVTN??/1 | VT105 test |
| R VMNG??/1 | Termination program |

The second diagnostic chain MNCFA.CCC provides the required diagnostics for performing a quick check of the MINC lab modules only. The contents of file MNCFA.CC are listed below.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | Start-up/sizer program |
| R VMNC??/1 | Floating point instruction set test |
| R VMNB??/1 | MNCDI test |
| R VMNE??/1 | MNCDO test |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R VMNG??/1 | Termination program |

Both programs are stored on the MINC diagnostic disk, available from the Software Distribution Center (SDC).

| | |
|---------|--|
| Kit No. | QJV35 - RZ (hard-copy documents) |
| | QJV35 - AX (RX02 floppy) |
| | ZJ281 - RX (hard-copy/RX02 floppy kit) |

11/23-BASED MINC

Modules in the Basic System

MNC11F-AA (115 V, 60 Hz) and MNC11F-AB (230 V, 50 Hz)

Processor (KDF11-AB) M8186

With warm floating point instruction set (KEF11-A) and memory management.

Jumper W1 installed - crystal clock
Jumper W4 removed - enable event line
Jumper W5 removed - } power-up to 773000 (BDV11)
Jumper W6 installed - }
Jumper W7 removed - enter console ODT on HALT
Jumper W8 installed - power-up with PC at 173000g (bootstrap)

Memory - MSV11-DD (M8044-D)

64K bytes MOS RAM without parity

On-board memory refresh

Jumper configuration

| Jumper | Jumper State | Function Implemented |
|------------------------------|---------------|------------------------------------|
| Pin 1 to 3 Pin 1 to 2 | IN } OUT } | Disable memory I/O page options |
| W2 | IN | Enable normal system power (+5 V) |
| W3 | IN | Enable normal system power (+12 V) |
| W4 | OUT | Disable battery power (+12 V) |
| W5 | OUT | Disable battery power (+5 V) |
| Pin 10 to 14 Pin 16 to 15 | IN } IN } | Select memory size of 64K bytes |

MSV11-DD Switch Settings

| Switch | Position 1st Module Bank 0-7 | Position 2nd Module Bank 10-17 | Position 3rd Module Bank 20-27 | Position 4th Module Bank 30-37 |
|---------------|---|---|---|---|
| S-1 | ON | ON | OFF | OFF |
| S-2 | ON | OFF | ON | OFF |
| S-3 | ON | ON | ON | ON |
| S-4 | ON | ON | ON | ON |
| S-5 | ON | ON | ON | ON |

Serial Line Interface - DLV11-J (M8043)

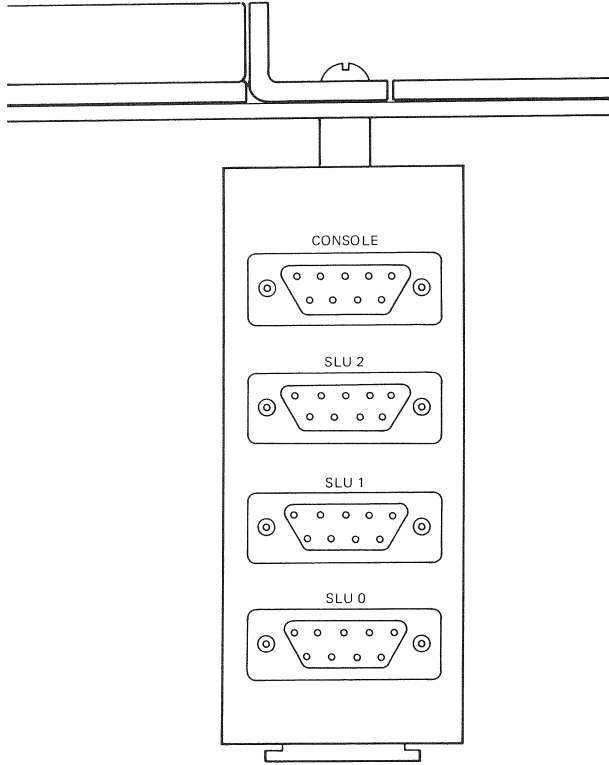
Must be at CS revision "E" or higher.

Number of serial lines: 4

Factory-set address and vector switches

| Device | Address | Vector | Baud Rate |
|---------------|----------------|---------------|----------------------|
| Console | 777560 | 60 | 9600 |
| SLU 2 | 776520 | 320 | 300 |
| SLU 1 | 776510 | 310 | 1200 |
| SLU 0 | 776500 | 300 | 9600 |

11/23-BASED MINC



MR 4980

MINC Terminal Distribution Panel

11/23-BASED MINC

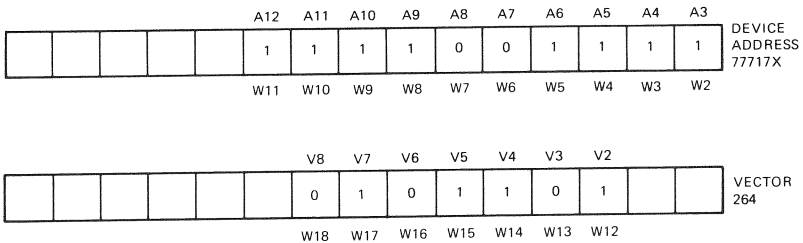
Bus Terminator/Diagnostic/Bootstrap BDV11-A (M8012)

Diagnostic/bootstrap conditions are factory-selected using switch packs.

| Switch A (E15) | RX02 Bootstrap |
|-------------------|-------------------|
| A1 | ON |
| A2 | ON |
| A3 | OFF |
| A4 | OFF |
| A5 | OFF |
| A6 | ON |
| A7 | OFF |
| A8 | OFF |

| Switch B (E21) | RX02 Bootstrap |
|-------------------|-------------------|
| B1 | OFF |
| B2 | OFF |
| B3 | OFF |
| B4 | OFF |
| B5 | ON |

Floppy Disk Interface – RXV21 (M8029)



1= JUMPER IN
0= JUMPER OUT

MR 4893

RXV21 Address and Switch Settings

DECLAB-11/MNC 11/23

DECLAB-11/MNC PDP-11/23-BASED SYSTEM

The DECLAB-11/MNC is a real time operating system featuring on-line data storage, and FORTRAN software with graphics, scientific, and laboratory subroutine packages. Each system contains as its main components, an MNC chassis, dual RL01 disk drives, and a terminal (VT105 or LA36). The MNC chassis houses a power supply, CPU, and related modules, and up to eight MNC- series option.

The physical components of the DECLAB system are grouped into two categories: items common to all MNC systems, and those that can be purchased as options, either when the system is first acquired or at some later time as add-ons. Each DECLAB system is configured to boot on power-up and halt on BREAK. The figures and tables that follow describe the modules, specifications, and components.

All DECLAB systems include the following standard items.

Mass storage device containing two RL01 disk drives

MNC chassis (MNCBA) with power supply (H786). This contains:

- KDF11-AB - LSI-11 processor with memory management, floating point (KEF11-A)
- MSV11-DD - Memory (128K byte: two modules)
- RLV11 - Controller (disk)
- DLV11-J - Four-channel serial ASCII interface
- IBV11-A - IEEE bus interface (optional)
- BDV11-A - Bus terminator/diagnostic/bootstrap module.

VT105 terminal with built-in graphics capability

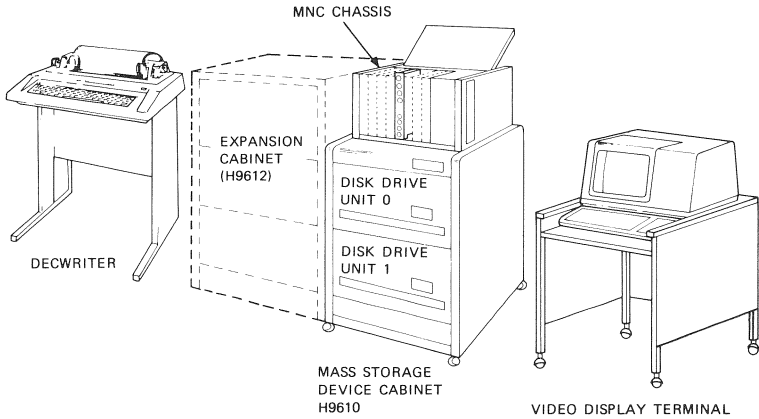
DECLAB systems can include some or all of the following lab modules.

- Analog-to-digital converter (MNCAD)
- Preamplifier (MNCAG)
- Dual multiplexer (MNCAM)
- Clock (MNCKW)
- Digital-to-analog converter (MNCAL)
- Digital input unit (MNCDI)
- Digital output unit (MNCDO)

DECLAB systems can also include:

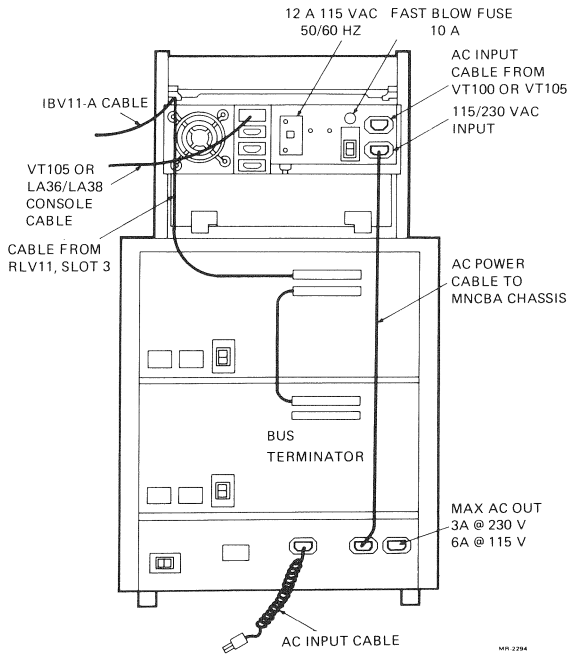
- Dot matrix printer (LAV11 + LA180 or LA35)
- 110 baud, 20 mA serial line interface (DLV11-KC).

DECLAB-11/MNC 11/23



MR-2261

DECLAB-11/MNC System with Optional Units



MR-2294

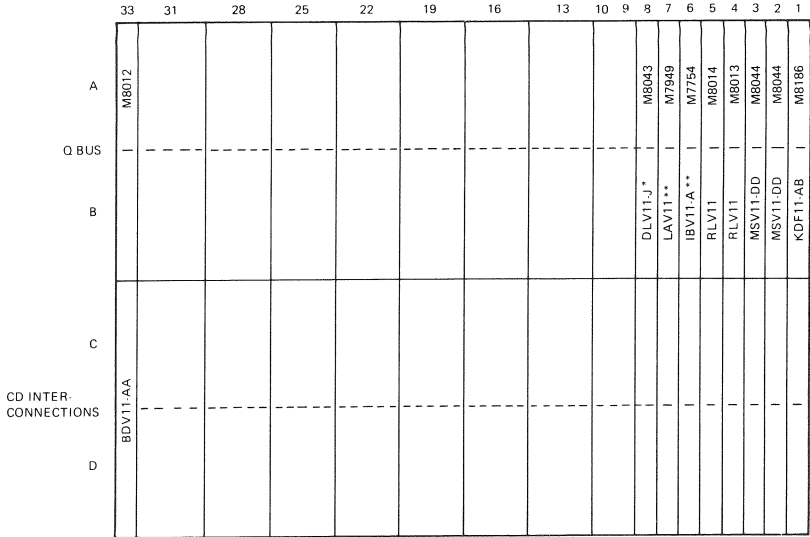
DECLAB-11/MNC Cable Connections

DECLAB-11/MNC System Model Designation

| System Requirements | MNCFA | |
|------------------------------------|-------|-------|
| | -J | -K |
| Input Power (V) | 115 | 115 |
| Frequency (Hz) | 60 | 60 |
| Cabinet/Power Controller (H9610) | BB/BC | BB/BC |
| MNC11- | D | D |
| Chassis (MNCBA) | | |
| KDF11-AB (M8186) | 1 | 1 |
| MSV11D (M8044) | 2 | 2 |
| DLV11-J (M8043) | 1 | 1 |
| IBV11-A (M7954) | | |
| BDV11-A (M8012) | 1 | 1 |
| RLV11- (M8013) | 1 | 1 |
| RLV11- (M8014) | 1 | 1 |
| LAV11-LA180 Printer | | |
| VT105 Terminal | | MA |
| LA36 | HE | |
| RL01 Disk Drive | 2 | 2 |
| QJV35-AR Diagnostic Package (RL01) | 1 | 1 |
| MNC11-F-AD | * | * |
| MNC11-F-AA | * | * |
| MNC11-F-AM | * | * |
| MNC11-F-DI | * | * |
| MNC11-F-DO | * | * |
| MNC11-F-KW | * | * |
| MNC11-F-AG | * | * |
| Cable Console Interface | | |
| Software Kit (English) | 1 | 1 |
| Blank Control Panel (BNCBL) | ** | ** |
| Installation Kit (MNCIK) | | |

*User's options

**As required to fill MNCFA



* NOTE: MUST BE AT CS REVISION 'E' OR HIGHER
 SLOTS 10 THROUGH 31 DECLAB-MNC OPTION EXPANSION AREA (FRONT VIEW) DECLAB MODULE UTILIZATION

** REPLACE THESE OPTIONS WHEN NOT REQUIRED WITH M8659 GRANT CARD OR G7272.

MIR 4804

PDP-11/23 DECLAB Module Configuration

NOTE

DECLAB-11/MNC option expansion area is to be used only for MNC-series module add-ons. No Qbus add-ons should be installed in this expansion area. No backplane expansion of the MNC system is possible.

System-Level Diagnostics

Two diagnostic chain files are contained on the RL01 diagnostic disk for system troubleshooting. The diagnostic chain MNC11F.CCC provides the required diagnostics for testing the CPU and related modules and MNC-series modules. This program does not test the BDV11 or VT105 options. This chain requires turnaround connectors on SLUs 0, 1, and 2. For detailed operational information, refer to Book 7 of Working with MINC Devices, AA-D572A-TC. The contents of file MNC11F.CCC are as follows.

- R VMNF??/ 1 MINC-11 option sizer program
- R JKDA??/ 1 CPU test
- R JKDB??/ 1 Extended instruction set




DECLAB-11/MNC 11/23

| | |
|------------|-------------------------------------|
| R JKDC??/1 | Floating point instruction set test |
| R JKDD??/1 | Traps test |
| R VIBB??/1 | IBV11 test |
| R VDLA??/1 | DLV11-J test |
| R VMNC??/1 | Clock test |
| R VMNB??/1 | MNC DI test |
| R VMNE??/1 | MNC DO test (digital out) |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R ZVTN??/1 | VT105 test |
| R VMNG??/1 | Termination program |

The second diagnostic chain MNC11F.CCC provides the required diagnostics for performing a quick check of the MNC-series modules only. The contents of file MNC11F.CCC are as follows.

| | |
|------------|-------------------------------------|
| R VMNF??/1 | Start-up/sizer program |
| R VMNC??/1 | Floating point instruction set test |
| R VMNB??/1 | MNC DI test |
| R VMNE??/1 | MNC DO test |
| R VMND??/1 | D/A test |
| R VMNA??/1 | A/D test |
| R VMNG??/1 | Termination program |

Both programs are stored on the MNC diagnostic disk, Software Distribution Center (SDC) kit no. BA-F018*-MC.

| LOCAL POWER | POWER CONTROLLER | |
|---------------------|--|--|
| 230V 10A 50/60HZ | PLUG  NEMA # 6-15P DEC # 90-08853 | RECEPTACLE 871-B  6-15R 12-11204 |
| | 115V 20A 50/60HZ | 871-C  HUBBELL # 5366-C DEC # 12-15183 |

MR-5383

DECLAB/MINC and MINC RL01 Add-On Power Requirements

Specifications

| | | 115 V, 50/60 Hz | | 230 V, 50 Hz | |
|--|-------------------------------------|-------------------|------------------------------------|-------------------|-------------|
| | Plug | Receptacle | Plug | Receptacle | |
| Power Connector | NEMA No. 5-15P DEC No. 90-089 38 | 5-15R 12-05351 | NEMA No. 6-15P DEC No. 90-08853 | 6-15R 12-11204 | |
| | DECLAB/ MNC System* RLO1 | VT105 LA36 | DECLAB/ MNC System RLO1 | VT105 LA36 | |
| Amperage Typical Maximum | 19 3.5 | 3.0 2.0 | 2.5 1.5 | 1.5 1.0 | |
| Wattage Typical Maximum | 500 1200 | 250 300 | 150 200 | 250 300 | 160 300 |
| Btu./Hour Typical Maximum | 600 | 550 1020 | 600 | 600 | 550 1020 |
| Weight Kilograms Pounds | 134 295 | 16.3 36 | 34.02 75 | 16.3 36 | 46.3 102 |

*Includes MNCBA chassis with MNC-series module and two RLO1 drives.

DECLAB-11/MNC 11/23

Modules Included in the Basic PDP-11/23 System

MNC11F-AA (115 V, 60 Hz) and MNC11F-AB (230 V, 50 Hz)

Processor (KDF 11-AB) M8186

With warm floating point instruction set (KEF11-A) and memory management.

- Jumper W1 installed - crystal clock
- Jumper W4 removed - enable event line
- Jumper W5 removed - } power-up to 773000 (BDV11)
- Jumper W6 installed - }
- Jumper W7 removed - enter console ODT on HALT
- Jumper W8 installed - power-up with PC at 173000g (bootstrap)

Memory – MSV11-DD (M8044)

64K byte MOS RAM (without parity)

On-board memory refresh

Jumper configuration

| Jumper | Jumper State | Function Implemented |
|------------------------------|---------------|------------------------------------|
| Pin 1 to 3 Pin 1 to 2 | IN } OUT } | Disable memory I/O page option |
| W2 | IN | Enable normal system power (+5 V) |
| W3 | IN | Enable normal system power (+12 V) |
| W4 | OUT | Disable battery power (+12 V) |
| W5 | OUT | Disable battery power (+5 V) |
| Pin 10 to 14 Pin 16 to 15 | IN } IN } | Select memory size of 64K bytes |

MSV11-DD Switch Settings

| Switch | Position 1st Module Bank 0-7 | Position 2nd Module Bank 10-17 | Position 3rd Module Bank 20-27 | Position 4th Module Bank 30-37 |
|---------------|---|---|---|---|
| S-1 | ON | ON | OFF | OFF |
| S-2 | ON | OFF | ON | OFF |
| S-3 | ON | ON | ON | ON |
| S-4 | ON | ON | ON | ON |
| S-5 | ON | ON | ON | ON |

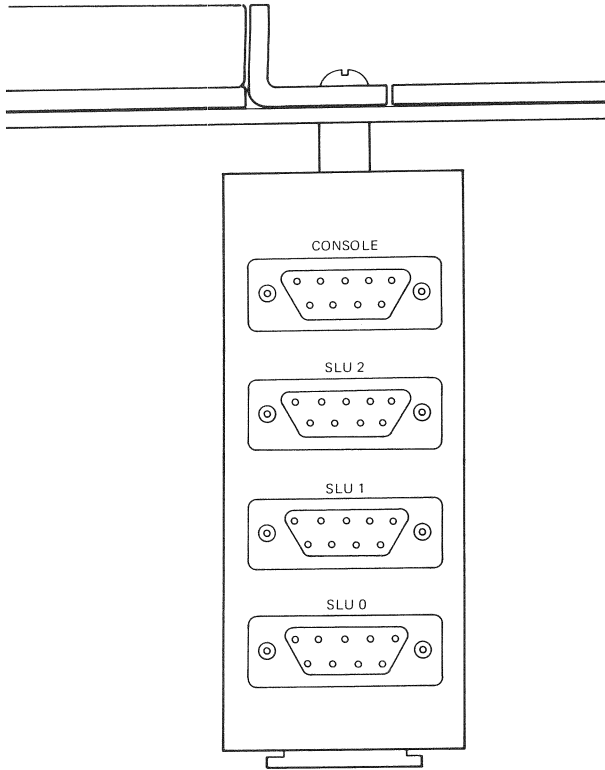
Serial Line Interface - DLV11-J (M8043)

Must be at CS revision "E" or higher.

Number of serial lines: 4

Factory-set address and vector switches

| Device | Address | Vector | Baud Rate |
|---------------|----------------|---------------|----------------------|
| Console | 777560 | 60 | 9600 |
| SLU 2 | 776520 | 320 | 300 |
| SLU 1 | 776510 | 310 | 1200 |
| SLU 0 | 776500 | 300 | 9600 |



MR 4980

MINC Terminal Distribution Panel

Bus Terminator/Diagnostic/Bootstrap BDV11-A (M8012)

Diagnostic/bootstrap conditions are factory-selected using switch packs.

| Switch A (E 15) | RL01 Bootstrap |
|----------------------------|---------------------------|
| A1 | ON |
| A2 | ON |
| A3 | OFF |
| A4 | OFF |
| A5 | OFF |
| A6 | OFF |
| A7 | OFF |
| A7 | ON |
| A8 | OFF |

| Switch B (E21) | RL01 Bootstrap |
|-------------------|-------------------|
| B1 | OFF |
| B2 | OFF |
| B3 | OFF |
| B4 | OFF |
| B5 | ON |

IEEE Bus Interface – IBV11-A (M7954) optional

Address and vector switch settings:

| | |
|-------------------------|---------------------|
| Address 171420 | Vector 420 |
| S2-1, 4 and 5 = ON only | S-1 and 5 = ON only |

Disk Interface – RLV11 (M8013, M8014)

Address and vector switch settings as shown in the following.

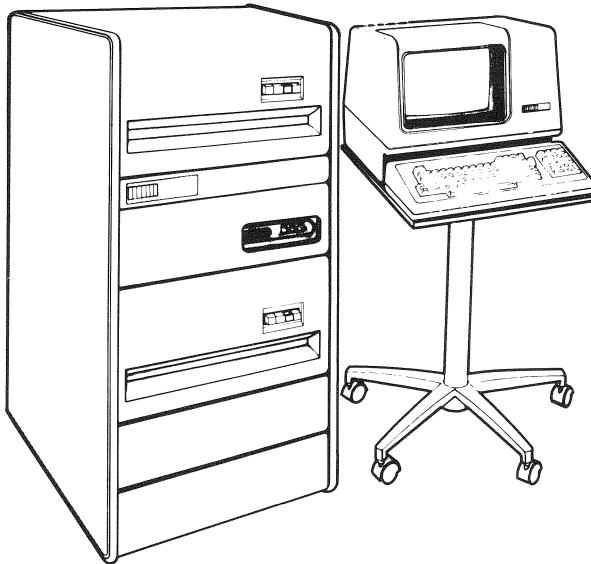
M8014 Switch Settings

| Switch | Position | Function |
|-------------------------|----------|------------|
| Bus Address (174400) | ON | A 12 (MSB) |
| | ON | A 11 |
| | OFF | A 10 |
| | OFF | A09 |
| | ON | A08 |
| | OFF | A07 |
| | OFF | A06 |
| | OFF | A05 |
| | OFF | A04 |
| | OFF | A03 (LSB) |
| Vector Switch (160) | OFF | V8 (MSB) |
| | OFF | V7 |
| | ON | V6 |
| | ON | V5 |
| | ON | V4 |
| | OFF | V3 |
| | OFF | V2 (LSB) |

PDP-11/23-PLUS SYSTEM

GENERAL

The PDP-11/23-PLUS is a high performance microcomputer system used for developing and executing programs for a variety of applications. The system contains a PDP-11/23B microcomputer and two RL02 disks, which are installed in a free-standing console. The system uses RT-11, RSX-11M, RSX-11M PLUS, RSTS/E, or CTS500 software and the DEC/X11 and DLDP+ diagnostic programs. The software provides high-level language program development, foreground/background real-time support, multi-programming, and equipment monitoring and control. Special bootstrap Read-Only Memory (ROM) initiates the system software when the system is turned on, and it can also automatically test the system.



MR 7400

PDP-11/23-PLUS Computer System

PDP-11/23-PLUS

COMPONENTS

PDP-11/23-PLUS System Components

| Component | BH | BJ | BK | BL | BM | BN | BP | BR |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Operating Voltages | 120 | 240 | 120 | 240 | 120 | 240 | 120 | 240 |
| Memory Size (K bytes) | 256 | 256 | 512 | 512 | 256 | 256 | 512 | 512 |
| PDP-11/23 Box | BC | BD | BE | BF | BC | BJ | BK | BF |
| KDF11-B M8189 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| KEF11-BA CIS* | | | | | 1 | 1 | 1 | 1 |
| KTF11-AA MMU | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| MSV11 M8067 | PK | PK | PL | PL | PK | PK | PL | PL |
| RLV12 M8061 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| BC80M-6 Cable | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| DZV11-C M7957* | | | | | 1 | 1 | 1 | 1 |
| BA11-Mounting Box | SA | SB | SA | SB | SA | SB | SA | SB |
| H403B AC Input Box | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H7861 Power Supply | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H9276 Backplane | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H9642 Console Cabinet | AA | AA | AA | AA | AA | AA | AA | AA |
| 874 Power Controller | A | B | A | B | A | B | A | B |
| H349 Distribution Panel | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7018261 Cable to KDF11-B | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7018219 Cable to DZV11-C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RL02-FK | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| BC21Z-8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

*Options available

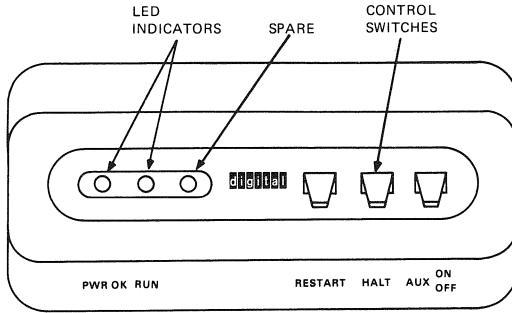
Optional Terminals

Users of the PDP-11/23-PLUS system have the following terminal options.

- VT100 Video Terminal
- VT102 Video Terminal
- LA120 DECwriter III

PDP-11/23-PLUS Operator Switch Panel

The operator switch panel, located on the front of the console, provides a communication link between the operator and the system. The switch functions are defined in the following table.



MR-4891

Front Panel Switches and Indicators

| Switch | Position | Function |
|------------|----------------------------|---|
| AUX ON/OFF | OFF | In the normal factory configuration, this removes ac power from the system. |
| | ON | In the normal factory configuration, this applies ac power to the system. If the HALT switch is up, the system is automatically booted. |
| HALT | Up (Enable) | This enables the processor to run. |
| | Down (Halt) | This halts the processor, which will respond to console ODT commands. Refer to the <i>Microcomputer Processor Handbook</i> , EB-18451-20, for ODT instructions. |
| RESTART | Restart (Momentary Switch) | When this switch is activated and the HALT switch is up, the processor carries out a power-up sequence and displays the bootstrap dialog as: TESTING MEMORY 0256.KW MEMORY START ? DLO<CR> |

PDP-11/23-PLUS

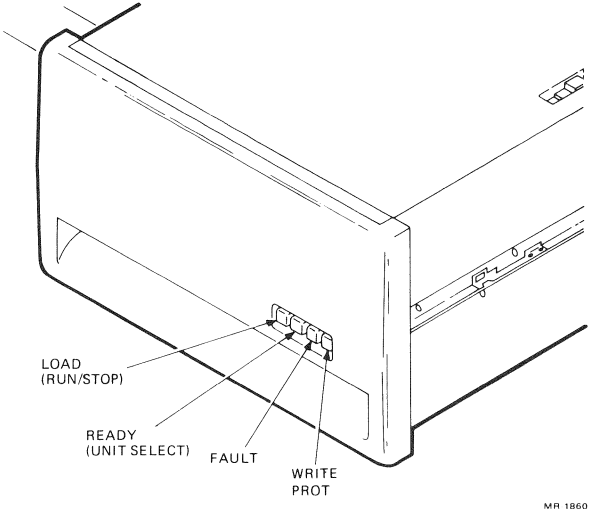
The PDP-11/23-PLUS switch panel also contains two indicators that provide the following information.

| LED | Function |
|--------|--|
| PWR OK | This LED is on when the processor is generating the proper dc output voltages. |
| RUN | This LED is on when the processor is operating; the LED goes off when the processor is not executing instructions. |

RL02 Disk Drives

The RL02 disk drive is a random-access mass storage device with a removable, top-loading disk cartridge. A lift-up cover provides access to the disk. The RL02 has four indicators on its front panel.

| Indicator | Function |
|-----------------------------|---|
| LOAD (Push Button) | This indicator lights to indicate that the spindle has stopped and a cartridge may be loaded. |
| UNIT SELECT (READY) | This indicator lights to indicate that drive 0 or 1 is ready to read, write, or receive controller commands. |
| FAULT | This indicator lights to indicate that a drive error condition exists. |
| WRITE PROT (Push Button) | This indicator lights to indicate that the currently mounted cartridge is protected from having data written on it. |



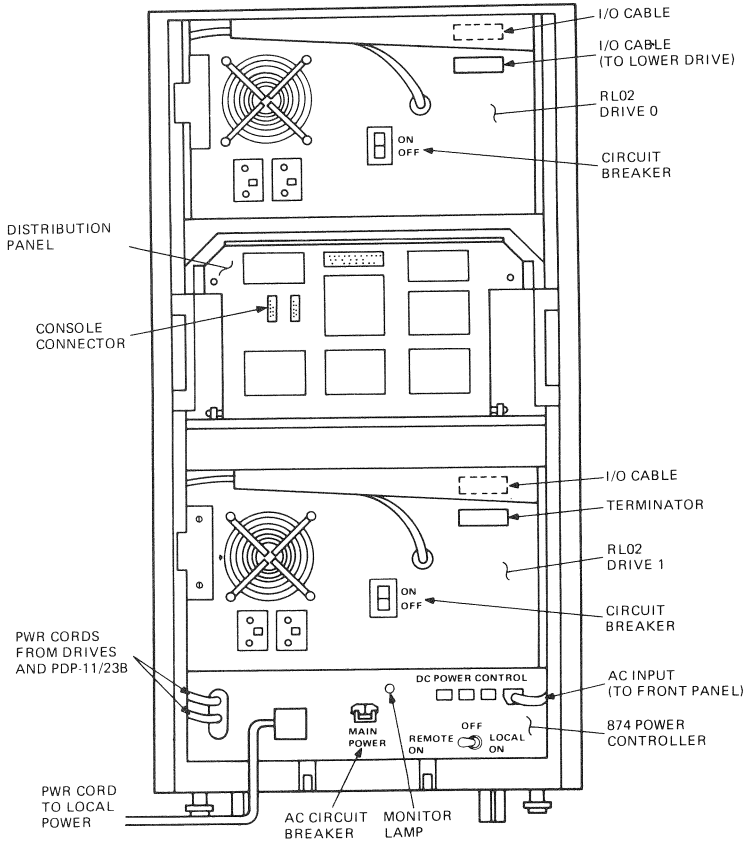
RL02 Disk Drive (Front View)

MR 1860

PDP-11/23-PLUS

Subsystem Components

The PDP-11/23-PLUS components are accessible when the back panel is removed (see the following figure).



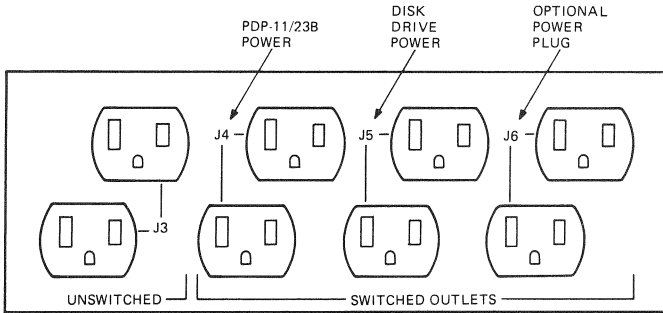
REAR VIEW

MR 7364

PDP-11/23-PLUS System (Rear Panel Removed)







PDP-11/23-PLUS

Power Controller – The 874 power controller is located on the rear base of the console cabinet. The front view shows the receptacles for providing power to the subsystem components. There are three models of the power controller.



MR 7365

874 Power Controller (Front View)

| LOCAL POWER | POWER CONTROLLER | |
|---------------------|---|---|
| | PLUG | RECEPTACLE |
| 120V 15A 50/60HZ |  874A* NEMA # 5-15P DEC # 90-08938 |  5-15R 12-14899 |
| 240V 10A 50/60HZ |  874B** NEMA # 6-15P DEC # 90-08853 |  6-15R 12-11204 |
| 120V 20A 50/60HZ |  874C** HUBBELL # 5366-C DEC # 12-15183 |  NEMA # 5-20R 12-12265 |

* NONEXPANDABLE SINGLE BOX SYSTEM
 ** EXPANDABLE BOX SYSTEM

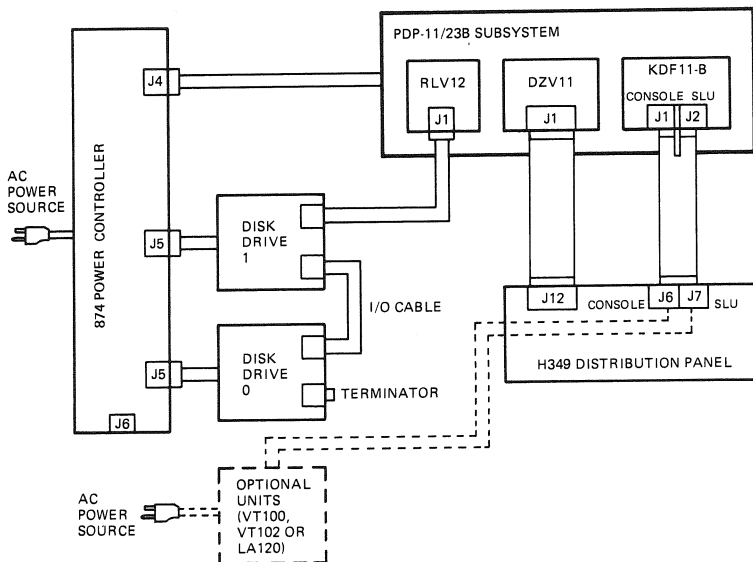
MR-7381

PDP-11/23 PLUS Power Connectors

PDP-11/23-PLUS

874 Power Controllers

| Models | 874-A | 874-B | 874-C |
|-----------------|-------|-------|-------|
| Input power VAC | 120 | 240 | 120 |
| Frequency | 50/60 | 50/60 | 50/60 |
| Current | 12 A | 8 A | 16 A |

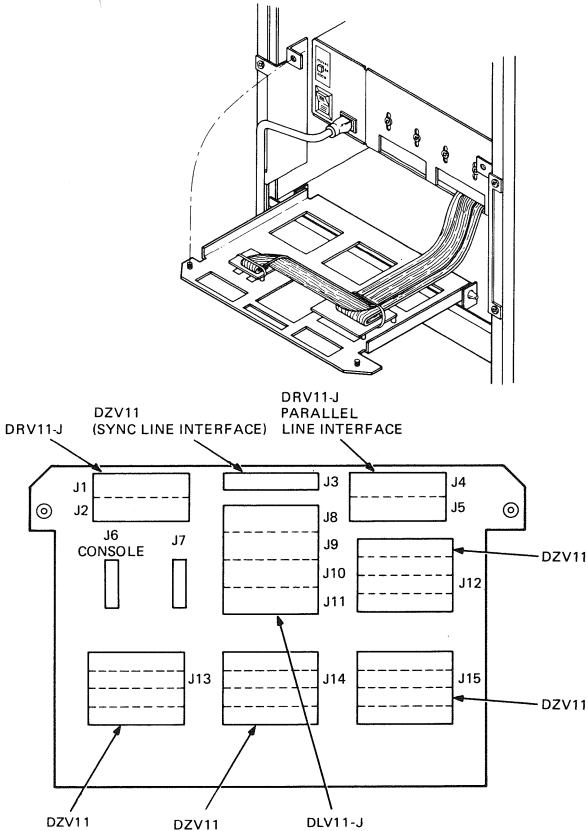


MR 7366

Subsystem Interconnections

PDP-11/23-PLUS

Distribution Panel – The H349 distribution panel is accessible from the rear of the system. The panel allows easy interconnections when interfacing peripheral equipment. The panel is secured by two captive screws, and the bottom is hinged to allow access to the PDP-11/23B micro-computer.

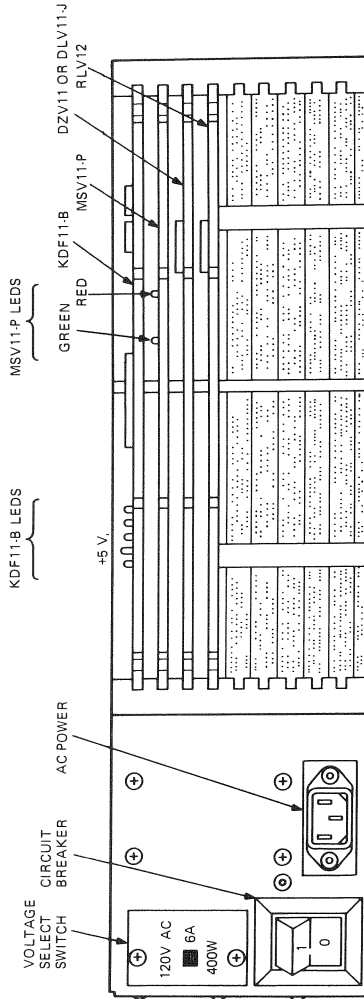


MR-7378

H349 Distribution Panel

PDP-11/23B Microcomputer – The microcomputer is accessible by dropping the distribution panel. The microcomputer uses the BA11-S box and contains the LSI-11 type modules.

PDP-11/23-PLUS



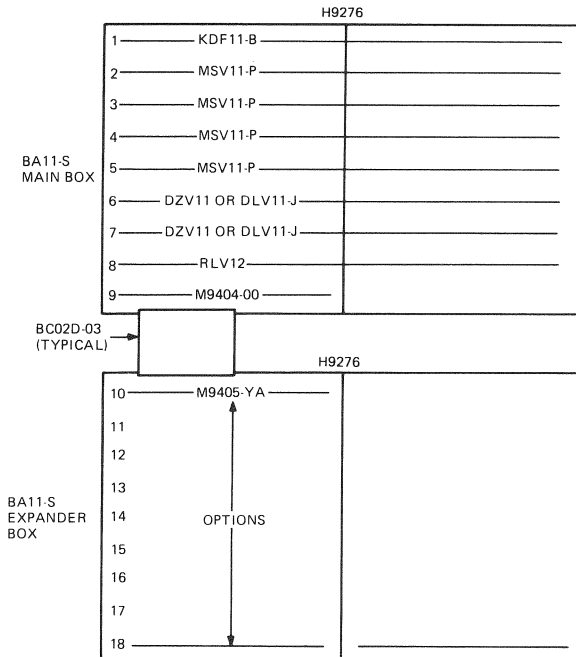
PDP-11/23B Subsystem (Rear View)

PDP-11/23-PLUS

Expansion – The PDP-11/23-PLUS is expanded by adding a BA11-SC (120 V) expander box and a BC02D-03 expander cable. The cable plugs into the last slot of the computer backplane and the first slot of the expander box. Optional modules can be added, up to the capacity of the space or power supply as shown in the following figures.

NOTE

The 874-C power controller must be used with PDP-11/23-PLUS systems.



PDP-11/23-PLUS SYSTEM RESTRICTIONS:

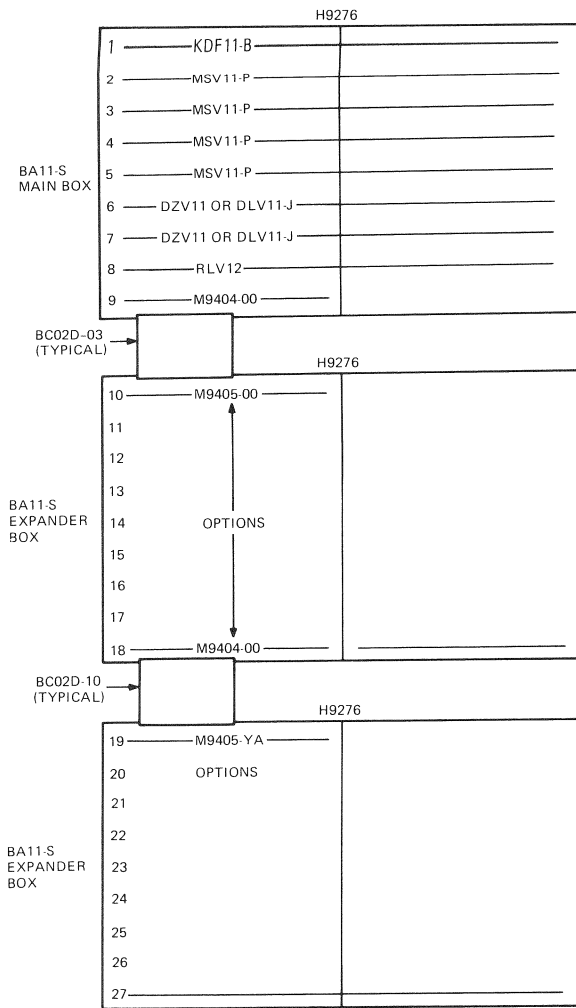
THE RLV12 MUST HAVE JUMPER M22 TIED TO M17, M20 AND M21, AND JUMPER M11 TIED TO M12 FOR 22-BIT ADDRESSING.

MSV11-P AND MSV11-D (NOT SUPPLIED) MEMORY MODULES SHOULD NOT BE USED TOGETHER IN THE SAME SYSTEM.

MR 7382

PDP-11/23-PLUS System (H9276) Two Q/CD Backplane Configuration

PDP-11/23-PLUS



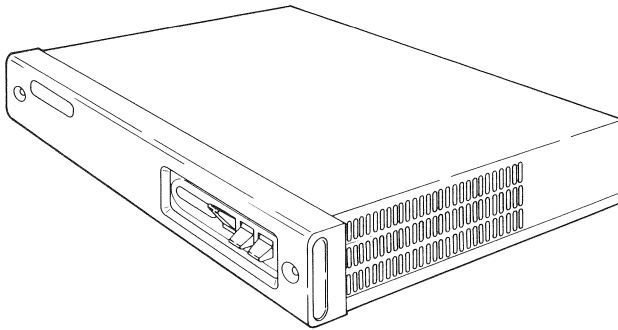
MR-6597

PDP-11/23-PLUS System Three Backplane Configuration

PDP-11/23S SYSTEM

GENERAL

The PDP-11/23S is a general purpose Q18 LSI-11 system unit enclosed in an BA11-M mounting box. This system contains the KDF11-B CPU (M8189) and either an MCV11-DC CMOS RAM or an MSV11-DD RAM. The PDP-11/23S has an H780 A/B power supply and an H9270 backplane. Also offered as a part of the PDP-11/23S system is an H3012 filter connector panel (distribution) in back of the system unit. This connector accepts the three different kinds of filter connector assemblies which are provided with each option to filter RF noise before exiting the enclosure.



MR 9041

PDP-11/23S System

PDP-11/23S

System Variations

PDP-11/23 SE/SF Components

BA11-MH/MJ mounting box
H780 A/B power supply
KDF11-B CPU (M8189) with SLUs cable and filter connector assembly
MSV11-DD MOS RAM (64K bytes)
H3012 filter connector panel

PDP-11/23 SC/SD Components

BA11-MH/MJ mounting box
H780 A/B power supply
KDF11-B CPU (M8189) with two SLUs cable and filter connector assembly
MCV11-DC CMOS RAM (32K bytes)
H3012 filter connector panel

PDP-11/23S Operator Switch Panel

The operator switch functions are defined in the following table.

PDP-11/23S System Components

| Component | 11/23-SE | 11/23-SF | 11/23-SC | 11/23-SD |
|------------------------------|----------|----------|----------|----------|
| BA11-MH/MJ Mounting Box | 1 | 1 | 1 | 1 |
| H780-A/B P/S | 1 | 1 | 1 | 1 |
| Operators Console | 1 | 1 | 1 | 1 |
| H9270 4 × 4 Backplane (Q18) | 1 | 1 | 1 | 1 |
| H3012 Filter Connector Panel | 1 | 1 | 1 | 1 |
| KDF11-B (M8189) CPU | 1 | 1 | 1 | 1 |
| MSV11-DD MOS RAM (64K) | 1 | 1 | – | – |
| MCV11-CD CMOS RAM (32K) | – | – | 1 | 1 |
| H3012 Distribution Panel | 1 | 1 | 1 | 1 |

KDF11-B PROCESSOR MODULE (CPU) (M8189)

Features of the KDF11-B processor module include a central processor, memory management unit (MMU), line frequency clock, bootstrap and diagnostic ROM, and two serial line units.

The module supports up to 256K of memory using the H9270 Q18 backplane and will support (Q22) extended 22-bit backplanes.

Features

KDF11-AA Compatible CPU (M8186)

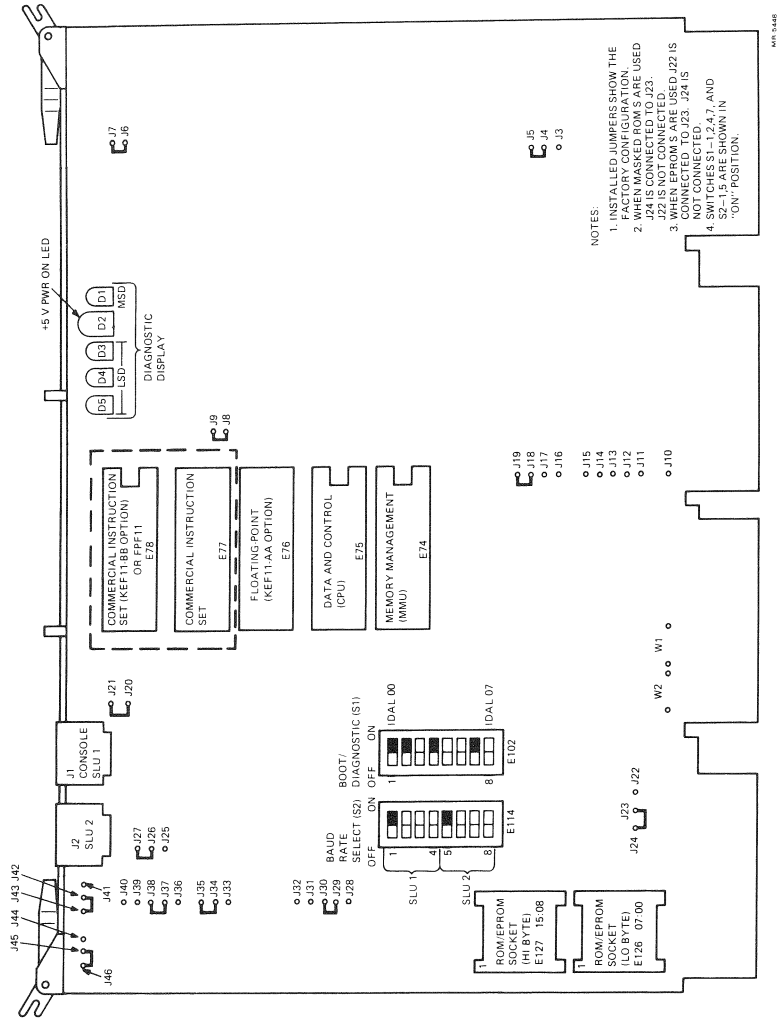
- Instruction set with over 400 instructions
- Four-level vectored interrupts
- 16-bit word or 8-bit byte addressable locations
- Multiple general purpose registers
- Stack processing
- Direct memory access (DMA)
- Power-fail/auto restart hardware
- 18-bit ODT console emulator

KDF11-AA Compatible Memory Management

- 18- or 22-bit address
- Kernel and user modes only (no supervisor mode)
- I space only (no D-space)
- Optional floating-point instruction set
- Optional commercial instruction set
- Onboard peripherals
- Line frequency clock (Enable/Disable)
- Bootstrap and diagnostic
- Console serial line unit
- Second serial line unit
- Extended LSI-11 bus interface (rows A and B)

NOTE

Interrupt and DMA latencies assume a KDF11-BA with memory management enabled and using MSV11-P memory.



REV. 2-66

KDF11-B Processor Module

KDF11-B Factory Set Switch Configurations

Bootstrap/Diagnostic Factory Switch Configuration

| Switch S1 | (E102) Position | Function |
|-----------|-----------------|---------------------------|
| 1 | ON | Execute CPU diagnostic |
| 2 | ON | Execute memory diagnostic |
| 3 | OFF | DECnet boot disable |
| 4 | ON | Console test and dialog |
| 5 | OFF | |
| 6 | OFF | |
| 7 | ON | RL02 bootstrap program |
| 8 | OFF | |

KDF11-B SLU Baud Rate Factory Switch Configuration

| Switch S2 | (E114) Position | Function |
|-----------|-----------------|-------------------------------|
| 1 | ON | |
| 2 | OFF | Console SLU set for 9600 baud |
| 3 | OFF | |
| 4 | OFF | |
| 5 | ON | |
| 6 | OFF | |
| 7 | OFF | Second SLU set for 9600 baud |
| 8 | OFF | |

NOTE

Power-up or restart of the KDF11-B will execute the CPU diagnostic and the memory diagnostic, followed by the console tests after switch S1 is placed in the position as shown. If the operator wishes to terminate the memory diagnostic and immediately enter the console test, the <CTRL>C keys must be pressed on the console terminal.

KDF11-B LED INDICATORS

The KDF11-BA ROM programs use four red LEDs to indicate which programs and program segments are running. If the program performs an error halt or hangs up waiting for data from a peripheral device, these LEDs operate as error indicators.

The four red LEDs represent an octal number from 0 (all LEDs OFF) to 17 (all LEDs ON). The following table lists the type of error associated with their octal number.

KDF11-B LED Indicators

| Display (Octal) | MSD Bit 3 | Bit 2 | LSD Bit 1 | Bit 0 | Type of Error |
|--------------------|--------------|-------|--------------|-------|---|
| 1 | OFF | OFF | OFF | ON | CPU test error |
| 02 | OFF | OFF | ON | OFF | Memory test error |
| 03 | OFF | OFF | ON | ON | Waiting for console terminal transmitter ready flag. |
| 04 | OFF | ON | OFF | OFF | Waiting for console terminal receiver done flag. |
| 05 | OFF | ON | OFF | ON | Load device status error |
| 06 | OFF | ON | ON | OFF | Bootstrap code incorrect |
| 07 | OFF | ON | ON | ON | DECnet waiting for a response from host. |
| 10 | ON | OFF | OFF | OFF | DECnet waiting for a message from host. |
| 11 | ON | OFF | OFF | ON | DECnet processing received the message. |
| 12 | ON | OFF | ON | OFF | ROM bootstrap error (not used on KDF11-B). |
| 13 | ON | OFF | ON | ON | Special memory test failure on locations 0-6 (memory test may be disabled). |
| 17 | ON | ON | ON | ON | System hung, halt switch on, or not in power-up mode 2. |

NOTE

The errors indicated in the above table are valid **ONLY** if the KDF11-BA BDV ROMs (part nos. 23-339E2-00 and 23-340E2-00 are installed in ROM sockets E126 (low byte) and E127 (high byte).

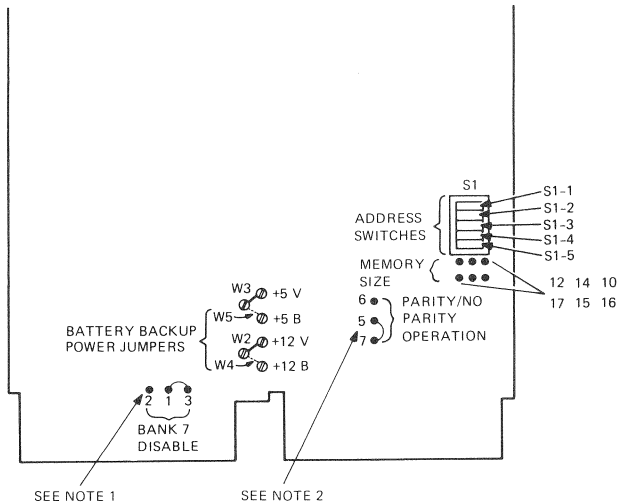
MSV11-D MOS RAM MEMORY

The MSV11-D (M8044-D) is a dual-height MOS RAM memory with 64K bytes of address space. Each MSV11-D memory used in the PDP-11/23S system normally reserves the upper 8K for peripheral devices and register addresses, therefore, each MSV11-D memory contains 57K of usable data addressing space.

MSV11-D Options

| Model | Memory Capacity (1) | Module | 2 Parity Bits |
|----------|----------------------|----------|---------------|
| MSV11-DD | 64K bytes by 16 bits | M8044-DA | No |
| MSV11-ED | 64K bytes by 18 bits | M8045-DA | Yes |

MSV11-D/E Jumpers and Switches



- NOTES:
 1. JUMPER 1 TO 2 = 30K OPTION (MINC) 1 TO 3 FOR NO 30K OPTION
 2. JUMPER 5 TO 7 FOR MSV11-D OR 5 TO 6 FOR MSV11-E

MR-5418

MSV11-D MOS RAM Jumpers

PDP-11/23S

The following table lists the jumper configurations used on the MCV11-CD for the PDP-11/23S system.

Jumper and Switch Configurations for the PDP-11/23S System

| Jumper/Switch | State | Function |
|---------------|-------|----------------------------------|
| Pin 1 to 3 | IN | (not using the 30K MINC option) |
| Pin 1 to 2 | OUT | (not using the 30K MINC option) |
| W2 | IN | Enable normal +5 V system power |
| W3 | IN | Enable normal +12 V system power |
| W4 | OUT | Disable +12 V battery power |
| W5 | OUT | Disable +5 V battery power |
| Pin 5 to 7 | IN | Disable parity |
| Pin 5 to 6 | OUT | Parity not selected |
| Pin 10 to 14 | IN | |
| Pin 15 to 16 | IN | Select memory range of 64K bytes |
| Switch S1-1 | ON | |
| Switch S1-2 | ON | PDP-11/23S |
| Switch S1-3 | ON | Selected starting address 0 |
| Switch S1-4 | ON | |
| Switch S1-5 | ON | |

MSV11-D, MSV11-E Summary Table of Addressing Switches

| Starting Address | S1-1 | S1-2 | S1-3 | S1-4 | S1-5 | MSV11-ED/MSV11-DD Memory Banks Selected |
|------------------|------|------|------|------|------|---|
| 0 | ON | ON | ON | ON | ON | 0-7 |
| 20000 | ON | ON | ON | ON | OFF | 1-10 |
| 40000 | ON | ON | ON | OFF | ON | 2-11 |
| 60000 | ON | ON | ON | OFF | OFF | 3-12 |
| 100000 | ON | ON | OFF | ON | ON | 4-13 |
| 120000 | ON | ON | OFF | ON | OFF | 5-14 |
| 140000 | ON | ON | OFF | OFF | ON | 6-15 |
| 160000 | ON | ON | OFF | OFF | OFF | 7-16 |
| 200000 | ON | OFF | ON | ON | ON | 10-17 |
| 220000 | ON | OFF | ON | ON | OFF | 11-20 |
| 240000 | ON | OFF | ON | OFF | ON | 12-21 |
| 260000 | ON | OFF | ON | OFF | OFF | 13-22 |
| 300000 | ON | OFF | OFF | ON | ON | 14-23 |
| 320000 | ON | OFF | OFF | ON | OFF | 15-24 |
| 340000 | ON | OFF | OFF | OFF | ON | 16-25 |
| 360000 | ON | OFF | OFF | OFF | OFF | 17-26 |
| 400000 | OFF | ON | ON | ON | ON | 20-27 |
| 420000 | OFF | ON | ON | ON | OFF | 21-30 |
| 440000 | OFF | ON | ON | OFF | ON | 22-31 |
| 460000 | OFF | ON | ON | OFF | OFF | 23-32 |
| 500000 | OFF | ON | OFF | ON | ON | 24-33 |
| 520000 | OFF | ON | OFF | ON | OFF | 25-34 |
| 540000 | OFF | ON | OFF | OFF | ON | 26-35 |
| 560000 | OFF | ON | OFF | OFF | OFF | 27-36 |
| 600000 | OFF | OFF | ON | ON | ON | 27-36 |
| 620000 | OFF | OFF | ON | ON | OFF | 30-37 |
| 640000 | OFF | ON | ON | OFF | ON | X |
| 660000 | OFF | OFF | ON | OFF | OFF | X |
| 700000 | OFF | OFF | OFF | ON | ON | X |
| 720000 | OFF | OFF | OFF | ON | OFF | X |
| 740000 | OFF | OFF | OFF | OFF | ON | X |
| 760000 | OFF | OFF | OFF | OFF | OFF | X |

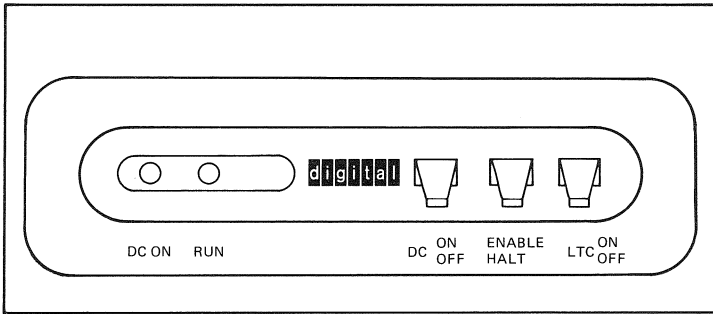
PDP-11/23S

Standard MSV11-D and MSV11-E Jumper Configurations

| Models | Jumpers (Two) Memory Range Pins | Memory Select Pins |
|--------------|------------------------------------|--------------------|
| MSV11-DA-EA | From 17 to 15 | From 17 to 14 |
| MSV11-DB,-EB | From 17 to 15 | From 12 to 14 |
| MSV11-DC,-ED | From 16 to 15 | From 16 to 14 |
| MSV11-DD,-ED | From 16 to 15 | From 10 to 14 |

PDP 11/23S/BA11-M Operator Control Panel Switches and Indicators

| Switch | Position | Function |
|-----------------------|-------------|--|
| DC ON/OFF | OFF | In the normal factory configuration setting, this switch OFF removes the dc voltage from the system. |
| | ON | Setting this switch ON allows dc power to be applied to the system. If the halt switch is also enabled (up), the system will automatically boot up the system. |
| HALT | UP (Enable) | Puts the processor in the run state. |
| | DOWN | The processor halts and responds to console ODT commands. Refer to the <i>Microcomputer Processor and Memories Handbook</i> for ODT commands. |
| LTC ON/OFF | ON | When switch is up (ON), the processor carries out normal system line time clock operations between the power supply and the processor. |
| | OFF | When down (OFF) the internal line time clock operations are disabled; for example when XXDP+ diagnostics are run. |
| LED Indicators | | Function |
| DC ON | | This LED is lit when the correct dc output voltage is being supplied. |
| RUN | | This LED is lit when the processor is operating; the LED goes off when the processor is not executing instructions. |



MR-12947

PDP-11/23S Switches and Indicators

| | | | | |
|---|---------------------------|---|----------------------------|---|
| 1 | PDP-11/23-S (KDF11-B) CPU | | | |
| 2 | OPTION (1) | | MSV11-DD OR MCV11-DC | |
| 3 | OPTION (2) | | OPTION (3) | |
| 4 | OPTION (5) | | OPTION (4) | |
| | A | B | C | D |

MR-9030

PDP-11/23S Backplane Option Slots

EXPANSION RULES

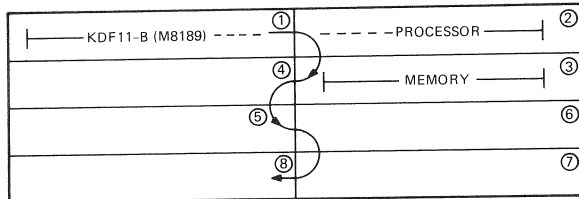
The H9270 backplane used in the PDP-11/23S system enclosure is generally used in a single backplane configuration, due to the bus loading requirements. The following rules apply only to the single backplane configuration.

1. The LSI-H9270 backplane can accept modules that have up to a total of 20 ac loads before an additional termination is required. The processor has on-board termination for one end of the bus. If more than 12 ac loads are included, the other end of the bus must be terminated with 120 ohms.
2. A terminated bus can accept modules having up to a total 20 ac loads.
3. The bus can accept modules with up to a total of 20 dc loads.
4. The bus signal lines on the backplane can be up to 35.6 cm (14 inches) long.

PDP-11/23S

PDP-11/23S

A single backplane configuration diagram is shown in the following figure.



MR-9028

Daisy-Chained Priority

Daisy-Chain Priority

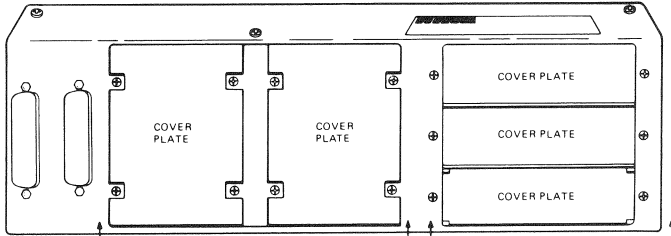
Signals normally move through option modules until they reach the requesting device. The example shown uses the CPU in slots 1 and 2 and memory in slot 3. The CPU module is the first module to receive the daisy-chained signals in slot 1, therefore, the CPU has the first priority. Five dual-height options can be installed in the backplane of this PDP-11/23S computing device after the memory option is installed.

NOTE

Any unused backplane slot that is followed by a quad-height module option must have either a G7272 or M8659 grant card installed in it to pass on continuity.

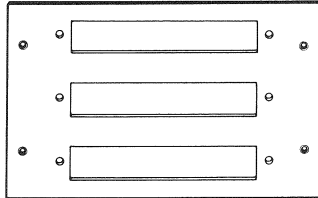
H3012 Cabinet Kit Assemblies

The H3012 filter connector panel, filter connector assemblies, and option cables make up the cabinet kit. Each panel is designed to accommodate three types of filter connector assemblies for FCC emission integrity. The next figure shows an empty H3012 cabinet kit with the various kinds of adaptor plates.

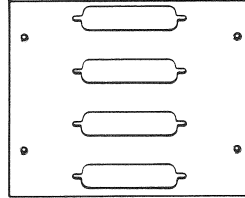


TEMPLATE

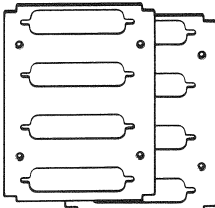
TEMPLATE



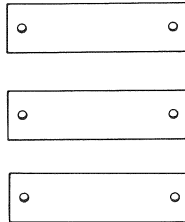
CONVERTS TWO FOUR-SLOT EIA SPACES TO THREE 40- OR 50-PIN FILTER CONNECTOR SPACES



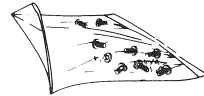
CONVERTS THREE 40- OR 50-PIN FILTER CONNECTOR SPACES TO ONE FOUR-SLOT EIA SPACE



TWO FOUR-SLOT FILTER CONNECTOR MOUNTING PLATES (WITHOUT FILTER CONNECTORS) PROVIDED FOR OEM INSTALLED OPTIONS



SINGLE 40- OR 50-PIN COVER PLATES



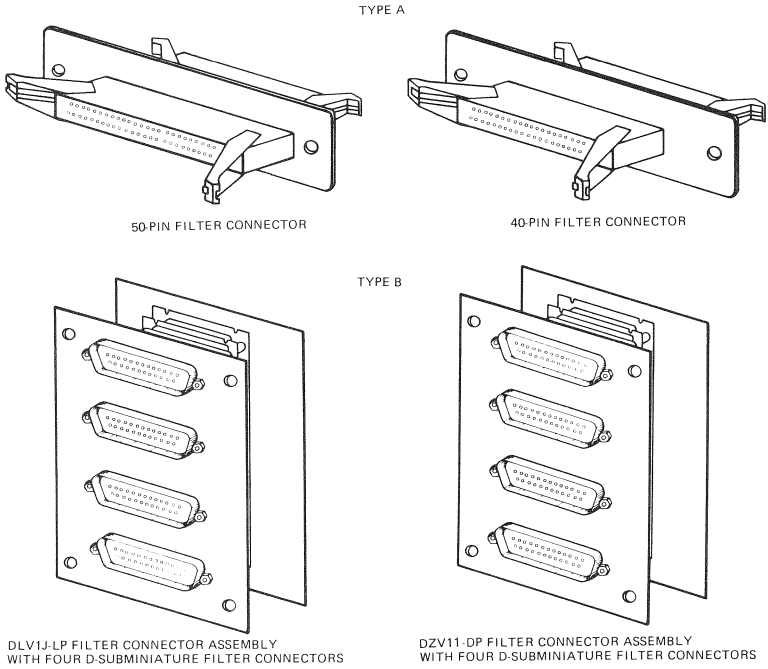
ASSORTED HARDWARE

MH 9017

H3012 Connector Types

PDP-11/23S

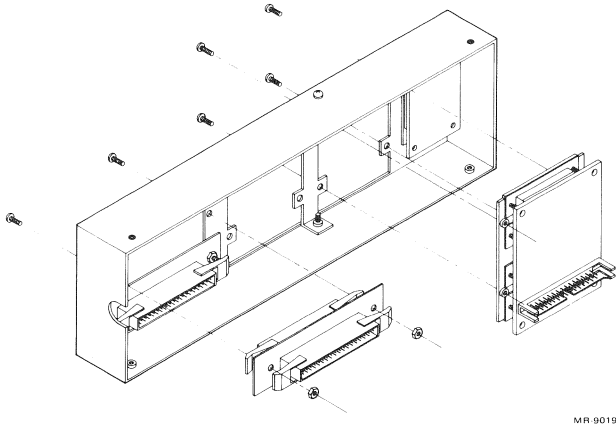
The figure below shows the types of filter assemblies used with the PDP-11/23S.



MR 9016

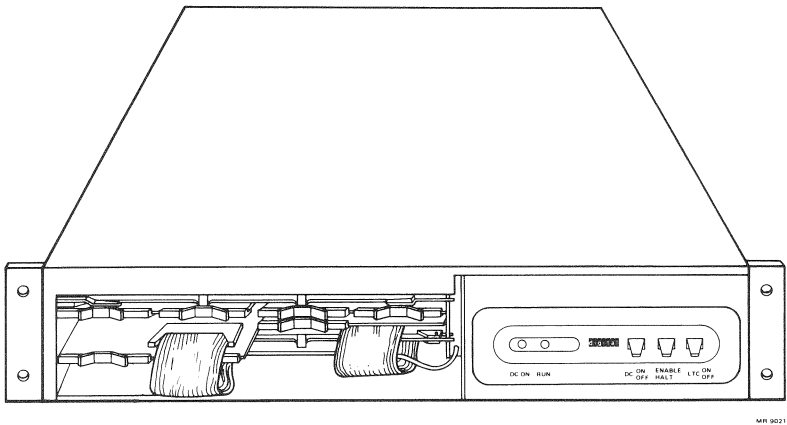
H3012 Subassemblies

The following figure shows how to mount the various kinds of filter connectors onto the H3012 panel.



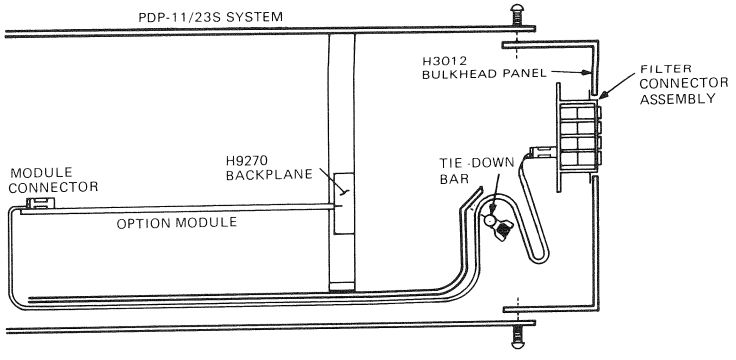
Connector Mounting

Figures showing how modules are installed in the PDP-11/23S/BA11-M system enclosure and how the cables are attached to the rear panel are shown below.



Module Loading

PDP-11/23S



H3012 Panel to Module Option Cabling

PDP-11/23 PLUS, MICRO/PDP-11 AND Micro/VAX EXPANSION

GENERAL

To configure an LSI-11 system, follow the steps listed below.

1. Choose the type of memory (MOS, PROM, or combination) required for the specific application.
2. Select the CPU and memory combination most suited for the application (the PDP-11/23 PLUS uses KDF11-B).
3. Select additional memory, interfaces, and peripheral options required.
4. Count the total number of module positions.
5. Count the total number of bus positions.
6. Choose a backplane configuration that satisfies the module position requirement, the bus position requirement, and also provides sufficient expansion space.
7. Enter the option names in the backplane positions of the selected configuration.
8. Review the initial backplane configuration to determine if changes must be made.
9. If no changes are necessary, move to the appropriate backplane configuration chart. Enter the option names and numbers, the ac and dc loads, the power consumption, and the cable numbers. Total the power consumption and the ac and dc loads. If any of these exceed the limits specified, the module configuration will have to be altered or a new backplane configuration will have to be selected.

EXPANSION

Expansion

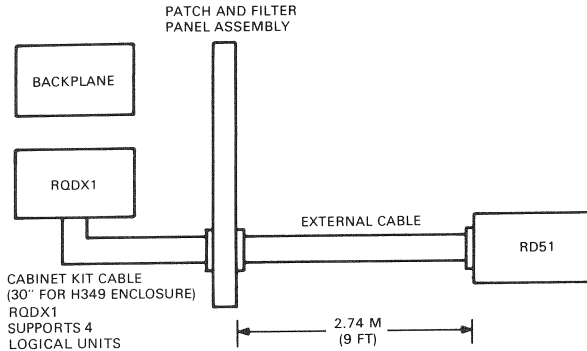
The following examples of system unit expansion show some of the ways system units can be enhanced by a variety of media products.

Each RQDX1 controller can support up to four logical system units:

RX50= 2 logical units

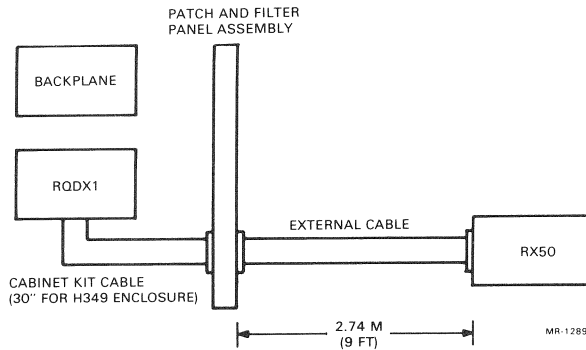
RD51= 1 logical unit

RD52= 1 logical unit



MR-12893

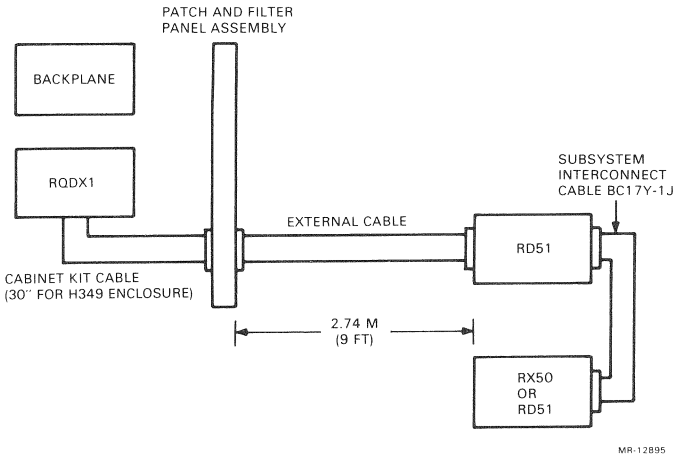
Single Expansion Configuration



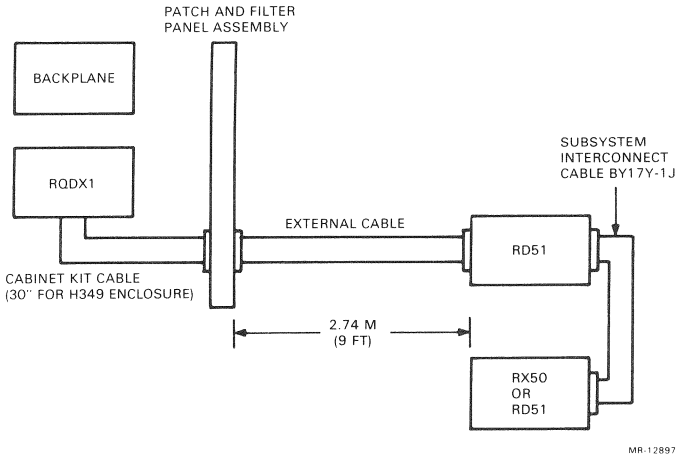
MR-12894

Single Expansion Configuration

EXPANSION

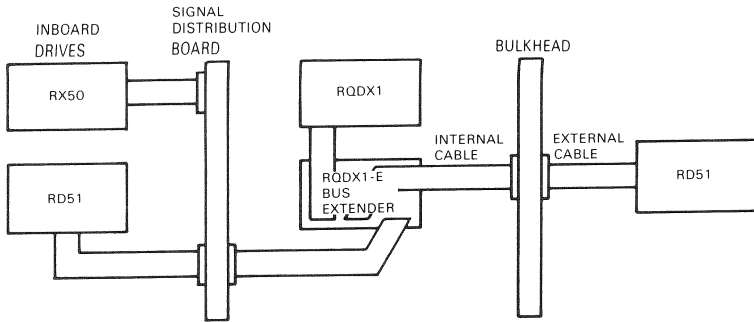


Double Expansion Configuration



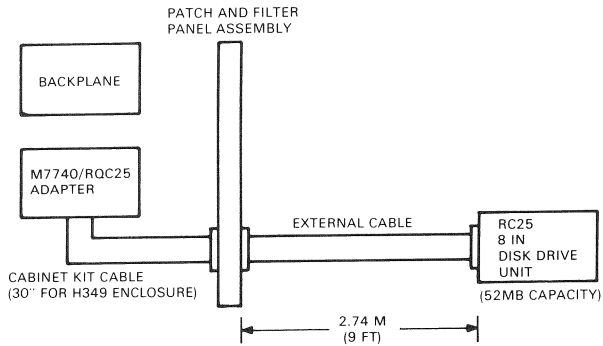
Double Expansion Configuration

EXPANSION



MR-12896

Maximum Expansion Configuration

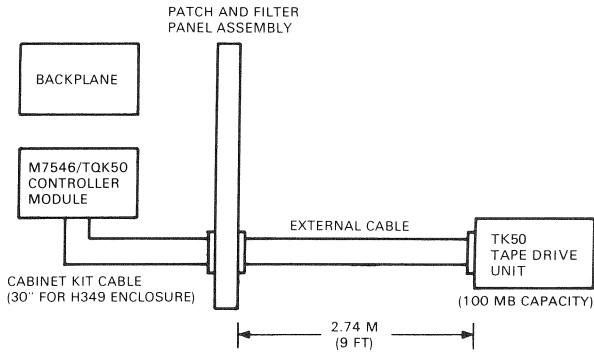


NOTE: ONE ADAPTER MODULE IS USED FOR EACH RC25 DISK DRIVE UNIT

MR-12899

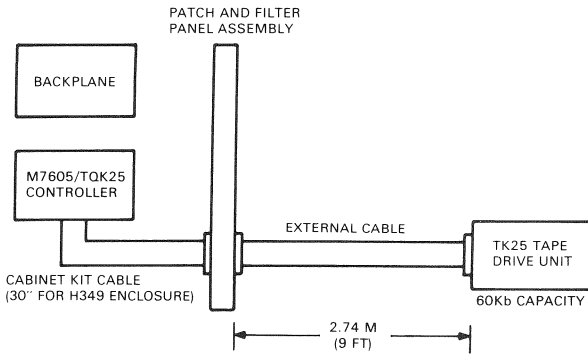
Eight-Inch Disk Drive Expansion

EXPANSION



MR-12900

Tape Drive Expansion



MR-12898

Tape Drive Expansion

VT103 LSI-11 VIDEO TERMINAL

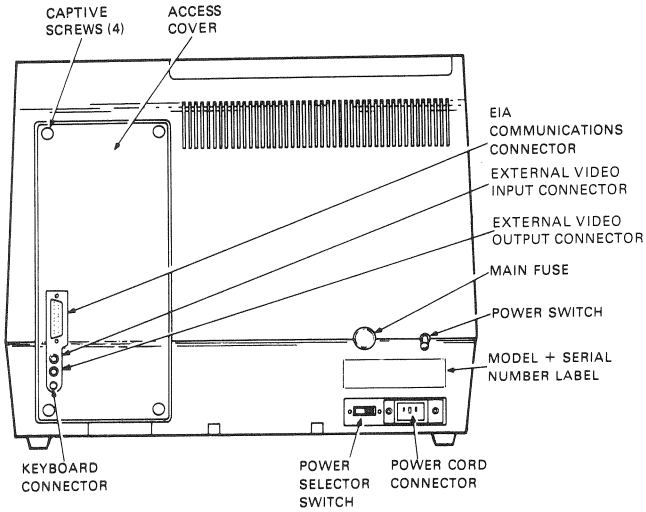
GENERAL

A complete and powerful microcomputer system can be configured using the VT103. By selecting an LSI-11 processor module, memory module, a serial line interface, I/O devices, and interconnection hardware, you can build a system to meet your application. The VT103 backplane provides communication paths between system components. Access to the backplane is shown in the following figure.

VT103 Power Supply Requirements

| Voltage | Current | Monitor | Basic Video | Adv Video | TU58 |
|---------|---------|---------|-------------|-----------|-------------------------------------|
| +5 V | 16.0 A | 0 | 2.5 A | 1.1 A | 0.75 A |
| +12 V | 5.0 A | 1.0 A | 0.6 A | 0 | 0.6 A (1.0 A spike on tape startup) |
| -12 V | 0.5 A | | | | |
| -23 V | 0.01 A | | | | |

VT103

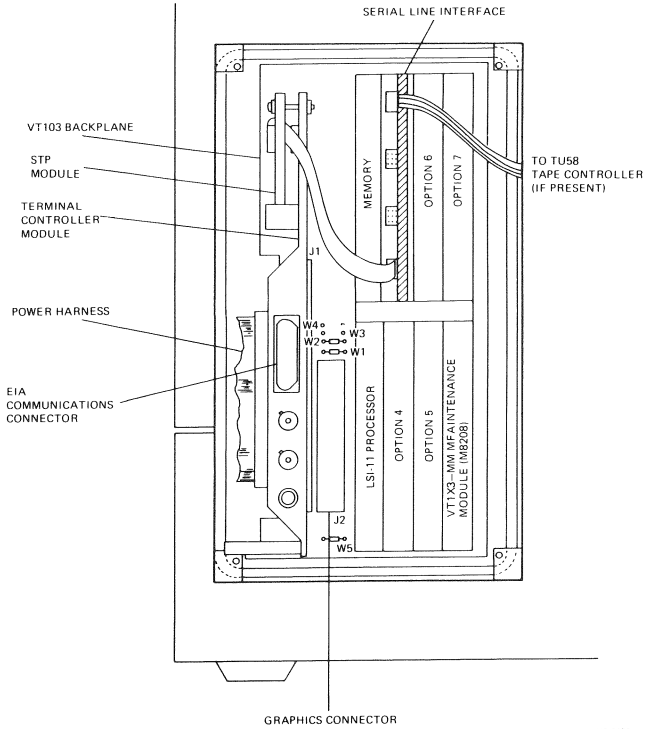


MR-2891

VT103 Rear View

LSI-11 BACKPLANE

The VT103 contains the LSI-11 backplane and the terminal controller module. The following figure shows the physical arrangement behind the access cover.



VT103 LSI-11 Backplane (H9274)

VT103

CONFIGURATION

There are five jumper wires on the backplane that are used to configure the system.

Jumper Configuration

| Jumper | Jumper State | Function |
|------------|--------------|--|
| W1, W2, W5 | I | Factory configured; do not change. |
| W3 | R | Factory configured; do not change. |
| W4 | R | If installed, enables LTC by connecting pin 14 to the backplane. |

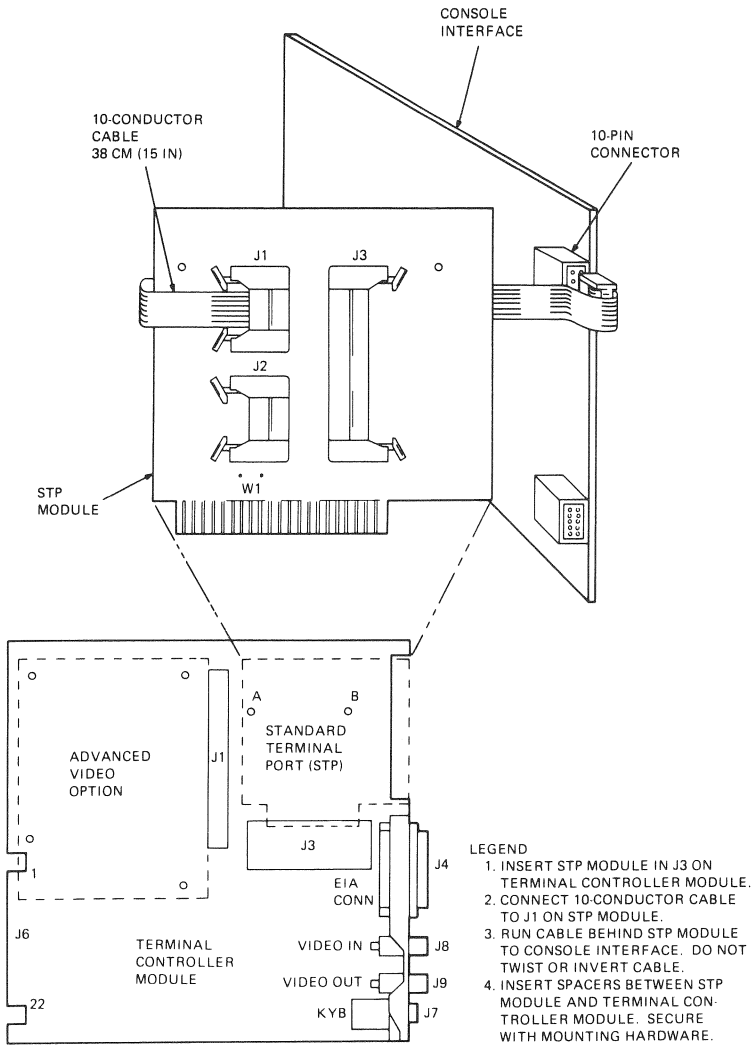
LTC Interrupt

Line time clock (LTC) interrupts can be enabled to the backplane by wire-wrap jumper W4. This jumper is not factory installed in the VT103. LTC interrupts occur at the line frequency of the ac supply to the VT103.

STANDARD TERMINAL PORT

The standard terminal port (STP) connector card provides internal connectors for communication line interfaces. You install this module in the STP connector on the terminal controller module, shown below. This module intercepts the communications path between the terminal controller module and the EIA connector at the rear of the terminal. The STP module has two 10-pin connectors (J1 and J2) and one 40-pin connector (J3).

J1 connects to the console device interface, which must also contain a 10-pin connector. J2 connects a second serial port to the terminal controller module. The second port is then connected through the terminal controller unit to the EIA connector at the rear of the terminal. Two 10-pin cables are provided with the VT103 for connecting the STP module to the console devices.



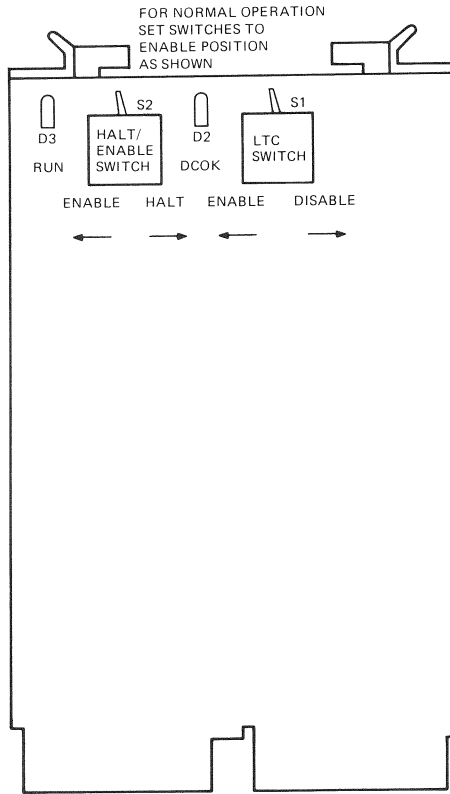
MR 2415

Standard Terminal Port (STP) Installation

VT103

VT1X3-MM MAINTENANCE MODULE (M8208)

The VT1X3-MM maintenance module (M8208) provides switches controlling the line time clock interrupts (LTC switch, S1) and the BHALT signal (HALT/ENABLE switch, S2). These switches are up or enabled for system operation. Both switches are up as seen from the back of the VT103-CX.



MR-6157

VT1X3-MM (M8208) Maintenance Module

The module also has two LEDs - one that is on while the processor is running, and another that is on when the bus has dc power.

The VT1X3-MM maintenance module goes in slot 4, rows A and B. This slot has been wired specifically for this module.

The following table shows LED and switch operation.

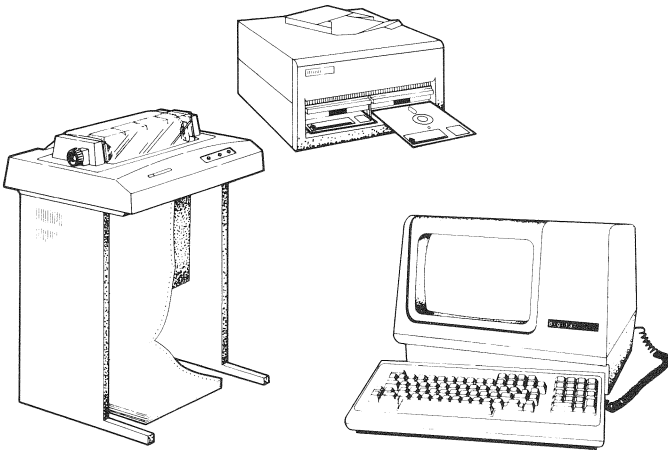
VT1X3-MM LED and Switch Operation

| Switch/Indicator | Function |
|-----------------------------|--|
| D2 (DC OK) | When lit, this LED indicates that dc power is applied to the bus. |
| D3 (Run) | When lit, this LED indicates that the processor is running. |
| S1 (Line time clock switch) | In the disable position, this switch prevents the line time clock (LTC) from interrupting the processor. In the enable position, this switch allows LTC interrupts. |
| S2 (HALT/ENABLE switch) | In the enable position, this switch allows the processor to operate under program control. In the halt position, this switch puts the processor in halt mode and allows it to respond to ODT commands. |

11MDS-A MICROCOMPUTER DEVELOPMENT SYSTEM

GENERAL

The 11MDS-A Microcomputer Development System is a single-user, table-top computer system for developing, debugging, and testing applications programs in the firmware of a target system. The 11MDS-A system includes the VT103-CX video terminal, the RX02M-E table-top diskette drive, and an LA120-RA DECprinter III. The system uses RT-11 operating system software and is designed to be used for developing microcomputer applications on a target system at the module level.



MR 6804

11MDS-A Microcomputer Development System

11MDS-A

Available Models

| | |
|----------|----------------|
| 11MDS-AA | 120 Vac, 60 Hz |
| 11MDS-AC | 120 Vac, 50 Hz |
| 11MDS-AD | 240 Vac, 50 Hz |

The 11MDS-A system includes:

1. VT103-CX video terminal that includes a detachable keyboard, the VT1XX-AB advanced video option, and an LSI-11 bus. The following modules are installed on the bus.

Modules Installed on the LSI-11 Bus

| Module | Name | Description |
|--------------|--------------|---|
| M8186 | KDF11-AA | LSI-11/23 CPU with KTF11-AA memory management unit and the KEF11-AA FP11 floating-point chip. |
| M8047-BA (2) | Two MXV11-AC | Multifunction modules, each with a 32K byte RAM and two serial line ports. One MXV11-AC includes the MXV11-A2 bootstrap ROM chip set. |
| M8044-D | MSV11-DD | 64K byte MOS RAM. |
| M8029 | RXV21 | RX02 disk interface. |
| M8208 | VT1X3-MM | Maintenance module. |

2. RX02M-E dual floppy disk drive in a table-top enclosure.
3. LA120-RA DECprinter III, a receive-only, 180 characters per second, hard-copy printer.

The connectors on the back of the VT103-CX are used as follows.

1. Printer connector (for LA120-RA DECprinter III).
2. Target port for your target system or PROM blaster.
3. Auxiliary port for connection to a TU58 DECtape II or a PROM blaster.

SPECIFICATIONS**Power Specifications**

| | |
|---------------------|--|
| Input voltage | |
| VT103-CX | 90-128 Vac 180-256 Vac (Switch-selectable) |
| LA120-RA | 90-128 Vac 180-256 Vac (Switch-selectable) |
| RX02M-EA | 90-128 Vac |
| RX02M-EC | 90-120 Vac |
| RX02M-ED | 200-256 Vac |
| Input current | |
| VT103-CX | 4.0 A maximum at 115 Vac 2.0 A maximum at 230 Vac |
| LA120-RA | 4.2 A maximum at 115 Vac |
| RX02M-EA | 4.0 A maximum at 115 Vac |
| RX02M-EC | 4.0 A maximum at 115 Vac |
| RX02M-ED | 2.0 A maximum at 230 Vac |
| Frequency | 47-63 Hz |
| VT103-CX | |
| LA120-RA | 49-61 Hz |
| RX02M-EA | 60 ± 1/2 Hz |
| RX02M-EC | 50 ± 1/2 Hz |
| RX02M-ED | 50 ± 1/2 Hz |
| System ride through | 15 ms minimum |
| Input protection | 4 A fuse |
| VT103-CX | |
| LA120-RA | 6 A fuse |
| RX02M-EA | 2 A slow blow fuse |
| RX02M-EC | 3.5 A circuit breaker |
| RX02M-ED | 1.75 A circuit breaker |

11MDS-A

Performance Specifications

VT103-CX

Data transfer rates

Console

15K baud – provided by the terminal controller through the STP module.

Printer connector

1200 baud

Target port

You select the target data transfer rate using the transmit speed (T SPEED), a set-up feature in the VT103-CX. It is factory set at 9600 baud. This port uses EIA RS-232-C compatible signals.

Auxiliary port

9600 baud
EIA RS-232-C compatible signals.

LA120-RA

Data transfer rate

Factory set to 1200 baud to match VT103-CX printer connector.

Maximum print speed

180 characters per second

RX02M-E

Data transfer rate

1.2 μ s per bit
833,333 bits/s

RX02K diskette media capacity

512K bytes

Programming Specifications

Address/vector assignment

Console

777560/60

Target

776500/300

Printer

776510/310

Auxiliary port

776520/320

RXV21

777170/264

Operating system software

RT-11 (Real time-11)

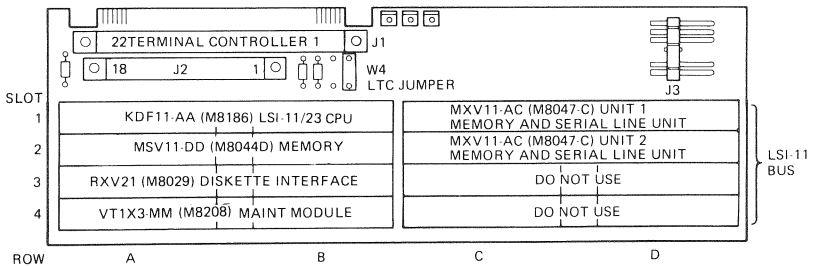
CONFIGURATION

The 11MDS-A contains an LSI-11 bus built into the VT103-CX terminals. The bus contains the LSI-11 modules that control the system, and these modules must be configured properly to function within the system. The modules and configuration requirements are detailed in the following table and figure.

LSI-11 Modules

| Module | Name | Function |
|-----------|--------------|--|
| M8186 | KDF11-AA | LSI-11/23 CPU with KTF11-AA memory management unit and KEF11-AA FP11 floating-point chip. |
| M8044-Dx* | MSV11-DD | 64K byte MOS RAM. |
| M8047-Cx* | Two MXV11-AC | Each with 32K byte RAM and two serial line ports. One MXV11-AC includes the MXV11-A2 bootstrap ROM chip set. |
| M8029 | RXV21 | RX02 disk interface. |
| M8208 | VT1X3-MM | Maintenance module. |

*Variable letter

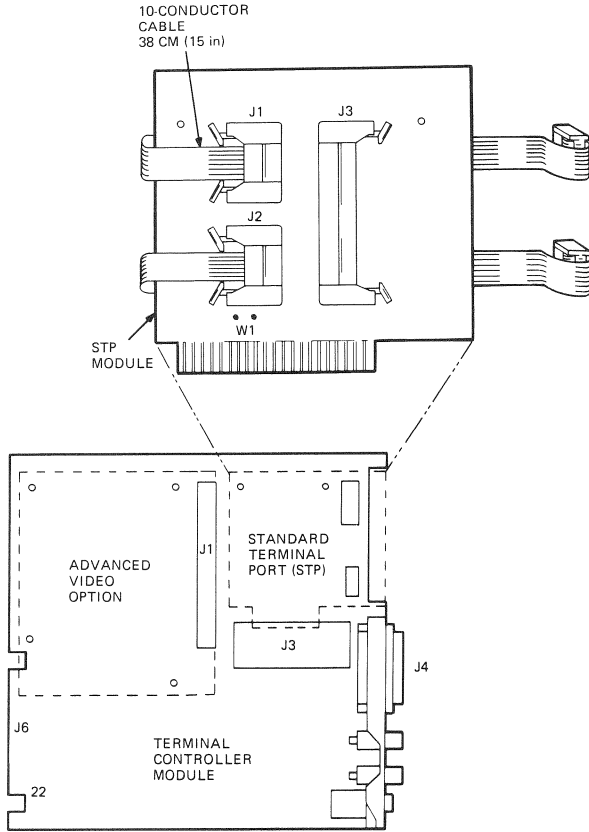


VT103-CX Module Positions

11MDS-A

Terminal Controller

The terminal controller module provides the basic video, terminal set-up memory, character ROMs, and communication protocol for the 11MDS-A system. This module goes in J1 of the VT103-CX backplane. The STP module and the advanced video option (AVO) are mounted on this module as shown in the following figure.



MR-6704

Standard Terminal Port (STP) Module Installation

Standard Terminal Port (STP)

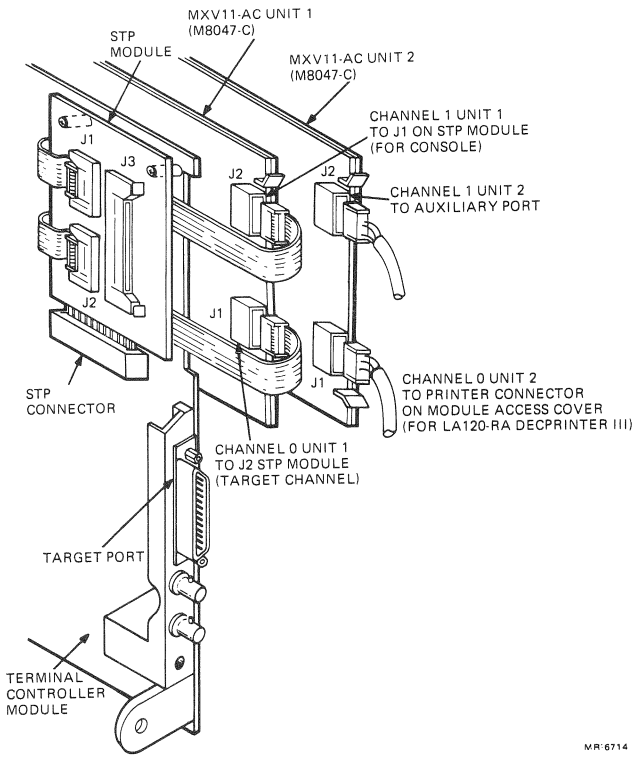
The STP module provides connectors for communication lines. This module intercepts the communication path between the terminal controller and the target port at the back of the terminal. The STP module plugs into J3 on the terminal controller module.

The STP module has two 10-pin connectors (J1 and J2) and one 40-pin connector (J3). J1 connects to the console device interface, channel 1 on the MXV11-AC (M8047) in slot 1, C and D. J2 connects to channel 0 of the same MXV11-AC to the target connector at the back of the terminal. J3 is not used.

NOTE

The channels on the serial line interfaces attached to the STP module have their baud rate selection disconnected. The baud rate for the console is approximately 15K baud. The baud rate for the target system is selected using T SPEED in set-up B mode.

11MDS-A



MR 6714

Connecting Cables from STP Module to MXV11-AC

Advanced Video Option (AVO)

The advanced video option included with the VT103-CX adds the following features.

1. Ten additional lines of 132 column display, allowing the screen to display a total of 24 lines.
2. Additional character features for highlighting characters on the screen in any of the following ways.

- Boldface
- Blink
- Underline
- Reverse
- Any combination of the above

3. Special graphic characters.

The advanced video option plugs into J1 on the terminal controller module.

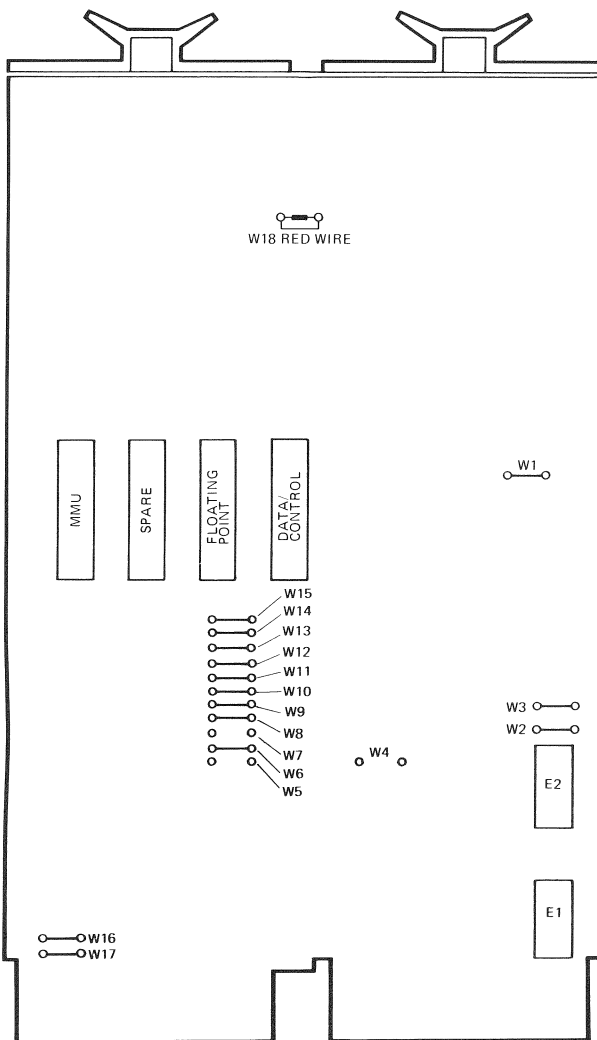
KDF11-AA Microprocessor (M8186)

The KDF11-AA microprocessor is a dual-height module that must occupy the first slot, rows A and B, in the LSI-11 bus on the VT103-CX backplane. The configuration of the jumpers on the module for the VT103-CX is shown and described in the following table and figure. The module also has a socket for the KEF11-AA and the FP11 floating-point IC chip included with the 11MDS-A system.

11MDS-A

KDF11-AA (M8186) Jumpers

| Jumper | Jumper State | Name |
|---------------|---|---|
| W1 | IN | Master clock (enabled) |
| W2 | OUT | Reserved for DIGITAL use |
| W3 | IN | Reserved for DIGITAL use |
| W4 | OUT | Event line (enabled) |
| W5, W6 | W5-OUT W6-IN | Power-up mode (Mode 2: bootstrap) |
| W7 | OUT | Enter console ODT on HALT |
| W8 | IN | Bootstrap starting address: 773000 ₈ for mode 2 |
| W9-W15 | IN (Ignored) (Not used if W8 is IN) | Bootstrap starting address: 773000 ₈ for mode 2 |
| W16, W17, W18 | IN | Reserved for DIGITAL use |



MR 6708

KDF11-AA (M8186) Jumper Locations

11MDS-A

MSV11-DD Memory (M8044-D)

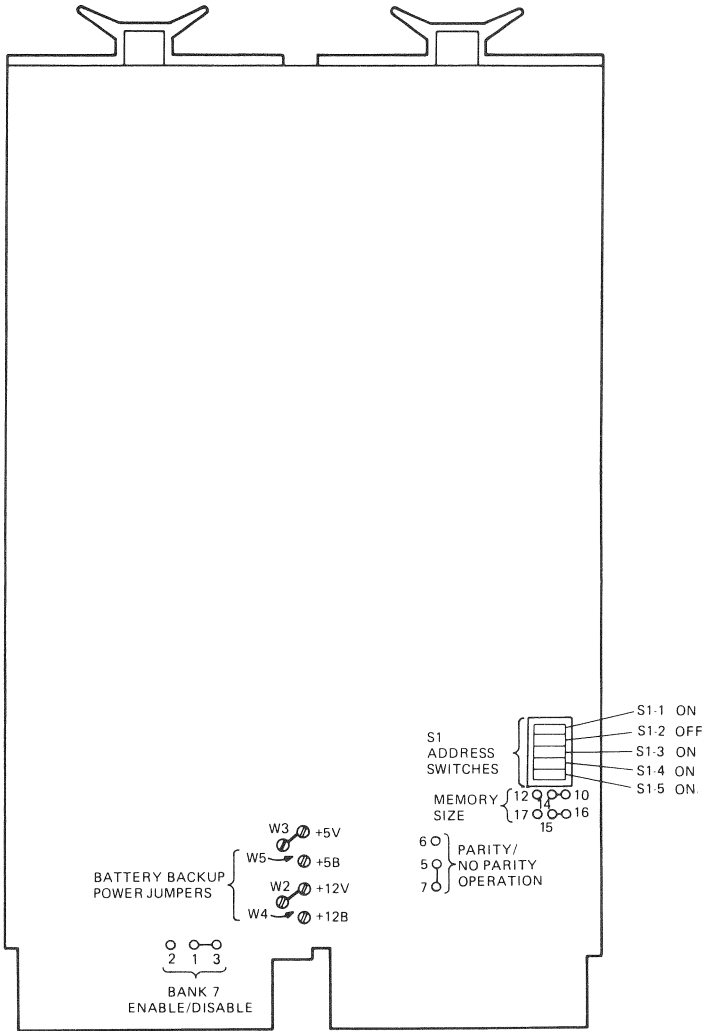
The MSV11-DD is a dual-height MOS RAM with 64K bytes of memory. It occupies slot 2, rows A and B, of the LSI-11 bus. A description of the 11MDS-A configuration of this module and its jumpers and switches follows.

MSV11-DD (M8044-D) Jumpers

| Jumper | Jumper State | Function Implemented |
|------------------------------|--------------|---|
| Pin 1 to 3 Pin 1 to 2 | IN OUT | Disable 2K word portion of memory in I/O page |
| W2 | IN | Enable system power (+5 V) |
| W3 | IN | Enable system power (+12 V) |
| W4 | OUT | Disable battery power (+12 V) |
| W5 | OUT | Disable battery power (+5 V) |
| Pin 10 to 14 Pin 16 to 15 | IN IN | Select memory size of 64K bytes |

MSV11-DD Switch Settings

| Switch | Starting Address 200000 (Bank Select 10-17) Switch Settings |
|--------|---|
| S-1 | ON |
| S-2 | OFF |
| S-3 | ON |
| S-4 | ON |
| S-5 | ON |



MR 6709

MSV11-DD (M8044-D) Switch and Jumper Locations

11MDS-A

MXV11-AC Multifunction Modules (M8047-C)

Two MXV11-AC modules occupy slots 1 and 2, rows C and D, of the LSI-11 bus. Each module includes 32K bytes read/write memory, space for bootstrap ROM ICs, and two asynchronous serial line units (SLUs). The bootstrap ROM ICs for the RX02 disk drive are included with the 11MDS-A and installed on MXV11-AC unit 1. These ROM ICs are the MXV11-A2 option.

The channel, address assignment, baud rate, and use of the serial line units on the MXV11-AC modules are shown in the following table.

MXV11-AC Serial Line Units

| MXV11-AC | Channel | Address | Vector | Baud | Destination |
|----------|---------|---------|--------|-------|--------------------------|
| Unit 1 | 0 | 776500 | 300 | 9600* | Target (through STP) |
| Unit 1 | 1 | 777560 | 60 | 15K | Console (through STP) |
| Unit 2 | 0 | 776510 | 310 | 1200 | LA 120-RA DECprinter III |
| Unit 2 | 1 | 776520 | 320 | 9600 | Auxiliary port |

*You may change the baud rate for the target system using T SPEED on console set-up B.

The placement of the jumper cards installed on the MXV11-AC modules are shown in the following figure. The cards use printed circuits to configure the jumper pins on the MXV11-AC modules. The wire table for the jumper cards and the part numbers of the jumper cards for each MXV11-AC are as follows.

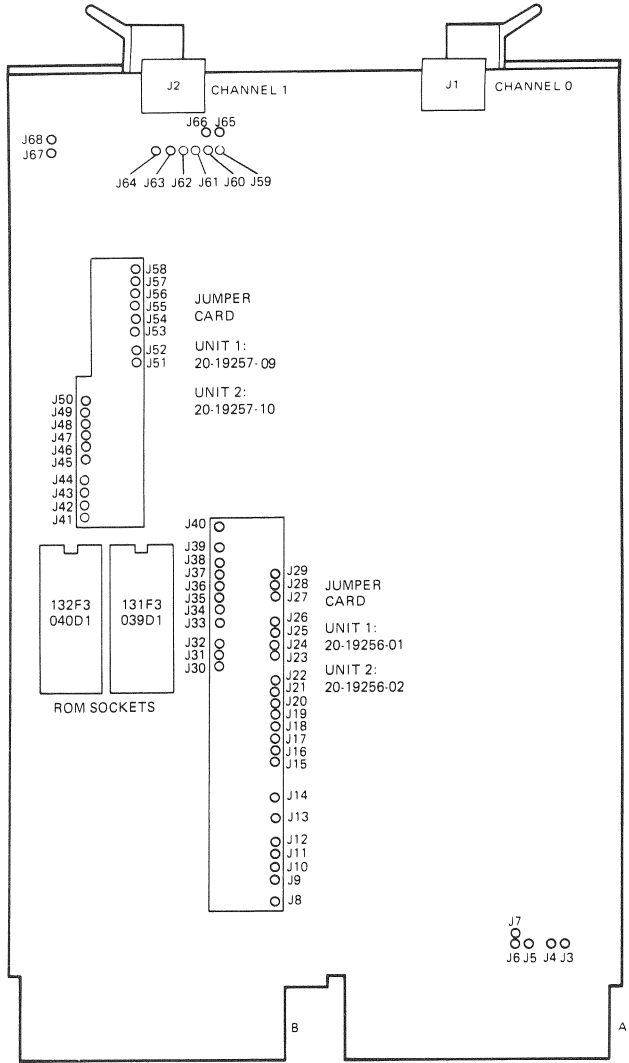
| MXV11-A and MXV11-AC | Part Numbers |
|----------------------------|-----------------------------|
| Unit 1 (with boot ROMs) | 20-19256-01 and 20-19257-09 |
| Unit 2 (without boot ROMs) | 20-19256-02 and 20-19257-10 |

Wire Table for Jumper Cards

| Jumper From | 20-19256-01 | 20-19256-02 | 20-19257-09 | 20-19257-10 |
|----------------|-------------|-------------|-------------|-------------|
| | To | To | To | To |
| J21 | J22 | J8 | | |
| J23 | J18 | J18 | | |
| J24 | J19 | J12 | | |
| J25 | J14 | J17 | | |
| J26 | J15 | J16 | | |
| J27 | J13 | J13 | | |
| J28 | J19 | J19 | | |
| J29 | J16 | NC* | | |
| J30 | J31 | J31 | | |
| J31 | J32 | J33 | | |
| J32 | J33 | J34 | | |
| J37 | J34 | NC* | | |
| J38 | J37 | NC* | | |
| J39 | J33 | NC* | | |
| J45 | | | NC* | J42 |
| J46 | | | NC* | J48 |
| J51 | | | J56 | J53 |
| J52 | | | J54 | J54 |
| J53 | | | J57 | J51 |
| J54 | | | J54 | J52 |
| J55 | | | J54 | J57 |
| J56 | | | J51 | J58 |

*NC = no connection

11MDS-A



MXV11-AC (M8047-C) Jumper Card Locations

If you are returning a defective M8047-C module, remove both jumper cards from the module and save them to install on your new module. Upon receipt of the new module, remove all the wire jumpers from pins J8 to J58 and on MXV11-AC unit 2, remove the jumper between J6 and J7. Install the jumper cards on the new module.

CAUTION

If your defective M8047-C has ROMs installed on it, remove these ROMs, noting their number and location, and save them for installation on your new module. You must use special handling techniques for the ROMs as follows.

The ROM is affected by static electricity. Therefore, when removing or installing a ROM make sure that you ground yourself first before removing the ROM. To do this, touch a metallic grounded surface while handling the module, then remove the ROM. You should wrap the ROM in conductive foam if possible.

Do not remove the conductive foam before installing the ROM on a new module. Gently press the foam against the surface of the module to remove static charges. Remove the foam and check that all ROM pins are straight before trying to insert the ROM into the ROM socket on the module. Align the notch on the ROM with the notch on the ROM socket and press the ROM firmly into the socket. Check to see that all ROM pins are correctly seated in the socket.

MXV11-AC Unit 1 with Bootstrap ROM – This module can be identified as having two ROM ICs installed in the two ROM sockets of the module. The ROM numbers are 131F3 and 132F3.

Channel 0, J1, of this module connects to the STP module and then to the target port. Channel 1, J2, connects to the STP module for use with the console. This module has the first 32K bytes of RAM memory with a starting address of 000000. The parameters set on this module by the jumper cards are described in the following table. This MXV11-AC is installed in slot 1, rows C and D, of the LSI-11 bus.

MXV11-AC Unit 1 (M8047-C) Configuration

| Function | Selection |
|-------------------------|------------------------------------|
| RAM bank | 0 |
| Bootstrap | Disk |
| SLU channel 0 address | 776500 |
| SLU channel 1 address | 777560 |
| SLU vector CH0 | 300 |
| SLU vector CH1 | 60 |
| SLU parameters | 8 data bits, no parity, 1 stop bit |
| Baud rates CH0 | 9600 (target) |
| Baud rates CH1 | 15K (console) |
| Break generation option | Halt |
| Crystal clock | Enabled |

MXV11-AC Unit 2 without Bootstrap ROM – This module does not have ROM ICs installed in either of the two sockets on the module. Channel 0, J1, of this module connects to the printer connector for use with the LA120-RA. Channel 1, J2, connects to the auxiliary port. This MXV11-AC has the second 32K bytes of RAM memory with a starting address of 100000. The parameters set on this module by the jumper cards are described in the following table. This module is installed in slot 2, rows C and D, of the LSI-11 bus.

This MXV11-AC connects to the printer and must have its break generation jumper (J6 to J7) removed. Removing this jumper removes the possibility that a break signal from the printer or auxiliary port may halt the system.

MXV11-AC Unit 2 Configuration

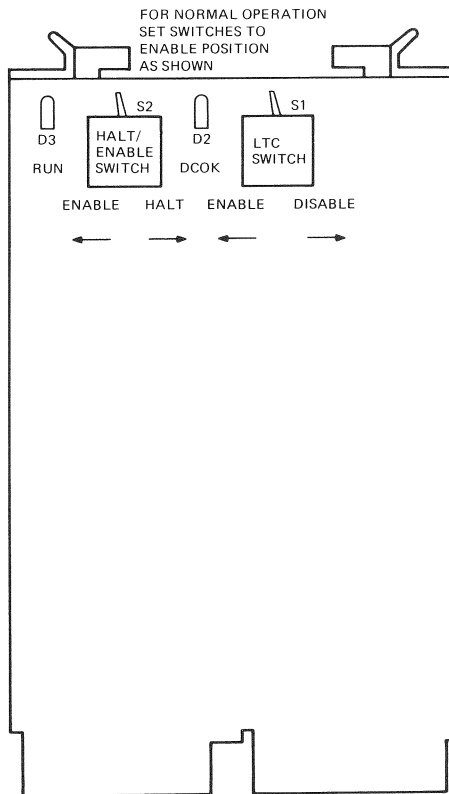
| Function | Selection |
|-------------------------|---|
| RAM bank | 4 (second 32K bytes) |
| SLU channel 0 address | 776510 |
| SLU channel 1 address | 776520 |
| SLU vector CH0 | 310 |
| SLU vector CH1 | 320 |
| SLU parameters | 8 data bits, no parity, 1 stop bit |
| Baud rate CH0 | 1200 (printer) |
| Baud rate CH1 | 9600 (auxiliary port) |
| Bootstrap | Disabled (not used) |
| ROM memory | Disabled (not used) |
| Break generation option | Disabled (jumper J6-J7 must be removed) |

RXV21 Disk Control (M8029)

The RXV21 is the interface between the LSI-11 bus and dual RX02 disk drives. Each drive uses a flexible diskette that can store up to 512K bytes of data. The VT103-CX uses the RXV21 as it comes from the factory with factory-configured jumpers. The RXV21 goes in slot 3, rows A and B, of the LSI-11 bus.

VT1X3-MM Maintenance Module (M8208)

The VT1X3-MM maintenance module (M8208) provides switches controlling the line time clock interrupts (LTC switch, S1) and the BHALT signal (HALT/ENABLE switch, S2). These switches are up, or enabled, for system operation. Both switches are up as seen from the back of the VT103-CX.



VT1X3-MM (M8208) Maintenance Module

11MDS-A

The module also has two LEDs — one that is on while the processor is running, and another that is on when the bus has dc power.

The VT1X3-MM maintenance module goes in slot 4, rows A and B. This slot has been wired specifically for this module.

The following table shows LED and switch operation.

VT1X3-MM LED and Switch Operation

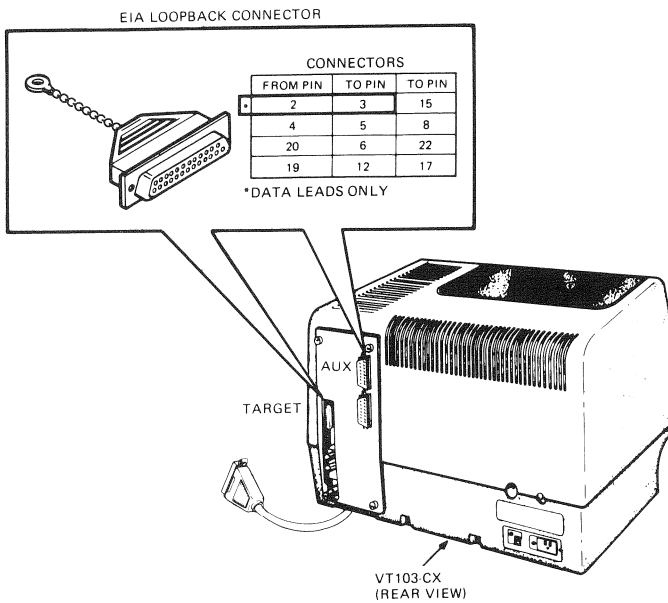
| Switch/Indicator | Function |
|-----------------------------|--|
| D2 (DC OK) | When lit, this LED indicates that dc power is applied to the bus. |
| D3 (Run) | When lit, this LED indicates that the processor is running. |
| S1 (Line time clock switch) | In the disable position, this switch prevents the line time clock (LTC) from interrupting the processor. In the enable position, this switch allows LTC interrupts. |
| S2 (HALT/ENABLE switch) | In the enable position, this switch allows the processor to operate under program control. In the halt position, this switch puts the processor in halt mode and allows it to respond to ODT commands. |

SYSTEM VERIFICATION PROGRAM

In order for the verification program to start automatically, the system must be started in the following sequence.

1. With power off, make sure that there is an EIA loopback connector installed on the target port and on the auxiliary port on the back of the VT103-CX.
2. Make certain that the printer has several sheets of fanfold paper installed.
3. Place the system verification program (diskette A) in either disk drive and close the disk drive door.
4. Place diskette B in the other disk drive and close its door.
5. Set the ON/OFF switch on the front of the printer on.
6. Set the ON/OFF switch on the back of the disk drive on.
7. Set the 1/0 switch on the back of the video terminal to 1.

The system software boots the diskette and, after ten seconds, prints the verification program start-up message on the video terminal. Testing begins automatically.



Connecting EIA Loopback Connector to
Target and Auxiliary I/O Ports

The verification program has seven tests that are run in sequence. These tests and their run times are as follows.

Verification Program Tests

| Test | Run Time |
|--------------------------|-----------------|
| Central processor | 1 min |
| Memory 00 to 32K bytes | 1 min |
| Memory 32K to 64K bytes | 1 min, 10 s |
| Memory 64K to 128K bytes | 2 min, 20 s |
| Serial I/O ports | 15 s |
| RX02M disk system | 3 min |
| LA120-RA DECprinter III | 1 min |

After a test runs successfully, "OK" prints on the video screen after the name of the test. The next test in the sequence begins immediately, printing the name of the test on the video screen on the next line. Both a successful response and an error response are shown in the following figures.



11MDS-A VERIFICATION PROGRAM

This checks out your 11MDS-A system hardware. The complete set of tests takes about 10 minutes to run. The RX02 floppy disk drives will click occasionally during testing.

*****CAUTION*****

These tests will WRITE on both RX02 disks and the LA120 printer. Ensure that both test program disks (A and B) are loaded and that the printer paper supply is adequate.

- Pass 1
 - Central Processor (test time is 1 minute) OK.
 - Memory 00 to 32K bytes (test time is 1 minute) OK.
 - Memory 32 to 64K bytes (test time is 1 minute, 10 seconds) OK.
 - Memory 64 to 128K bytes (test time is 2 minutes, 20 seconds) OK.
 - Serial I/O Ports (test time is 15 seconds) OK.
 - RX02 floppy disk system (test time is 3 minutes) OK.
 - LA120 DECprinter III (test time is 1 minute) OK.
- (check the printer paper for satisfactory print quality)

****The 11MDS-A checkout is complete****
 ****All system components test OK ****

To discontinue testing, press keyboard "BREAK".
 Otherwise, the test sequence will restart in 30 seconds.

MR 7640

A Successful Pass of the Verification Program



11MDS-A VERIFICATION PROGRAM

This checks out your 11MDS-A system hardware. The complete set of tests takes about 10 minutes to run. The RX02 floppy disk drives will click occasionally during testing.

*****CAUTION*****

These tests will WRITE on both RX02 disks and the LA120 printer. Ensure that both test program disks (A and B) are loaded and that the printer paper supply is adequate.

- Pass 1
 - Central Processor (test time is 1 minute) OK.
 - Memory 00 to 32K bytes (test time is 1 minute) OK.
 - Memory 32 to 64K bytes (test time is 1 minute, 10 seconds) OK.
 - Memory 64 to 128K bytes (test time is 2 minutes, 20 seconds) OK.
 - Serial I/O Ports (test time is 15 seconds) ERROR.
 - RX02 floppy disk system (test time is 3 minutes) OK.
 - LA120 DECprinter III (test time is 1 minute) OK.
- (check the printer paper for satisfactory print quality)

Errors have been detected in the following sub-systems:
 Target I/O Port M8047-C (MXV11-AC #1, port 0)
 check that loop-back is installed!!!

Contact DEC Field Service for assistance.
 XXXXXX
 @

MR 7642

An Example of an Error Message Printout

COMMERCIAL SYSTEMS**D315 DATASYSTEM**

The standard D315 Datasystem includes the following.

1. RX78 table-top version of the RX02
2. PDP-11/23-AH boxed system
3. VT100 video/keyboard transaction terminal

Options include:

1. LA120-RA dot matrix printer
2. DUV11-DA (M7951) synchronous serial line unit
3. MSV11-DD (M8044) MOS memory module
4. Roll-around cart for flexibility.

Related Documentation

D315 Datasystem Pocket Service Guide (EK-OD315-PS)

Diagnostics

The D315 checkout diskette, BA-S370A-MC, and BA-S524A-MC (diagnostics) are shipped with each system.

Before running diagnostics, make sure the serial line turnaround connectors (H315-B) are installed on any unused terminal or printer jacks.

To run the D315 checkout diskette, place the diskette (BA-S370A-MC) in one drive and BA-S524A-MC in the other. Then start the restart switch.

The following is a sample printout of the D315 checkout diskette diagnostics as received on the VT100. It includes examples of the six tests. OK is the response given at the end of a test to show successful completion.

D315

This checks out your D315 system hardware. The complete series of tests takes only 15 minutes to run. The RX02 floppy disk drive will click occasionally during testing.

- Central Processor Test (test time is 30 seconds)OK
- First 32K bytes of memory (test time is 1 minute, 25 seconds)OK
- Second 32K bytes of memory (test time is 2 minutes)OK
- Serial Input / Output ports and Clock (test time is 25 seconds)OK
- RX02 floppy disk drives (test time is 4 minutes, 35 seconds).....OK
- LA120 Printer (test time is 1 minute)OK

The following is an example of an error message printout noted while running the RX02 floppy disk drive test.

Error printout

? ERROR DETECTED IN THE FLOPPY DISK SYSTEM ?

Testing cannot proceed.

NOTE

Each error message is similar in that it identifies the problem area, discontinues testing, and recommends corrective action to be taken.

System Checkout

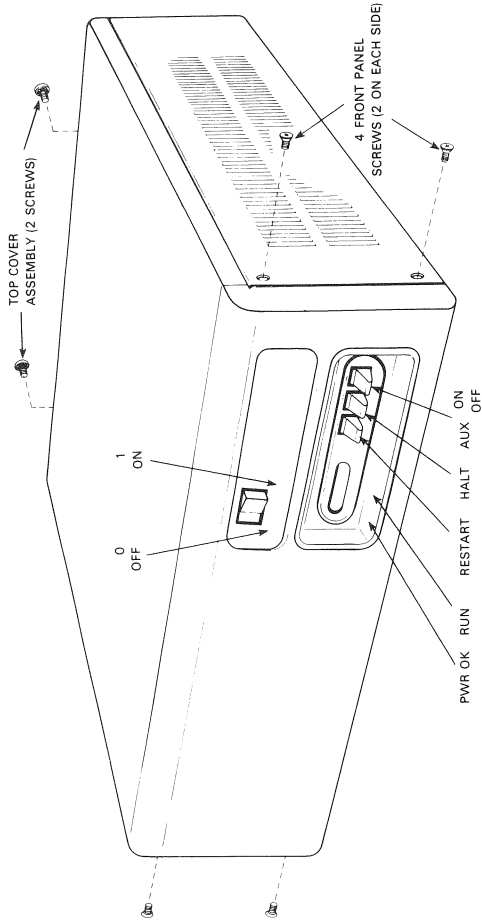
| System | Probable Cause / Remedy |
|---|---|
| The checkout message does not appear when you run the D315 checkout diskette. | Make sure the terminal's ON-LINE light is on. Make sure the HALT and AUX ON/OFF switches are up and the diskettes (BA-S370A-MC and BA-S524A-MC) are correctly inserted. |
| The checkout message still does not appear. | Reverse the floppies and retry. |

PDP-11/23 AH

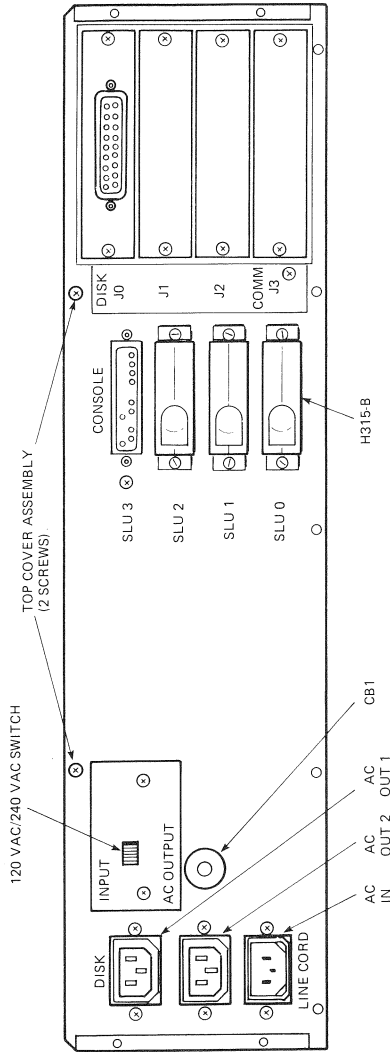
The PDP-11/23 AH is the system microcomputer. The front panel switches and indicators are described in the following table. The two figures show the front and rear panel assemblies.

PDP-11/23 AH Switch/Indicator Functions

| Switch/LED | Position | Function |
|------------------------|----------|---|
| Power control | 0 | Power off |
| | 1 | Power on |
| AUX ON/OFF | OFF | The line time clock is disabled (OFF when running standard diagnostics). |
| | ON | The line time clock is enabled (Usually ON for most operating systems and when running D315 customer confidence diagnostics). |
| HALT | Up | The processor is enabled to run. |
| | Down | The processor is halted. |
| RESTART (Momentary) | Restart | When the HALT switch is up, the processor carries out a power-up sequence and displays the bootstrap dialog. |
| PWR OK | | On when the correct dc output voltages are being generated by the microcomputer system. |
| RUN | | On when the processor is operating. |



PDP-11/23 AH Front Panel Assembly



MR 5817
MC 2821

PDP-11/23 AH Rear Panel Assembly

D315

Voltage Select Switch -

WARNING

Make certain that the ac power has been removed before proceeding.

The voltage select switch (120/240 Vac) is located on the rear panel assembly and is locked in place by a voltage plate to prevent accidental change. To change the voltage setting, remove the two phillip screws holding the plate in place. Once the plate has been removed, select either 120 Vac or 240 Vac. Replace the voltage plate with the appropriate voltage identification on the voltage face plate (each side of the plate is labeled 120 Vac or 240 Vac).

Backplane - An H9270 backplane provides the bus and control interconnections for the modules of the PDP-11/23 AH. The location of the backplane modules are as follows.

| | ROW A | ROW B | ROW C | ROW D |
|---------|---------------------------------------|----------|----------|----------|
| SLOTS 1 | M8186 | KDF11-AA | M8047 | MXV11-AC |
| 2 | M8029 | RXV21 | M8047 | MXV11-AC |
| 3 | * M7951 DUV11-DA (QUAD-HEIGHT MODULE) | | | |
| 4 | * M8044 | MSV11-DD | * M8044 | MSV11-DD |

* OPTIONAL MODULES

| SLOT NO. | MODULE NUMBER | OPTION NUMBER | DESCRIPTION | CSR/BUS ADDRESS | INTR VCTR |
|----------|---------------|---------------|--------------------------|------------------|-----------|
| 1AB | M8186 | KDF11-AA | 11/23 CPU | | |
| 1CD | M8047 | MXV11-AC | MEM & 2 SLUs ROM BOOT | 176500 177560 | 300 60 |
| 2AB | M8029 | RXV21 | DISK INTERFACE | 777170 | 264 |
| 2CD | M8047 | MXV11-AC | MEMORY & 2 SLUs | 176520 176510 | 320 |
| *3 | M7951 | DUV11-DA | SYNC SLU | 160040 | 330 |
| *4AB | M8044 | MSV11-DD | 64KB MEMORY | | |
| *4CD | M8044 | MSV11-DD | 64KB MEMORY | | |

*OPTION MODULES

MR 8618
MK 2630

H9270 Module Use

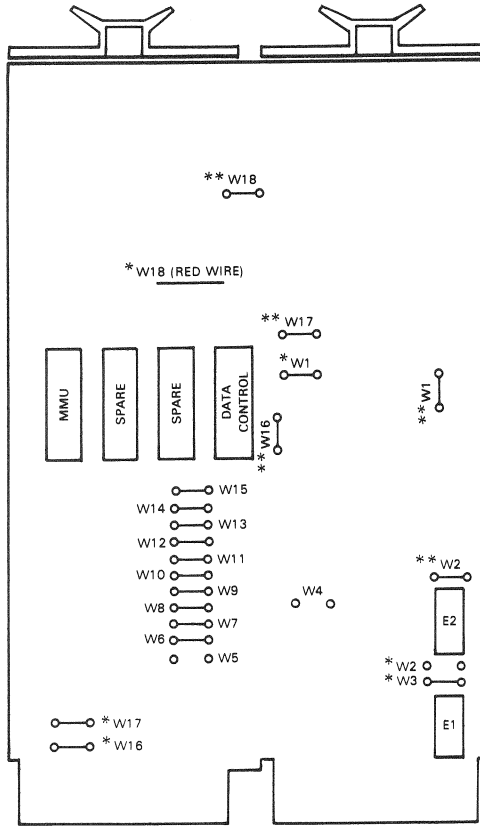
Configuration

The modules are configured by installing jumper wires or selecting switch positions. This section describes the configuration requirements for modules used in this system.

KDF11-AA (M8186) Jumpers - The KDF11-AA is a 16-bit, high performance microprocessor on one multilayer module (M8186). This module is the heart of the system and includes jumpers W1 through W18 as listed in the following table.

KDF11-AA (M8186) Jumper Functions

| Jumper | Name | Function | Jumper State |
|---------------|-----------------------------------|--|---------------------|
| W1 | Master clock | Enable internal master clock. | IN |
| W2 | Reserved for DIGITAL use | Factory configured, do not change. | OUT |
| W3 | Reserved for DIGITAL use | Factory configured, do not change. | IN |
| W4 | Event line | Out = enabled. | IN |
| W5, W6 | Power-up mode | Console ODT. | W5 = IN W6 = OUT |
| W7 | Halt / trap | Enter console ODT on halt. | OUT |
| W8 | Bootstrap address | In = power up to 173000. Out = power up to the address specified by W9-W15. | IN |
| W9-W15 | User-selectable bootstrap address | W9-W15 apply to address bits 09 through 15 respectively. | OUT |
| W16-W18 | Reserved for DIGITAL use | Factory configured, do not change. | IN |



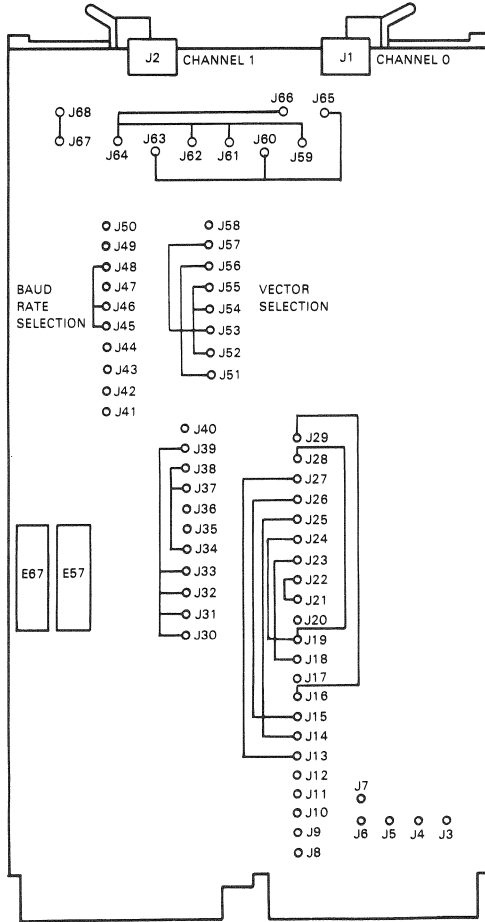
NOTES:

1. JUMPERS W9 THROUGH W15 MAY BE EITHER IN OR OUT DEPENDING ON W8. IF W8 IS IN, JUMPERS W9 THROUGH W15 ARE IGNORED.
2. JUMPERS SHOWN WITH AN * ARE FOR ETCH REV C ONLY.
3. JUMPERS SHOWN WITH AN ** APPLY TO ETCH REV A AND B.
4. THE ABOVE JUMPER CONFIGURATION APPLIES TO ETCH REV C MODULES. MODULES OF ETCH REV A AND B DO NOT INCLUDE A W3 JUMPER.
5. JUMPER W2 MUST BE INSTALLED ON ALL ETCH REV A AND B MODULES.

MR 8010
MK 2029

KDF 11-AA Module Layout

MXV11-AC (M8047) Memory - The MXV11-AC memory and asynchronous line interface consists of two MXV11-AC modules, both having 32K by 16-bits of MOS memory and two asynchronous serial lines. In addition, one module has two 512 × 8 ROMs (E57 and E67) memory diagnostics and two bootstraps - one for the TU58 and one for the RX78. These ROMs are not installed in the other MXV11-AC module.



| DESCRIPTION | SOCKET | PART NO. |
|-------------|--------|--------------|
| LOW BYTE | E57 | 23-039D1-0-0 |
| HIGH BYTE | E67 | 23-040D1-0-0 |

MR 8620
MK 2636

MXV11 Module Layout

MXV11-AC (M8047) Jumpers and ROM Boot (Module 1) – Jumpers for Module 1 must be installed as described in the following table.

MXV11-AC (M8047) Module 1 Jumper Functions

| Function | MXV11-AC Pins | |
|--|---------------|-----|
| | From | To |
| RAM banks (BANKS 0, 1, 2, 3, 16K) | J30* | J31 |
| | J32* | J33 |
| | J31* | J32 |
| SLU address 176500 (Channel 0) SLU 0 | J23* | J18 |
| | J24* | J19 |
| SLU address 177560 (Channel 1) SLU 3 - Console | J26* | J15 |
| | J25* | J14 |
| | J27* | J13 |
| | J28* | J19 |
| SLU vector Channel 0 vector 300 Channel 1 vector 60 | J56* | J51 |
| | J54* | J52 |
| | J55* | J54 |
| | J53* | J57 |
| ROM bootstrap (disk) | J37* | J38 |
| | J21* | J22 |
| | J34* | J37 |
| | J33* | J39 |
| | J29 | J16 |
| SLU parameters (8 data bits Ch 1) (Even parity Ch 1) (8 data bits Ch 0) (Even parity Ch 0) (1 stop bit Ch 1) (1 stop bit Ch 0) | J59* | J61 |
| | J61* | J62 |
| | J62* | J64 |
| | J64* | J66 |
| | J60* | J63 |
| | J63* | J65 |
| Baud rate (SLU 1) (9.6K) (SLU 0) (9.6K) | J46* | J48 |
| | J45 | J48 |
| Break Gen. (not used) Remove factory jumpers | | |
| Crystal clock (not a user option) | J68* | J67 |

* Factory-installed jumpers. All jumpers not listed must be removed.

MXV11-AC (M8047) Jumpers (Module 2) – Jumpers for Module 2 must be installed as described in the following table.

MXV11-AC (M8047) Module 2 Jumper Functions

| Function | MXV11-AC Pins | |
|--|---------------|-----|
| | From | To |
| RAM banks (Banks 4, 5, 6, 7, 16K) | J30 | J31 |
| | J31 | J33 |
| | J32 | J34 |
| SLU address 176510 (Channel 0) SLU 1 | J23* | J18 |
| | J24 | J12 |
| SLU address 176520 (Channel 1) SLU 2 | J26 | J16 |
| | J25 | J17 |
| | J27* | J13 |
| | J28* | J19 |
| SLU vector Channel 0 vector 310 Channel 1 vector 320 | J56 | J58 |
| | J55 | J57 |
| | J54* | J52 |
| | J53 | J51 |
| ROM bootstrap (disk) | J8 | J21 |
| <i>ROM selection disable</i> | | |
| SLU Parameters (8 data bits Ch 1) (Even parity Ch 1) (8 data bits Ch 0) (Even parity Ch 0) (1 stop bit Ch 1) (1 stop bit Ch 0) | J59* | J61 |
| | J61* | J62 |
| | J62* | J64 |
| | J64* | J66 |
| | J60* | J63 |
| | J63* | J65 |
| Baud rate | | |
| (SLU 1) (9.6K) | J45 | J48 |
| (SLU 0) (9.6K) | J46* | J48 |
| Break Gen. (not used) Remove factory jumpers | | |
| Crystal clock (not a user option) | J68* | J67 |

* Factory-installed jumpers. All jumpers not listed must be removed.

RXV21 (M8029) Jumpers

| Drive | Address | Address Jumpers | | | | | | | | | |
|----------------|---------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | W11 | W10 | W09 | W08 | W07 | W06 | W05 | W04 | W03 | W02 |
| Drives 0 and 1 | 177170 | IN | IN | IN | IN | OUT | OUT | IN | IN | IN | IN |
| Drives 2 and 3 | 177150 | IN | IN | IN | IN | OUT | OUT | IN | IN | OUT | IN |
| Drive | Vector | Vector Jumpers | | | | | | | | | |
| | | W18 | W17 | W16 | W15 | W14 | W13 | W12 | | | |
| Drives 0 and 1 | 264 | OUT | IN | OUT | IN | IN | OUT | IN | | | |
| Drives 2 and 3 | 270 | OUT | IN | OUT | IN | IN | IN | OUT | | | |

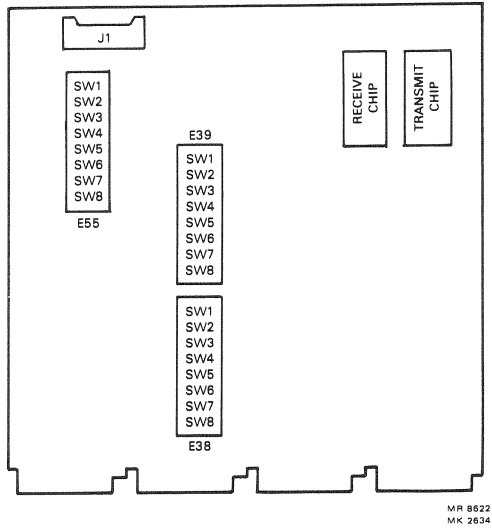
IN = logical 1
 OUT = logical 0

NOTE

Drives 2 and 3 are optional, and are usually jumpered for address 177150 and vector 270 when installed.

D315

DUV11-DA (M7951) Switches - The DUV11-DA synchronous serial line unit switch configuration and the E55 switch functions are listed in the following tables.



DUV11 Module Layout

DUV11-DA (M7951) Switch Configuration

| Address Device | Switch Number | Vector Address |
|----------------|---------------|----------------|
| 17 | | |
| 16 | | |
| 15 | | |
| 14 | | |
| 13 | | |
| 12 | E38 S1 = 0 | |
| 11 | E38 S2 = 0 | |
| 10 | E38 S3 = 0 | |
| 09 | E38 S4 = 0 | |
| 08 | E38 S5 = 0 | E39 S3 = 1 |
| 07 | E38 S6 = 0 | E39 S4 = 0 |
| 06 | E38 S7 = 0 | E39 S5 = 0 |
| 05 | E38 S8 = 0 | E39 S6 = 1 |
| 04 | E39 S1 = 0 | E39 S7 = 0 |
| 03 | E39 S2 = 1 | E39 S8 = 0 |
| 02 | E39-0 RCVR | E39-0 RCVR |
| 01 | E39-1 XMTR | E39-1 XMTR |
| 00 | | |

NOTE

Standard device address 160010 and vector 440.

Switch ON = logical 1

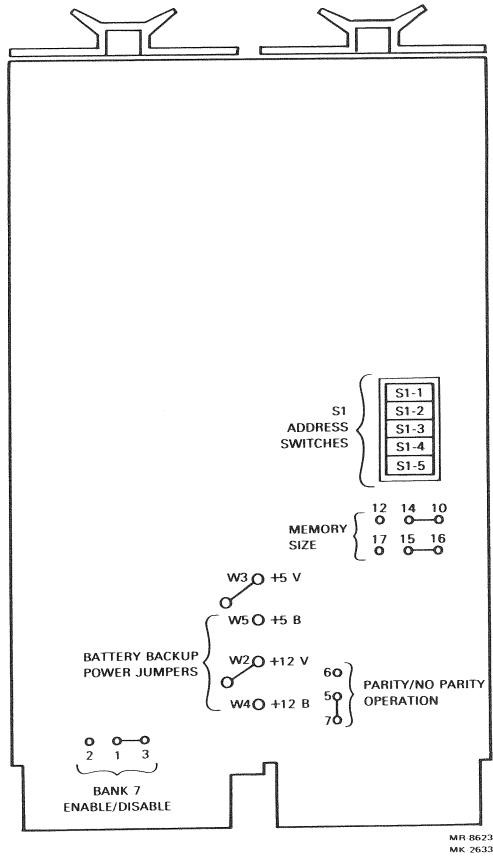
Switch OFF = logical 0

E55 Switch Settings and Functions

| E55 Switch | Factory Setting | Function |
|------------|-----------------|---|
| S1 | ON | Optional clear - Switch on enables clear option; used to clear RXCSR bits 01, 02, and 03. |
| S2 | OFF | Transmit - Switch on enables secondary data channel between the modem and the DUV11. |
| S3 | OFF | Receive - Switch on enables secondary data channel between the modem and the DUV11. |
| S4 | OFF | Switch on enables the receiver to synchronize internally upon receiving one sync-character. The usual condition of receiving two sync-characters exists when S4 is off. |
| S5 | OFF | Special feature - Switch on allows the external clock to be internally generated; used when a modem is not used. If S5 is on, S7 should be off. |
| S6 | OFF | Special feature - Optional feature is switched on for program control of data rate selection. |
| S7* | OFF | Maintenance clock - Switch on enables the maintenance clock. |
| S8 | OFF | Not used. |

*S7 is used only when running diagnostics and should be returned to the off position before running system software.

MSV11-DD (M8044) Jumpers and Switches - The MSV11-DD MOS read/write memory jumper and switch configuration and the memory address range selection are shown in the following tables.



MSV11-DD Module Layout

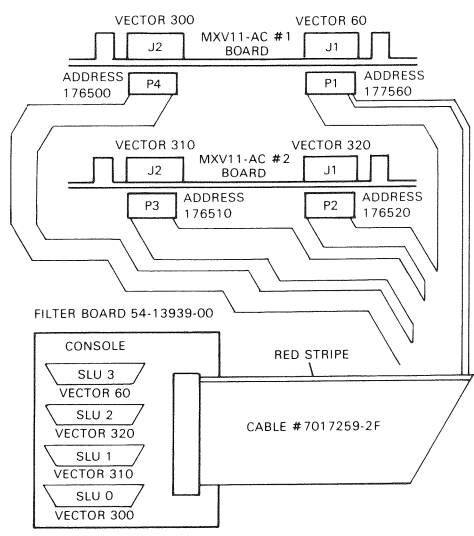
MSV11-DD (M8044) Jumper/Switch Configuration

| Designation | Function | Jumper/Switch State |
|-------------|---|---------------------|
| W2 | Battery backup when out | IN |
| W3 | Battery backup when out | IN |
| W4 | Battery backup when in | OUT |
| W5 | Battery backup when in | OUT |
| Pins 5-7 | Pin memory type (no parity) | IN |
| Pins 10-14 | Memory size | IN |
| Pins 15-16 | Memory size | IN |
| Pins 1-3 | Usable memory (installed from 1 and 2 bank 7 enabled) | IN |

Memory Address Range Selection

| Range | Base Address | S1-1 | S1-2 | S1-3 | S1-4 | S1-5 |
|---------|---------------|------|------|------|------|------|
| 0-32K | 000000-177776 | ON | ON | ON | ON | ON |
| 32-64K | 200000-377776 | ON | OFF | ON | ON | ON |
| 64-96K | 400000-577776 | OFF | ON | ON | ON | ON |
| 96-128K | 600000-777776 | OFF | OFF | ON | ON | ON |

Cabling - The internal connections from the H9270 backplane and the rear panel assembly are interconnected by cable #70-17259-2F. The cable connections are described in the following figure and table.



NOTE:
 THIS FIGURE SHOWS HOW TO CABLE UP THE FOUR SERIAL LINES ON THE
 MXV11s USING THE 7017259-2F CABLE FROM THE MXV11s TO THE REAR
 PANEL OF THE CPU BOX.

MR-9624
 MK-2631

MXV11-AC Cabling Diagram

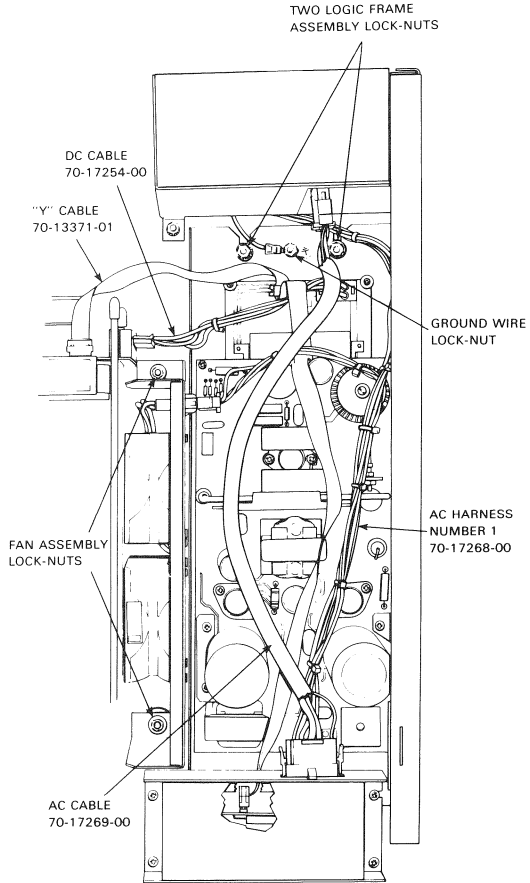
Signal Cable List

| Cable Function | Part Number | From | To |
|-----------------------|-------------|---------------------------------------|---|
| Disk bus | 70-14033-2F | RXV21 J1 (M8029) | CPU rear panel J0 |
| | 70-17258-2F | CPU panel J0 | RX02 |
| VT100 console cabling | 70-17259-2F | MXV11-ACs J1 | CPU rear panel SLU 3 |
| | BC03M-25 | SLU 3 CONN CPU rear panel | Console terminal |
| DUV11* | BC05C-2F | DUV11-DA J1 | J3 CONN CPU rear panel (7017261-01) filter adapter assembly |
| LA120* | BC03M-25 | SLU 2 CONN CPU rear panel | LA 120 printer |
| AC cable | 70-17269-00 | Front panel AC switch box assembly J1 | Rear panel assembly J1 |
| DC cable | 70-17254-00 | DC power distribution board J2 | Logic frame assembly J1 (attached to backplane) |

Signal Cable List (Cont)

| Cable Function | Part Number | From | To |
|--|-------------|--------------------------------|--|
| D315 distribution panel 54-13939-00 | 70-17259-2F | P1 P2 P3 P4 | J1 MXV11-AC #1 J1 MXV11-AC #2 J2 MXV11-AC #2 J2 MXV11-AC #1 |
| AC harness number 1 | 70-17268-00 | Rear panel assembly P1 | Power supply (Mother) board J1 |
| AC harness number 1 | 70-17268-00 | Rear panel assembly P2 | Fan assembly J1 |
| Y cable | 70-13371-01 | Y cable P2 | DC power distribution board J3 |
| Y cable | 70-13371-01 | DC power distribution board J3 | Front panel board J1 (54-12985-00) |
| Y cable | 70-13371-01 | DC power distribution board J3 | J2 located on the backplane |

*Denotes option



MR-8625
MK-2638

Logic Frame/Fan Assembly

D322

The standard Datasystem 322 includes the following.

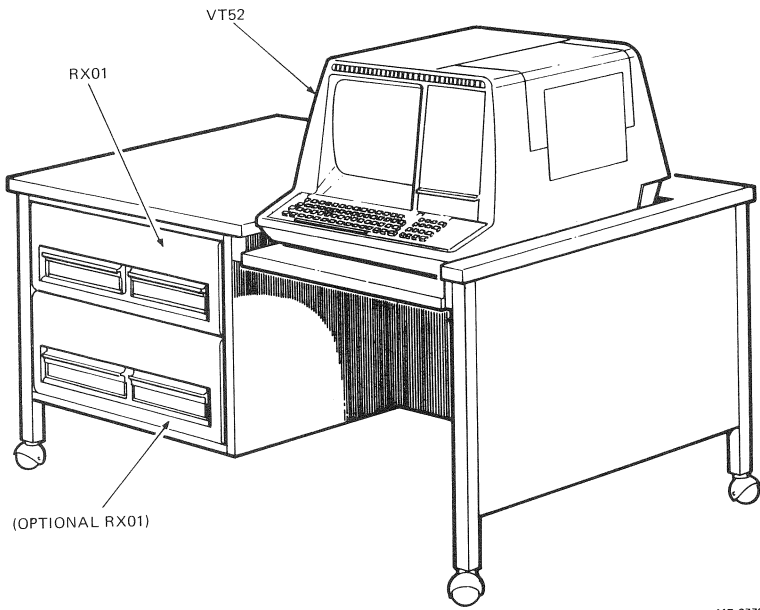
- Desk-like cabinet
- Central processor with 32K bytes of MOS memory
- One RX01 dual floppy disk unit with 512K bytes of data storage
- VT52 video/keyboard transaction terminal

Options include:

- Additional memory up to a total of 56K bytes
- Additional dual floppy disk unit in the same cabinet
- Choice of printers (30 cps up to 300 lpm)
- Cartridge disk drives (2.5 million bytes removable; 5.0 fixed)
- Up to three video or hard-copy terminals
- 2780 communications package and CTS-300 DICAM, providing both batch and interactive communication capabilities.

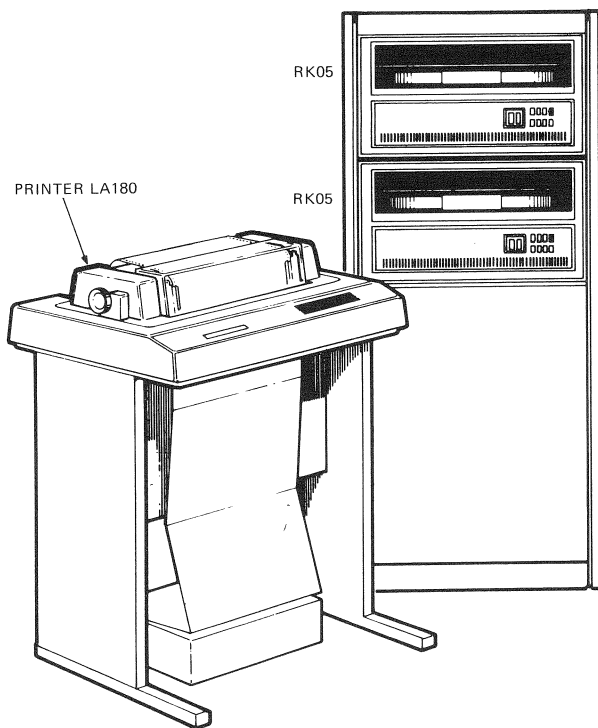
Further information may be found in the *DEC Datasystem 320 Family Service Manual*, EK-DDS03-SV.

D322



MR-0779

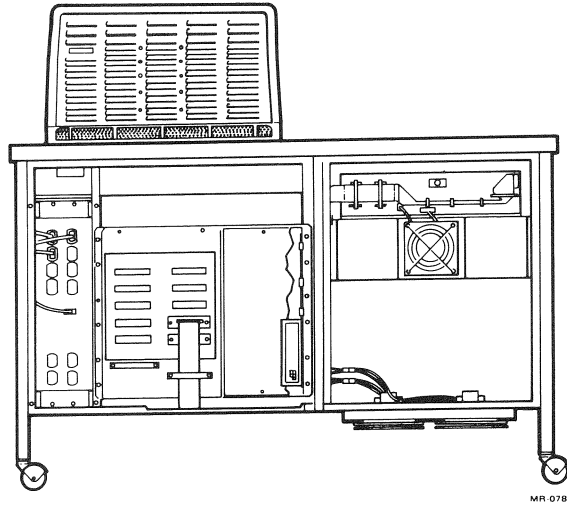
Basic 322 System



MR-0781

Optional Cabinet and Printer

D322



Basic D322 System, Rear View with Door Removed

D322 System Model Designations

| | Model Designation | | | |
|-----------------------|-------------------|--------|--------|--------|
| D322A- | AA | AD | AY | AZ |
| Input Power/Frequency | 115/60 | 230/50 | 115/60 | 230/50 |
| Software Category | A | A | C | C |
| D322- | A | B | ↑ | ↑ |
| H9820- | W | W | | |
| RXV11- | DA | DD | same | same |
| PDP-11/03- | JA | JB | as | as |
| VT52- | AE | AF | AA | AD |
| LAV11-* | PA | PD | column | column |
| DS3RK- | AA | AD | | |
| H967- | HK | HL | | |
| RKV11- | DA | DB | ↓ | ↓ |





*Model AA + LAV11 = Model BA

Model AD + LAV11 = Model BD

Model AY + LAV11 = Model BY

Model AZ + LAV11 = Model BZ

D322 SPECIFICATIONS* SEE D324 SPECS FOR PRINTER SPECS

| | BASIC 322 | | OPTIONAL CABINET | |
|----------------------------------|---|---|---|---|
| | 115 V 60 HZ | 230 V 50 HZ | 115 V 60 HZ | 230 V 50 HZ |
| POWER CONNECTOR |  |  |  |  |
| NEMA NO. DEC P/N | 5-15P 90-08938 | 6-15P 90-08853 | 5-15P 90-08938 | 6-15P 90-08853 |
| AMPERAGE | 12 AMPS | 6 AMPS | 12 AMPS | 6 AMPS |
| BTU/HOUR | 3400 | 3400 | 1400 | 1400 |
| HEAT DISSIPATION | 1000 W | 1000 W | 400 W | 400 W |
| SHIPPING WEIGHT (APPROXIMATE) | 400 LBS 182 KG | 400 LBS 182 KG | 300 LBS 136 KG | 300 LBS 136 KG |

*SPECIFICATIONS HAVE BEEN FIGURED ON THE MAXIMUM CONTAINED IN EACH UNIT.

Specifications

MR-0782

Modules Included in the Basic System

Processor

KD11-P (M7264-BB)

Resident memory addressed as bank 0
CPU refresh disabled
Powers up to 173000

Or

KD11-Q (M7264-YB)

No resident memory
CPU refresh disabled
Powers up to 173000

Memory

MSV11-B (M7944)

4K RAM
Three in basic system with KD11-P
Addresses start at bank 1
Refreshed by REV11-C

Or

D322

MSV11-C (M7955-YD)

16K RAM
One in basic system with KD11-Q
Addresses start at bank 0
Internal refresh

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
9600 baud
EIA
One stop bit, eight data bits, no parity

RX01 Floppy Disk Interface

RXV11 (M7946)

First device address (disk 0) 177170
First vector 264
Second device address (disk 1) 177150
Second vector 270

Bootstrap/Diagnostic

REV11-C (M9400-YC)

Bootstrap enabled
Diagnostics enabled
Refresh enabled for MSV11-B
Refresh disabled for MSV11-C

Terminator

TEV11 (M9400-YB)

120 Ω terminator

Optional Modules for Recommended Expansion

LA180 Printer Interface

LAV11 (M7949)

Device address 177510
Vector 200

Or

LPV11 (M8027)

Device address 177510
Vector 200

RK05 Disk Interface

RKV11-D

Interfaced to computer by M7269
See the "CPU/Options" section for more detailed information.

Communications Interface

DUV11 (M7951)

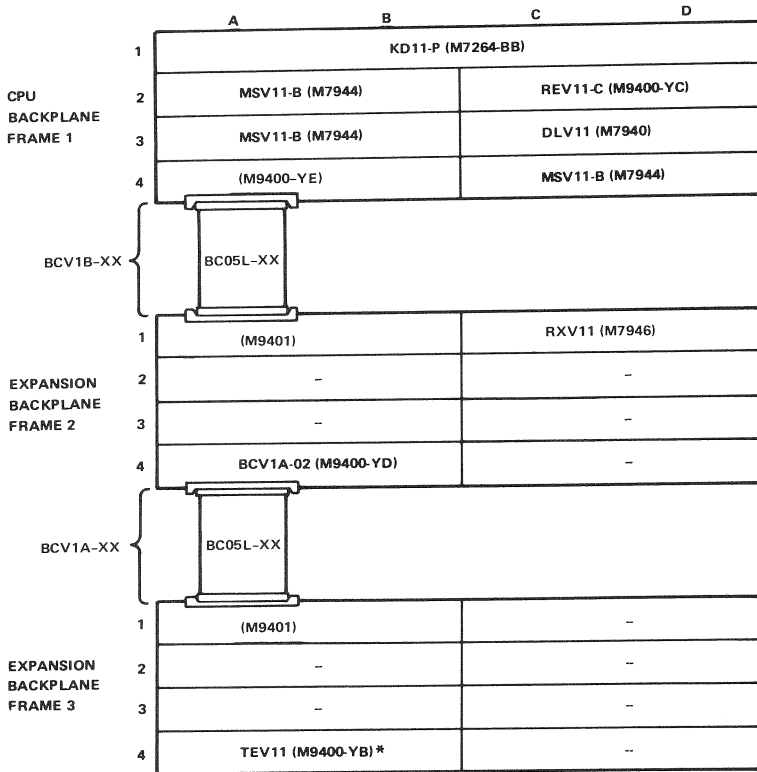
Device address 160010
Vector 440

DLV11 (M7940)

Device address:
console 177560
second terminal 176500

Vector:
console 60
second terminal 300

D322

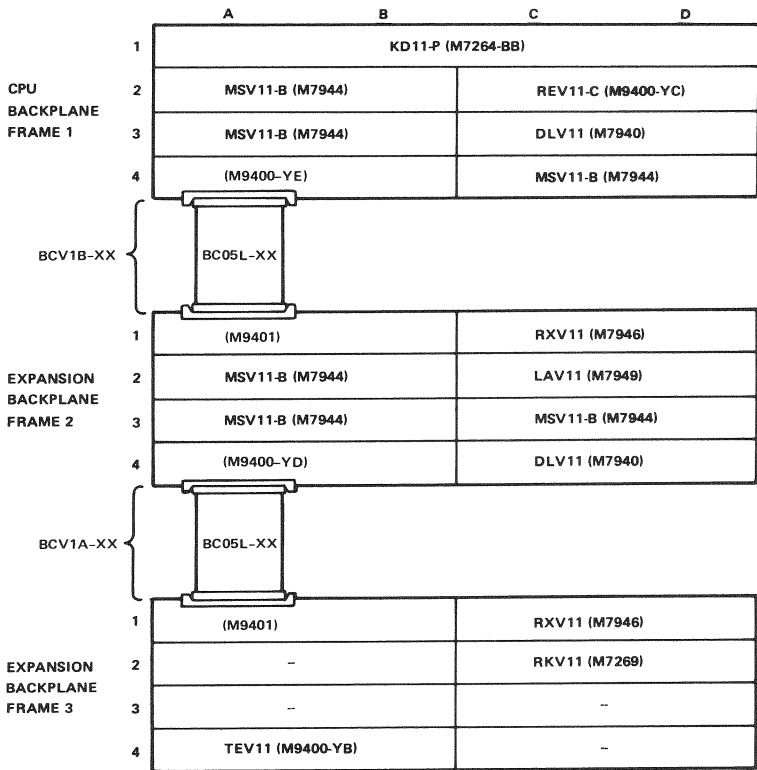


MR-0783

*IN MOST CASES M9400 MODULES ARE PLACED IMMEDIATELY FOLLOWING THE LAST MODULE IN THE SYSTEM. THE TEV11, HOWEVER, IS AN EXCEPTION TO THE GENERAL RULE. IN THE BUSINESS PRODUCTS SYSTEMS IT IS PLACED IN THE LAST SLOT OF THE LAST BACKPLANE IN ORDER TO MINIMIZE NOISE.

D322 Module Utilization Drawing for Basic System

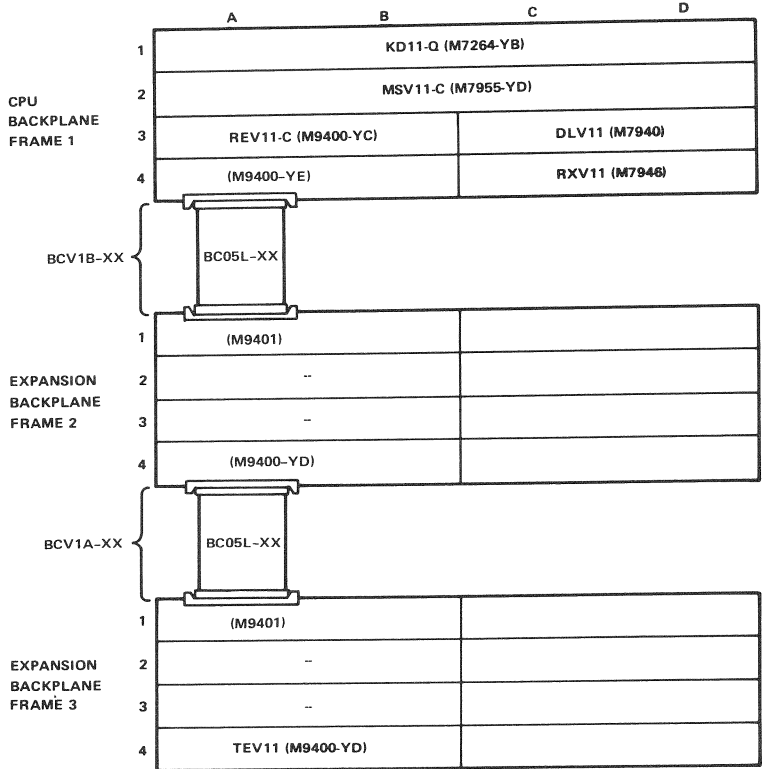
Using PDP-11/03-JA or - JB CPU Box



MR-0784

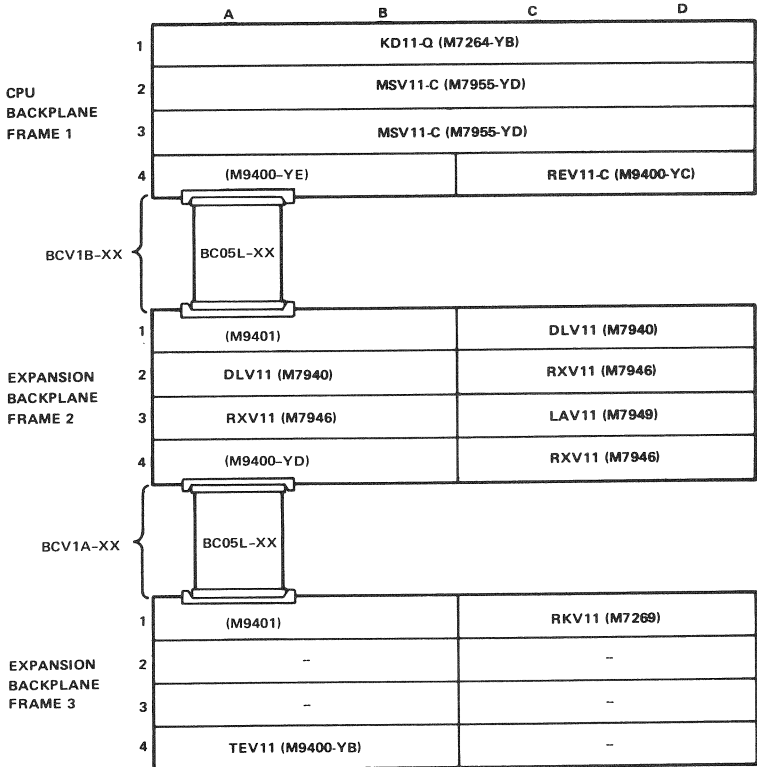
D322 Module Utilization Drawing for Recommended Expanded Systems Using PDP-11/03-JA or -JB CPU Box

D322



MR-0785

D322 Module Utilization for Basic System
Using PDP-11/03-JC or -JD CPU Box



MR-0786

D322 Module Utilization for Recommended Expanded Systems Using PDP- 11/03-JC or -JD CPU Box

D324

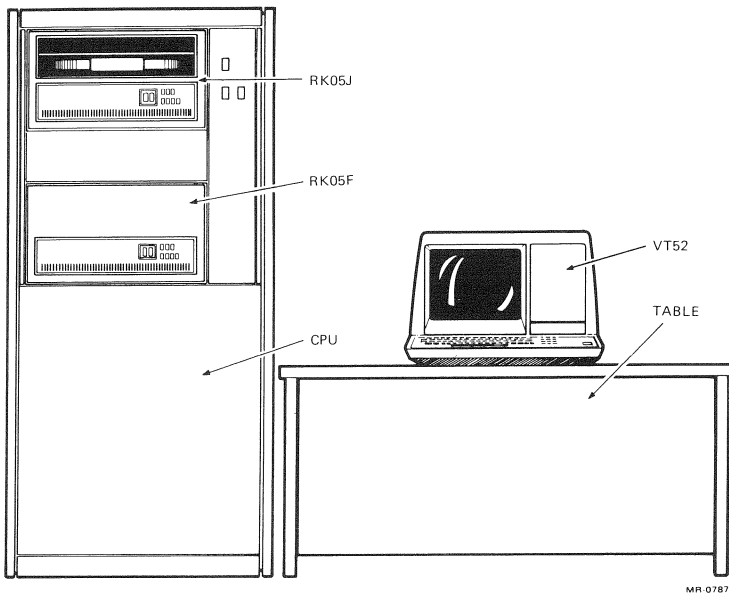
D324

The standard Datasystem 324 includes the following.

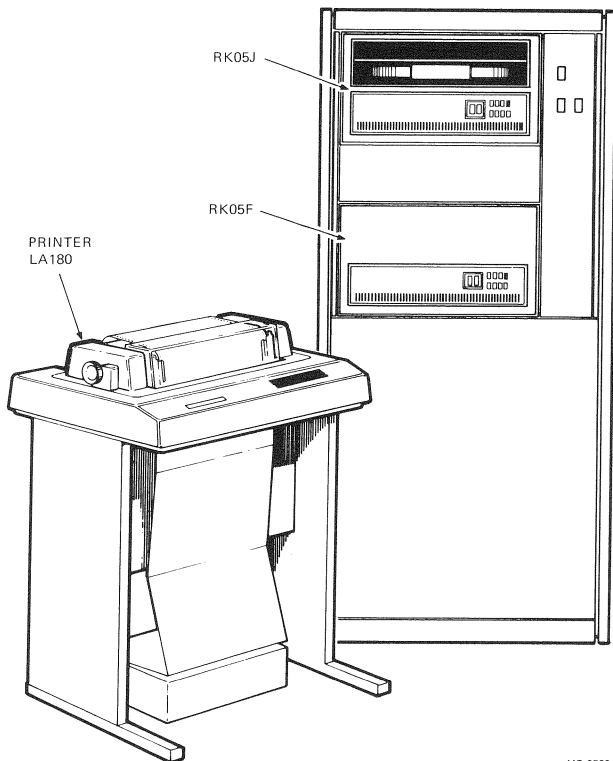
- Stylized cabinet and desk
- Central processor with 32K bytes of MOS memory
- One RK05J removable disk drive with a capacity of 2.4 million bytes of data
- One RK05F fixed disk drive with a capacity of 4.8 million bytes of data
- VT52 video/keyboard transaction terminal

Options include additional memory up to a total of 56K bytes.

Further information may be found in the *DEC Datasystem 320 Family Service Manual*, EK-DDS03-SV.



Basic 324 System



MR 0789









Optional Cabinet and Printer

D324 System Model Designations

| | Model Designation | | | |
|---|---|---|-------------------------------|--|
| D324A- Input Power/Frequency | AA 115/60 | AD 230/50 | AY 115/60 | AZ 230/50 |
| Software Category | A | A | C | C |
| D324- H9602- RKV11- PDP-11/03- H970- VT52- LAV11- RXV11- | A CC DA JA DA AE PA DA | B CD DB JB DA AF PD DD | ↑ same as column | ↑ same as column ↓ |

- *Model AA + LAV11 = Model BA
- Model AD + LAV11 = Model BD
- Model AY + LAV11 = Model BY
- Model AZ + LAV11 = Model BZ

D324 SPECIFICATIONS*

| | PRINTER LA180 | | RK05 CABINET | | CPU CABINET | | VT52 DESK | |
|----------------------------------|---|---|---|---|---|---|---|---|
| | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ |
| POWER CONNECTOR |  |  |  |  |  |  |  |  |
| NEMA NO. DEC P/N | 5-15 P 90-08938 | 6-15 P 90-08853 | 15-30 P 12-11193 | 15-30 P 12-11193 | 15-30 P 12-11193 | 66-20 P 12-11192 | 5-15 P 90-08938 | 6-15 P 90-08853 |
| AMPERAGE | .3 A | 1.5 A | 24 A | 6 A | 24 A | 6 A | 1 A | .5 A |
| BTU/HOUR | 1023 | 1023 | 1400 | 1400 | 3400 | 3400 | 400 | 400 |
| HEAT DISSIPATION | 300 W | 300 W | 400 W | 400 W | 1000 W | 1000 W | 118 W | 118 W |
| SHIPPING WEIGHT (APPROXIMATE) | 120 LBS 55 KG | 120 LBS 55 KG | 300 LBS 136 KG | 300 LBS 136 KG | 400 LBS 182 KG | 400 LBS 182 KG | 225 LBS 102 KG | 225 LBS 102 KG |

* SPECIFICATIONS HAVE BEEN FIGURED ON THE MAXIMUM CONTAINED IN EACH UNIT.

MR-0790

Specifications

Modules Included in the Basic System

Processor

KD11-P (M7264-BB)

Resident memory addressed as bank 0
CPU refresh disabled
Powers up to 173000

Or

KD11-Q (M7264-YB)

No resident memory
CPU refresh disabled
Powers up to 173000

Memory

MSV11-B (M7944)

4K RAM
Three in basic system with KD11-P
Addresses start at bank 1
Refreshed by REV11-C

Or

MSV11-C (M7955-YD)

16K RAM
One in basic system with KD11-Q
Addresses start at bank 0
Internal refresh

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
9600 baud
EIA
One stop bit, eight data bits, no parity

D324

Disk Drive Interface

RKV11-D

Interfaced to computer by M7269
Device address 177400
Vector 220

Bootstrap/Diagnostic

REV11-C (M9400-YC)

Bootstrap enabled
Diagnostic enabled
Refresh enabled for MSV11-B
Refresh disabled for MSV11-C

Terminator

TEV11 (M9400-YB)

120 Ω terminator

Optional Modules for Recommended Expansion

LA180 Printer Interface

LAV11 (M7949)

Device address 177510
Vector 200

Or

LPV11 (M8027)

Device address 177510
Vector 200

RX01 Floppy Disk Interface

RXV11 (M7946)

First device address (disk 0) 177170
First vector 264
Second device address (disk 1) 177150
Second vector 270

Communications Interface

DUV11 (M7951)

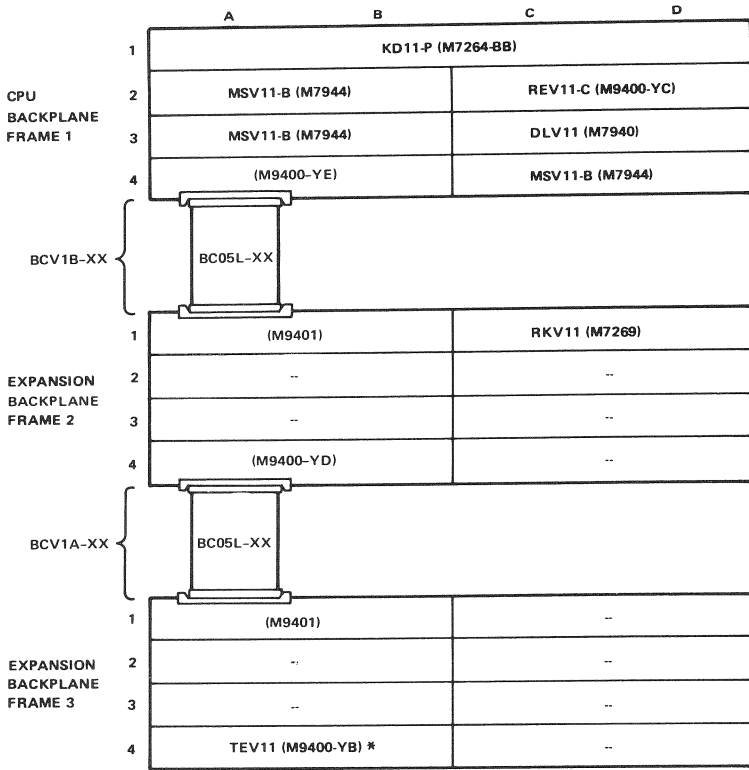
Device address 160010
Vector 440

DLV11 (M7940)

Device address:
console 177560
second terminal 176500

Vector:
console 60
second terminal 300

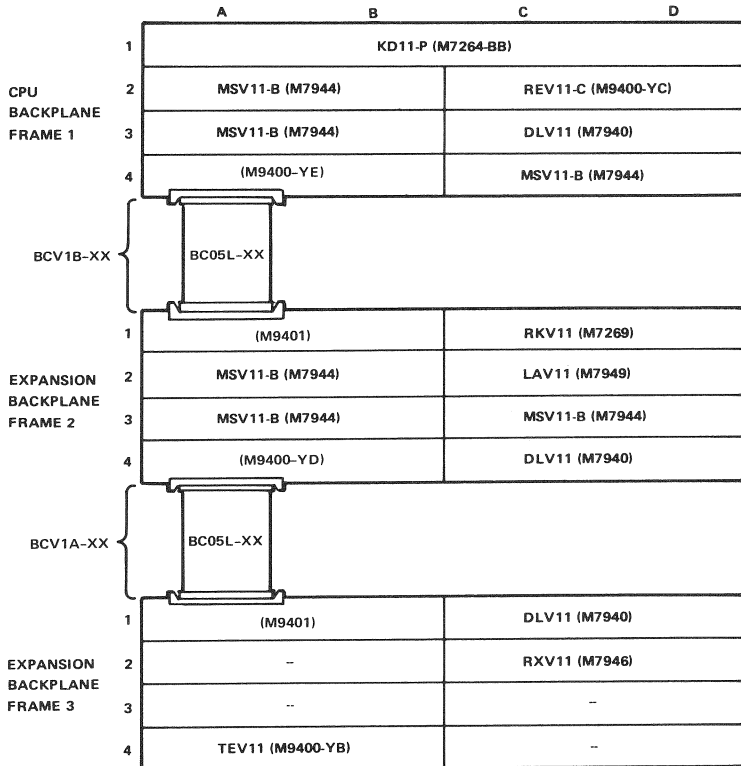
D324



MR-0791

*IN MOST CASES M9400 MODULES ARE PLACED IMMEDIATELY FOLLOWING THE LAST MODULE IN THE SYSTEM. THE TEV11, HOWEVER, IS AN EXCEPTION TO THE GENERAL RULE. IN THE BUSINESS PRODUCTS SYSTEMS IT IS PLACED IN THE LAST SLOT OF THE LAST BACKPLANE IN ORDER TO MINIMIZE NOISE.

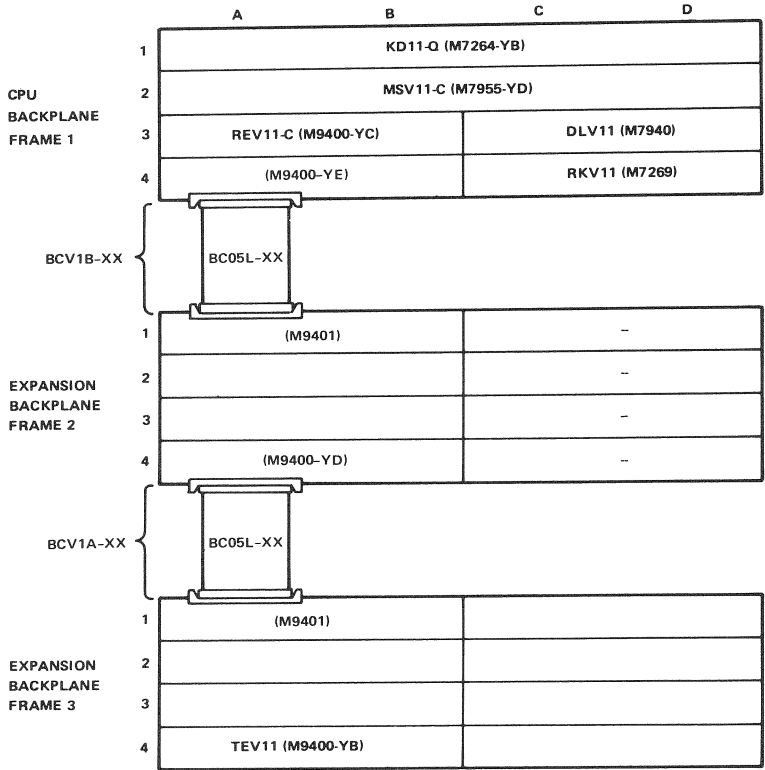
D324 Module Utilization Drawing for Basic System
Using PDP-11/03-JA or -JB CPU Box



MR-0793

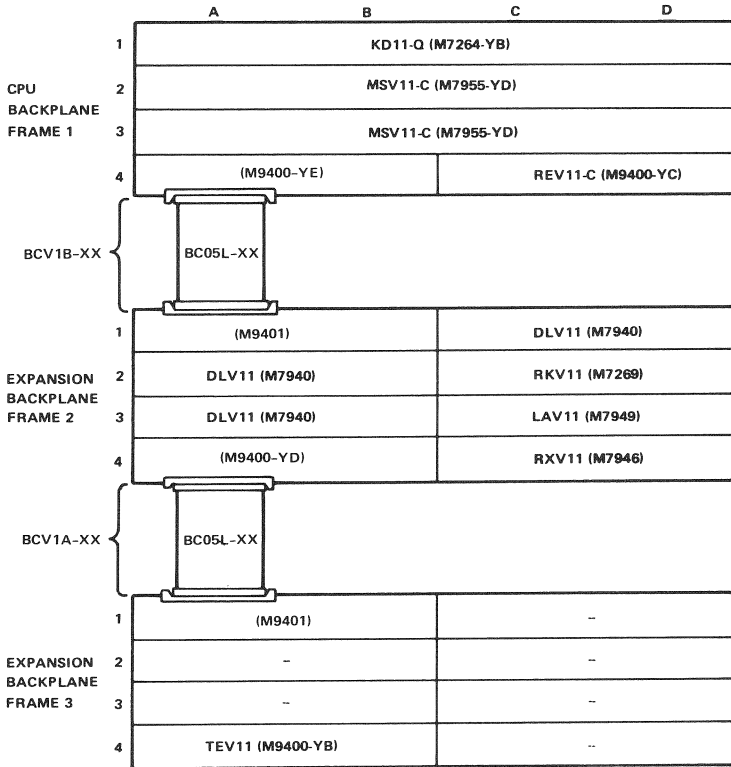
D324 Module Utilization Drawing for Recommended Expanded Systems Using PDP-11/03-JA or -JB CPU Box

D324



MR-0792

D324 Module Utilization for Basic System
Using PDP-11/03-JC or -JD CPU|Box



MR 0794

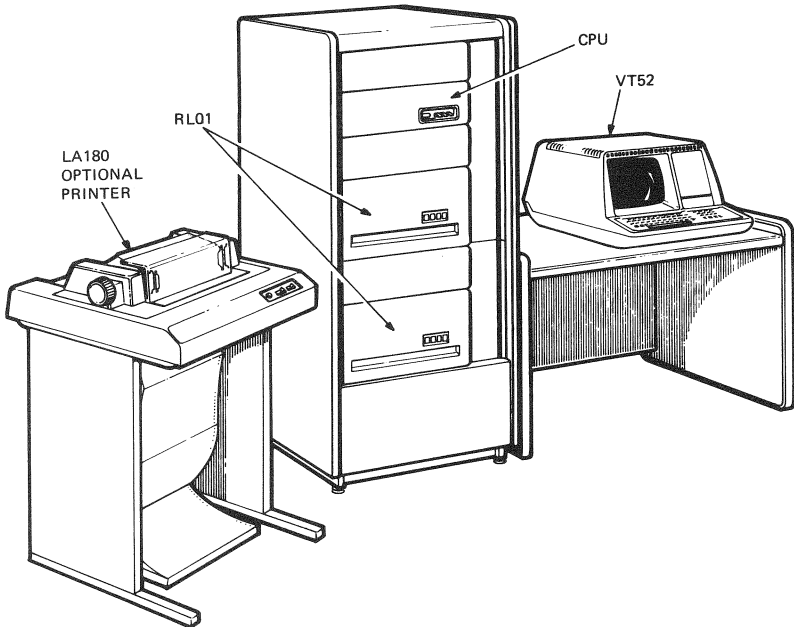
D324 Module Utilization for Recommended Expanded Systems Using PDP-11/03-JC or -JD CPU Box

D325

D325

The D325 system, with DIGITAL's fully supported CTS-300 software license and DIBOL instruction set, includes the PDP-11/03 central processor, 64K bytes of MOS memory, bootstrap loader, serial line interface, and VT52 CRT console terminal. There is an RLV11 controller with dual five-megabyte removable disk drives (RL01) for use as a system device and as a primary backup and load device. This configuration is arranged in an H9602 cabinet and an H9532-AA desk.

Space is reserved in this configuration for a printer. Any of the following may also be added: additional RLO1 disk drives plus cabinet, dual floppy disk unit, choice of four printers, up to three video or hard-copy terminals and/or a 2780 communication package and CTS-300 DICAM (a software package).











MR-4882

D325 System

| | Model Designation | |
|-----------------------|-------------------|--------|
| D325A | AA | AD |
| Input Power/Frequency | 115/60 | 230/50 |
| H9602 | CM | CN |
| PDP-11/03 | NC | ND |
| RL01 | AK | AK |
| H9532 | AA | AA |
| VT52 | NE | NF |
| LA180* | PA | PD |

*Model AA + LA180 = Model BA,
 Model AD + LA180 = Model BD.

D325 SPECIFICATIONS

| | PRINTER LA180 | | RL01 CABINET | | CPU CABINET | | VT52 DESK | |
|-------------------------------|--|--|--|--|--|--|--|--|
| | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ | 115V 60HZ | 230V 50HZ |
| POWER CONNECTOR | 15A  | 15A  | 30A W  | 30A W  | 30A W  | 20A X  | 15A  | 15A  |
| NEMA NO. | 5-15 P | 6-15 P | 15-30 P | 15-30 P | 15-30 P | 66-20 P | 5-15 P | 6-15 P |
| DEC P/N | 90-08938 | 90-08853 | 12-11193 | 12-11193 | 12-11193 | 12-11192 | 90-08938 | 90-08853 |
| AMPERAGE | 3 A | 1.5A | 2.6A | 1.3A | 8A | 4A | 1A | .5A |
| BTU/HOUR | 1023 | 1023 | 1100 | 1100 | 3400 | 3400 | 400 | 400 |
| HEAT DISSIPATION | 300W | 300W | 300W | 300W | 960W | 960W | 118W | 118W |
| SHIPPING WEIGHT (APPROXIMATE) | 120 LBS 55 KG | 120 LBS 55 KG | 275 LBS 125 KG | 275 LBS 125 KG | 350 LBS 159 KG | 350 LBS 159 KG | 225 LBS 102 KG | 225 LBS 102 KG |

MR 4883

Specifications

D325

Modules Included in the Basic System

Processor

KD11-Q (M7264-YB)

No resident memory
CPU refresh disabled
Powers up to 173000

Memory

MSV11-DD (M8044)

64K byte MOS RAM
One in basic system
Addresses start at bank 0
Internal refresh

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
9600 baud
EIA
One stop bit, eight data bits, no parity

Disk Drive Interface

RLV11 (M8013 and M8014)

Device address 174400
Vector 160

Bootstrap

BDV11-AA (M8012)

Bootstrap enabled
Real time clock enabled (switch B5)

LA180 Printer Interface

LPV11 (M8027)

Device address 177514
Vector 200

| Q-BUS | | C/D BUS FOR INTERCONNECTING | |
|-------|---------------------|-----------------------------|---|
| A | B | C | D |
| 1 | KD11-Q (M7264-YB) | | |
| 2 | MSV11-DD(M8044-DA) | | |
| 3 | RLV11 (M8013) | | |
| 4 | RLV11 (M8014) | | |
| 5 | DLV11 (M7940) | EMPTY | |
| 6 | LPV11 (M8027) | EMPTY | |
| 7 | OPTION | | |
| 8 | OPTION | | |
| 9 | BDV11-AA (M8012-YA) | | |

MR 4884

D325 Module Configuration Using PDP-11/03-NC or PDP-11/03-ND Box

D333C

The D333C data system with DIGITAL's fully supported CTS-300 software license and DIBOL instruction set includes the PDP-11/23 microcomputer with 128K bytes of MOS memory, a four-channel serial line interface with bootstrap/terminator and a VT100 CRT console terminal. There is an RXV21 controller for a dual RX02 floppy disk storage medium. This configuration is arranged in an H9642 system cabinet and an H9532 work table. This system can be expanded for greater storage capacity.

| | Model Designation | |
|-----------------------|--------------------------|--------|
| D333C | AA | AD |
| Input Power/Frequency | 115/60 | 230/50 |
| H9652 | - | - |
| PDP-11/23 | AA | AB |
| VT100 | NA | NB |
| LA180 | PA | PD |
| RX02 | BA | BC |

D333C

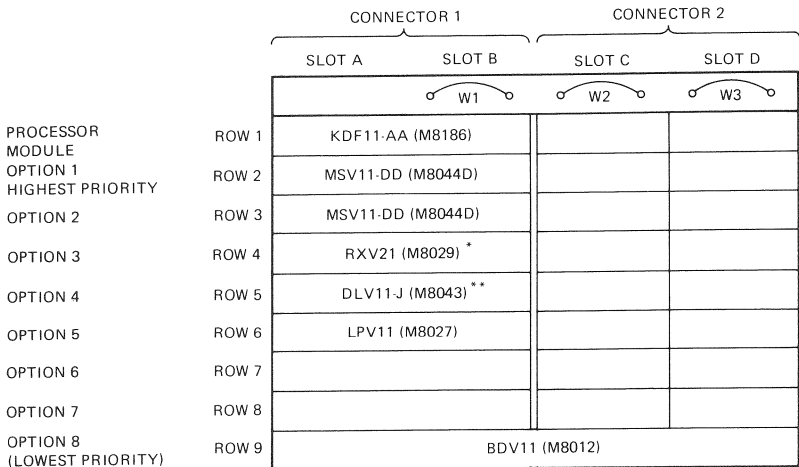
Compatible Options

- An additional 128K bytes memory
- Additional video or hard-copy terminals for a total of four
- Additional storage medium
Second dual floppy disk (1 megabyte storage)
- Choice of printers
- BATCH or interactive communication software languages:

DICAM - Data System Interactive Communications Access Method
(for IBM 360/370 hosts)

DIBOL - DIGITAL Business-Oriented Language

RDCP - 2780/3780 BATCH Communication Package.



VIEW IS FROM MODULE SIDE OF BACKPLANE

*NOTE: MUST BE AT CS REVISION 'E1' OR HIGHER.

**NOTE: MUST BE AT CS REVISION 'E' OR HIGHER.

MR 4885

D333 Module Configuration

D335C

The D335C data system, with DIGITAL's fully supported CTS-300 software license and DIBOL instruction set, includes the PDP-11/23 microcomputer with 128K bytes of MOS memory, a four-channel serial line interface with bootstrap/terminator, and a VT100 CRT console terminal. There is an RLV11 controller with 10-megabyte removable RL01 dual disk drives for use as a system device and a primary backup and load device. This configuration is arranged in an H9642 system cabinet and an H9532 work table.

Space is available in this configuration for a printer.

| | Model Designations | |
|-----------------------|---------------------------|--------|
| D335C | AA | AD |
| Input Power/Frequency | 115/60 | 230/40 |
| H9642 | - | - |
| PDP-11/23 | AA | AB |
| RL01 | AK | AK |
| H9532 | AB | AB |
| VT100 | NA | NB |
| LA180* | PA | PD |

*Optional

Modules Included in the Basic System**Processor**

KDF11-AA (M8186)

Memory management standard
KEF11-A floating point (optional)

Memory

MSV11-DD (M8044)

64K bytes MOS RAM (two in basic system)
Addresses start at bank 0
Internal refresh

D335C

Serial Line Interface

DLV11-J (M8043) (Must be at CS revision "E" or higher.)

Console device address 177560

Vector address 60

9600 baud

EIA RS423 and RS-232C

One stop bit, eight data bits, no parity

Disk Drive Interface

RLV11 (M8013 and M8014)/RL01

Device address 174400

Vector address 160

Bootstrap

BDV11-AA (M8012)

Bootstrap enabled

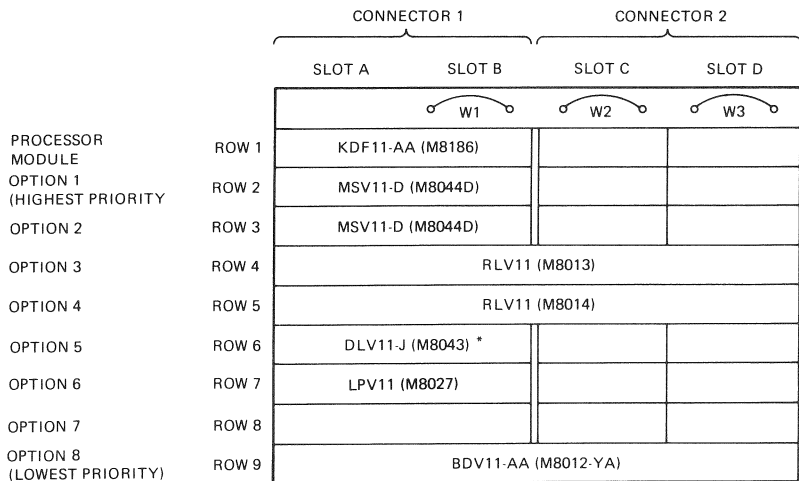
Real time clock enabled (switch B5)

LA180 Printer Interface

LPV11 (M8027)

Device address 177514

Vector address 200



VIEW IS FROM MODULE SIDE OF BACKPLANE

*NOTE: MUST BE AT CS REVISION 'E' OR HIGHER.

MR-4886

D335 Module Configuration

D336C

The D336C data system, with DIGITAL's fully supported CTS-300 software license and DIBOL instruction set, includes the PDP-11/23 microcomputer with 128K bytes of MOS memory, a four-channel serial line interface with bootstrap/terminator, and a VT100 CRT console terminal. There is an RLV11 controller with 20-megabyte removable dual RL02 disk drives for use as a system device and a primary backup and load device. This configuration is arranged in an H9642 system cabinet and an H9532 worktable.

Space is available in this configuration for added expansion such as a printer, a serial line interface, synchronous communication, memory, floppy control, etc.

D336C

| | Model Designation | |
|-----------------------|-------------------|--------|
| D336C | AA | AD |
| Input Power/Frequency | 115/60 | 230/50 |
| H9642 | - | - |
| PDP-11/23 | AA | AB |
| RL02 | AK | AK |
| H9532 | AB | AB |
| VT100 | NA | NB |
| LA180* | PA | PD |

*Optional

Modules Included in the Basic System

Processor

KDF11-AA (M8186)

Memory management standard
KEF11-A floating point (optional)

Memory

MSV11-DD (M8044)

64K bytes MOS RAM (two in basic system)
Addresses start at bank 0
Internal refresh

Serial Line Interface

DLV11-J (M8043) (Must be at CS revision "E" or higher.)

Console device address 177560

Vector address 60
9600 baud
EIA RS423 and RS-232C
One stop bit, eight data bits, no parity

Disk Drive Interface

RLV11 (M8013 and M8014)/RL02

Device address 174400
 Vector address 160

Bootstrap

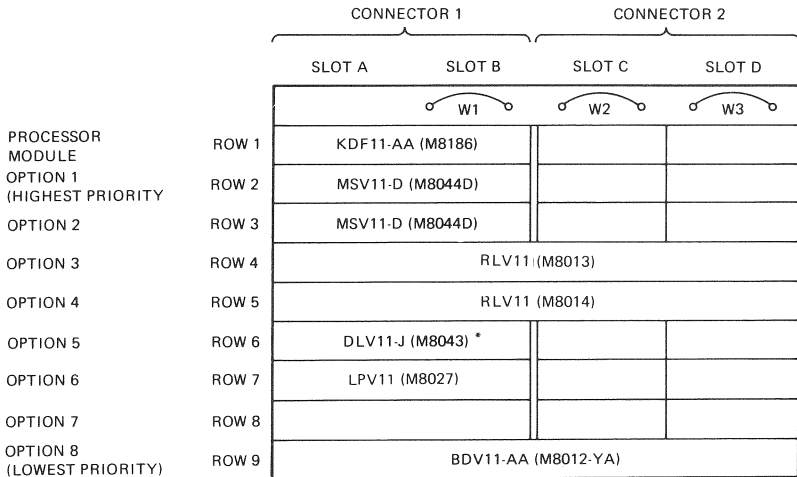
BDV11-AA (M8012)

Bootstrap enabled
 Real time clock enabled (switch B5)

LA180 Printer Interface

LPV11 (M8027)

Device address 177514
 Vector address 200



VIEW IS FROM MODULE SIDE OF BACKPLANE

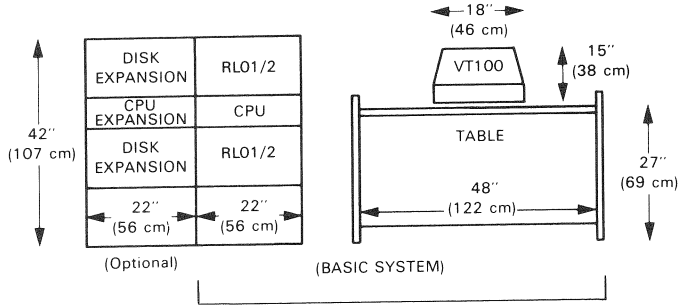
*NOTE: MUST BE AT CS REVISION 'E' OR HIGHER.

MR-4887

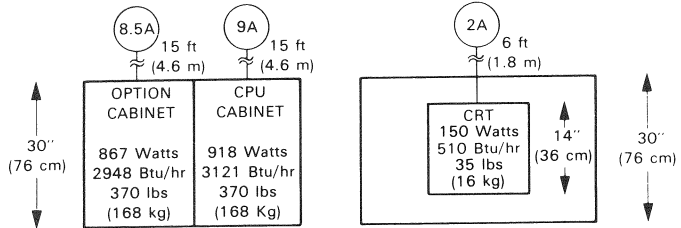
D336 Module Configuration

D336C

FRONT VIEW



TOP VIEW

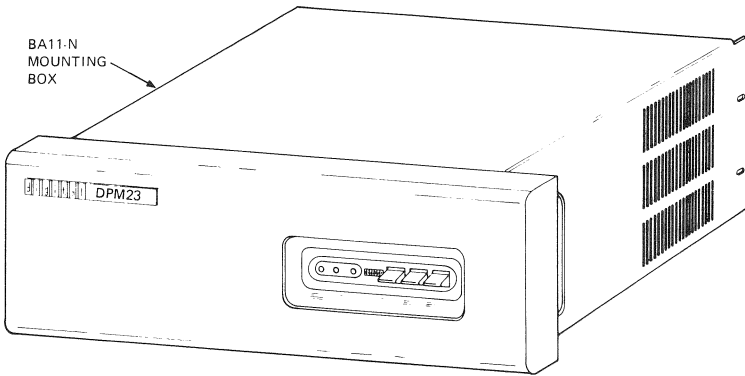


MR-4888

D325, D335, and D336 Data Systems

DPM23 DISTRIBUTED PLANT MANAGEMENT SYSTEM

The DPM23 is a subsystem kernel connected to a distributed plant management system via the DECdataway communications channel. A kernel DPM23 consists of an LSI-11/23 processor, 64K bytes of main memory, and an ISV 11-B DECdataway interface in an H9273 backplane. This assembly is enclosed in a BA11-N rack mountable box and equipped with a power supply, front panel controls, and indicators. It is available separately or in a DIGITAL H9646-AC/AD cabinet. Both cabinet and noncabinet models are available with either 120 V or 240 V service options. These choices are indicated by the DPM23 model number suffix listed in the following table.



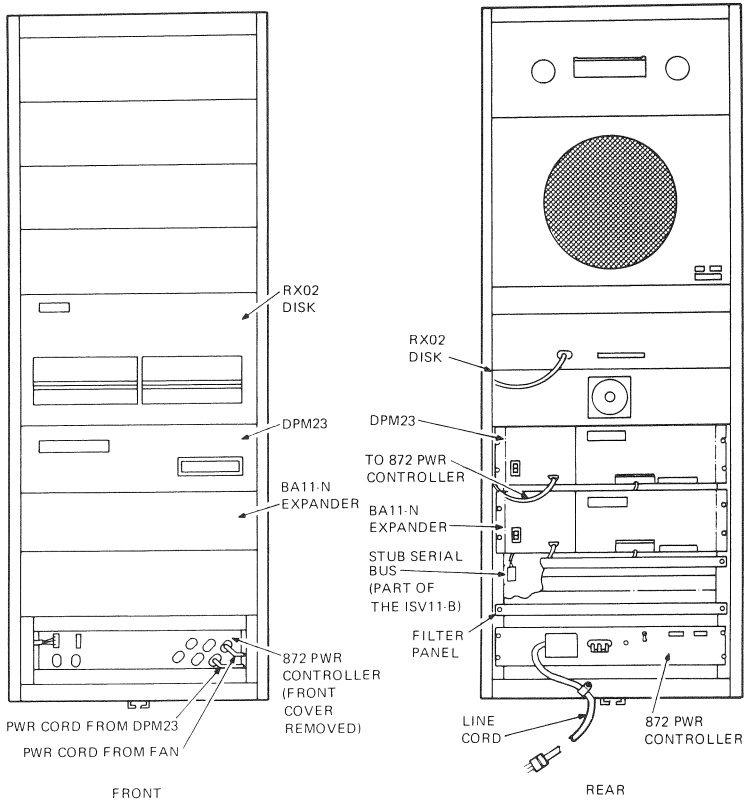
MR 8626
MA 7083

A DPM23 Subsystem Kernel

DPM23

DPM23 System Model Designations

| DPM23 Model | H9646 Cab | Power Controller | Voltage | Current | Frequency |
|-------------|-----------|------------------|---------|---------|-----------|
| A, K | | | 120 V | 6 A | 47-63 Hz |
| D, N | | | 240 V | 3 A | 47-63 Hz |
| CA, CK | AC | 872-D | 120 V | 16 A | 47-63 Hz |
| CD, CN | AD | 872-E | 240 V | 8 A | 47-63 Hz |



MR 8627
MA 7086

Cabinet Mounted DPM23

Hardware Options

In addition to the kernel system, the DPM23 supports the following hardware options.

DPM23 Hardware Options

| Class | Option | Description |
|--------------|--|---|
| General | KEF11-AA BDV11-AA TEV11 | Floating-point option. Diagnostic, bootstrap, terminator. Bootstrap, terminator. |
| Main memory | MSV11-DD | Each MSV11-DD has 64K bytes of memory. Up to three units can be added for a total of 256K bytes including the kernel system. |
| Mass memory | RXV21-DA/DD | RX02 floppy disk (non-DMA). |
| Terminals | DLV11 DLV11-E DLV11-F DLV11-J | Serial line unit. Asynchronous line interface (EIA only, full modem control). Asynchronous line interface (EIA or 20 mA, no modem control). Four asynchronous serial interfaces. |

NOTE

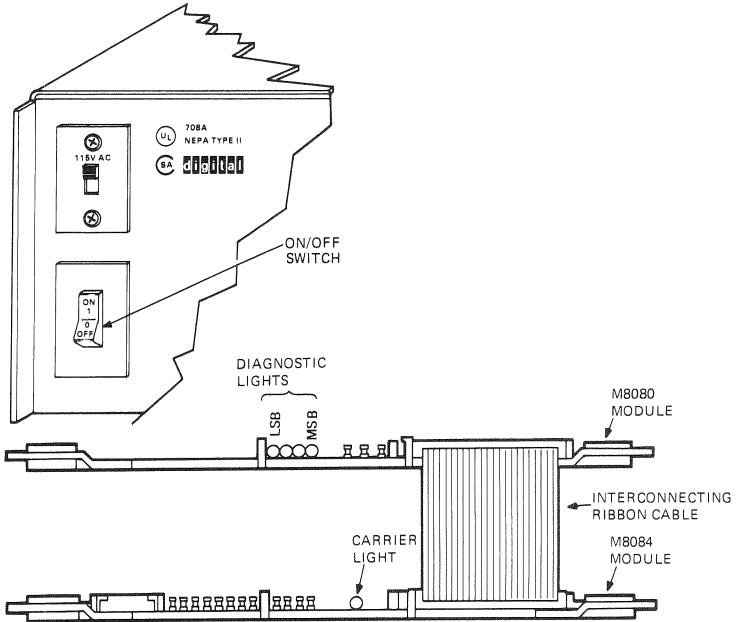
You can use only one DLV11-J in the DPM23 due to a vector address conflict with the ISV11-B.

| | | |
|-----------------|-------------|--|
| | DLV11-KA | 20 mA current loop converter used with the DLV11-J (one per serial line). |
| | DZV11-B | Four-terminal asynchronous multiplexer. |
| Hardcopy | LPV11-PA/PD | Line printer. |
| Process control | IPV12 | Supports up to 80 I/O modules. |
| Expansion | BA11-NE/NF | You can extend the LSI-11 bus in the DPM23 by adding up to two BA11-N expander boxes. However, in expanded systems care must be taken to observe the backplane configuration rules of BA11-N enclosures. |

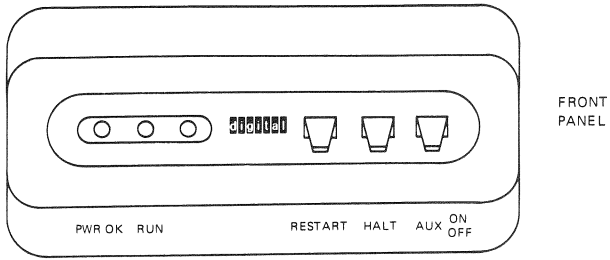
DPM23

DECdataway Interface (ISV11-B) – This unit interfaces the DECdataway to the DPM23's LSI-11 bus. It consists of two modules and two cables. One module, the M8080, interfaces with the LSI-11 bus via its etched edge connector; the other module, the M8084, interfaces with the DECdataway via one of the two cables. The second cable interconnects the two modules. Note that although the two modules always interconnect with a cable, they do not necessarily go in adjacent slots of the H9273 backplane. The M8080 is always assigned as the last option on the LSI-11 bus (except for the BDV11 or TEV11 options). The M8084, though it occupies a slot in the backplane, does not plug into the backplane and is always assigned to the last available slot.

DPM23 Switches and Indicators – The switches and indicators used to control the DPM23 subsystem are described in the following figures and table.



THESE MODULES ARE LOCATED IN THE LOGIC ASSEMBLY IN THE REAR OF THE DPM23 OR EXPANDER BOX



MR 8628
MA 7093

DPM23 Switches and Indicators

DPM23

DPM23 Switches and Indicators

| Switch or Indicator | Location | Function |
|---------------------|-----------------------|---|
| ON/OFF | Rear of DPM23 chassis | Turns the DPM23 on or off. |
| AUX ON/OFF | Front panel | This switch is not used unless the DPM23 is mounted in a cabinet. In a cabinet-mounted DPM23, a cable connects this switch to the cabinet power controller. Since all cabinet equipment is powered from the power controller, this switch serves as the master on/off switch for the entire cabinet. |
| HALT | Front panel | In the down position, this switch halts program execution by the DPM23 processor. In the up position, program execution is enabled but does not start automatically. A down-line loading procedure from the dataway host normally starts the DPM23. |
| RESTART | Front panel | When this momentary contact switch is moved to the up position and released, it causes the DPM23 to do a power-up sequence. If the HALT switch is up, the processor can start executing a program. If the HALT switch is down, the processor enters ODT mode, and responds to ODT commands from a console terminal. |

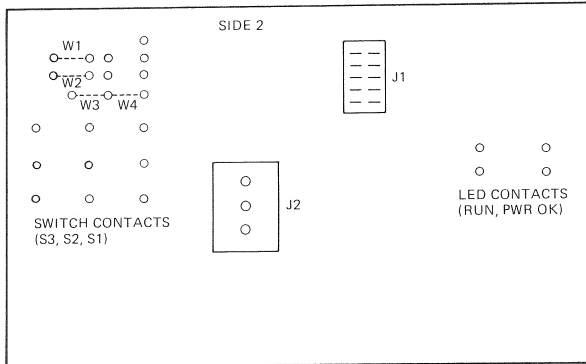
DPM23 Switches and Indicators (Cont)

| Switch or Indicator | Location | Function |
|-----------------------|----------------------|---|
| PWR OK | Front panel | This indicator lights when power supply dc voltages are present. |
| RUN | Front panel | This indicator lights when the processor is executing programs. |
| Diagnostic indicators | ISV11-B M8080 module | When one of the twelve ISV11-B ROM-resident diagnostics is running, these indicators display its number (in octal). An error in any one of the first nine (hardcore) tests causes its number to be displayed continuously. An error in any of the last three (softcore) tests causes the test's number to flash on and off for ten seconds. |
| Carrier indicator | ISV11-B M8084 module | This indicator is on whenever a message is being transmitted to or from any port on the dataway. |
| Unlabeled indicator | Front panel | This is a spare LED. |

DPM23

Configuration

The standard DPM23 system configuration consists of the backplane, Bezel, KDF11-AA, MSV11-DA, and the ISV11-B. The requirements of these modules and assemblies are described in the following figures. Additional LSI-11 optional modules must be configured to meet the requirements they were selected for.



NOTES:

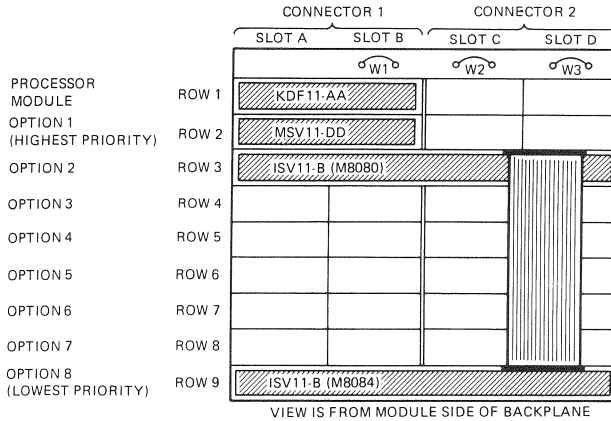
1. VIEW IS FROM THE REAR OF THE BEZEL WHEN THE BOARD IS MOUNTED ON THE BEZEL.
2. JUMPERS ARE MOUNTED ON SIDE 1.

FACTORY JUMPER CONFIGURATION

| JUMPER | JUMPER STATE | FUNCTION |
|--------|--------------|--|
| W1, W2 | OUT | ALLOWS THE AUX ON/OFF SWITCH TO TURN THE SYSTEM POWER ON AND OFF |
| W3 | OUT | CPU IS MOUNTED IN THIS BACKPLANE |
| W4 | IN | ENABLES THE RUN INDICATOR BECAUSE THE CPU IS MOUNTED IN THIS BACKPLANE |

MR 8629
MA 0737B

DPM23 Bezel Printed Circuit Board



H9273-A OPTION POSITIONS
KERNEL DPM23 ONLY

STANDARD FACTORY JUMPER CONFIGURATION

| JUMPER | JUMPER STATE | FUNCTION |
|--------|--------------|---|
| *W1 | IN | THE H786 POWER SUPPLY GENERATED LTC SIGNAL IS USED TO ASSERT BEVNT L SIGNAL |
| W2, W3 | DON'T CARE | |

*W1 MUST BE REMOVED FROM ALL BUT THE LAST BOX IN A MULTIPLE-BOX SYSTEM SINCE ONLY THE BOX CONTAINING THE M8012 MODULE MUST BE THE SOURCE OF THE LTC SIGNAL

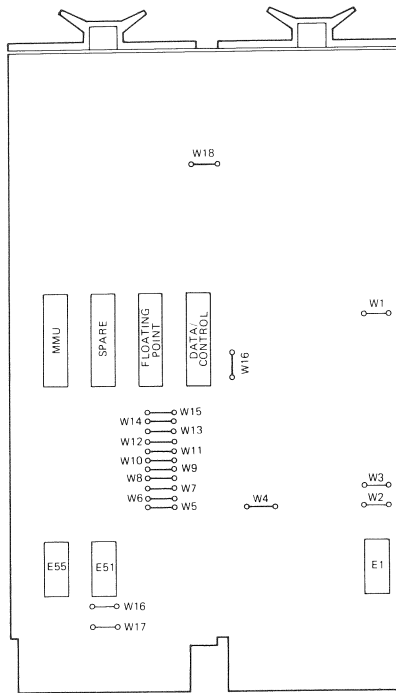
MR 8630
MA 7101

DPM23 Kernel System Backplane

DPM23

FACTORY JUMPER CONFIGURATION (REV C)

| JUMPERS | JUMPER STATE | FUNCTION |
|-----------------|--------------|---|
| W1 | IN | ENABLE INTERNAL MASTER CLOCK DIGITAL USE. |
| W2, W3 | AS RECEIVED | ONLY W2 OR W3 MUST BE INSTALLED. NOT BOTH |
| W4 | REMOVED | EVENT LINE ENABLE |
| W5, W6 | REMOVED | POWER UP MODE 0 |
| W7 | IN | TRAP TO LOCATION 10 OR HALT |
| W8 THROUGH W15 | DON'T CARE | |
| W16 THROUGH W18 | IN | DIGITAL USE ONLY |



MR 8631
MA 7102

DPM23 KDF 11-AA Processor

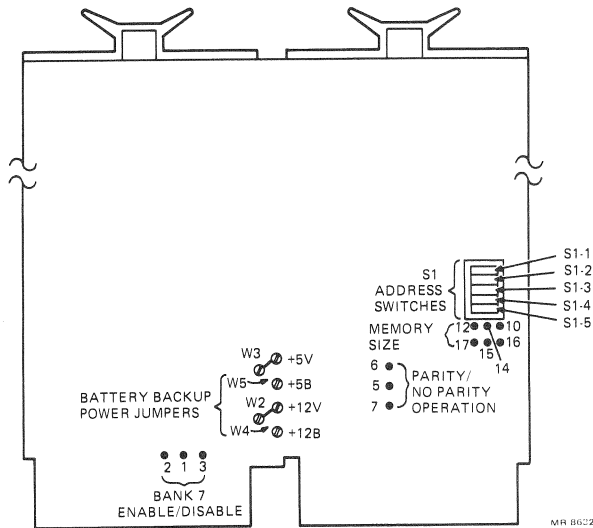
FACTORY JUMPER CONFIGURATIONS

| JUMPER | JUMPER STATE | FUNCTION IMPLEMENTED |
|--------------|--------------|---|
| PIN 1 TO 3 | IN | DISABLES MEMORY BANK 7 |
| PIN 1 TO 2 | REMOVED | ENABLE NORMAL SYSTEM POWER (+12V) ENABLE NORMAL SYSTEM POWER (+5V) DISABLE BATTERY POWER (+12V) DISABLE BATTERY POWER (+5V) SELECT MEMORY SIZE OF 32K WORDS |
| W2 | IN | |
| W3 | IN | |
| W4 | REMOVED | |
| W5 | REMOVED | |
| PIN 10 TO 14 | IN | |
| PIN 16 TO 15 | IN | |

SWITCH SETTINGS

| SWITCH | 1ST MODULE BANK 0-7 | 2ND MODULE BANK 10-17 | 3RD MODULE BANK 20-27 | 4TH MODULE BANK 30-37 |
|--------|---------------------|-----------------------|-----------------------|-----------------------|
| S-1 | 1 | 1 | 0 | 0 |
| S-2 | 1 | 0 | 1 | 0 |
| S-3 | 1 | 1 | 1 | 1 |
| S-4 | 1 | 1 | 1 | 1 |
| S-5 | 1 | 1 | 1 | 1 |

1=SWITCH CLOSED (ON)
0=SWITCH OPEN (OFF)

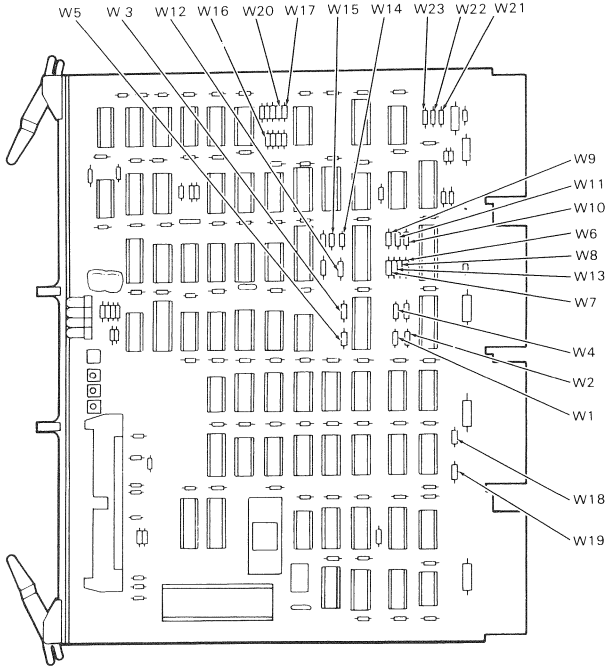


MSV11-D, MSV11- SWITCH AND JUMPER LOCATIONS

MR 8622
MA 7103

DPM23 MSV11-DD Memory Module

DPM23



FACTORY JUMPER CONFIGURATION

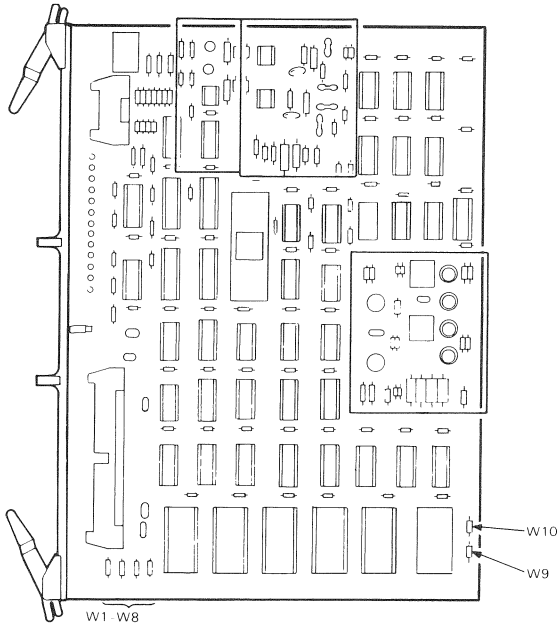
IN: W7, W8, W9, W10, W17, W18, W19, W20
 OUT: ALL OTHERS

JUMPER FUNCTIONS

| JUMPER | USE |
|------------------|--------------------|
| W1-W8, W12, W13 | LSI-11 BUS ADDRESS |
| W9-W11, W14, W15 | VECTOR ADDRESS |
| W16 | HOLD ON B SACK L |
| W17, W20 | DMA TIMERS |
| W18, W19 | CONNECT PINS |
| W21-W23 | RESERVED |

MR 8633
 MA 7104

ISV 11-B M8080 Module



FACTORY JUMPER CONFIGURATION

IN: W1, W3, W5, W7, W9

OUT: ALL OTHERS

JUMPER FUNCTIONS

| JUMPER | USE |
|----------------|----------------|
| W7, W8 | PROM SELECTION |
| W1-W6, W9, W10 | PROM POWER |

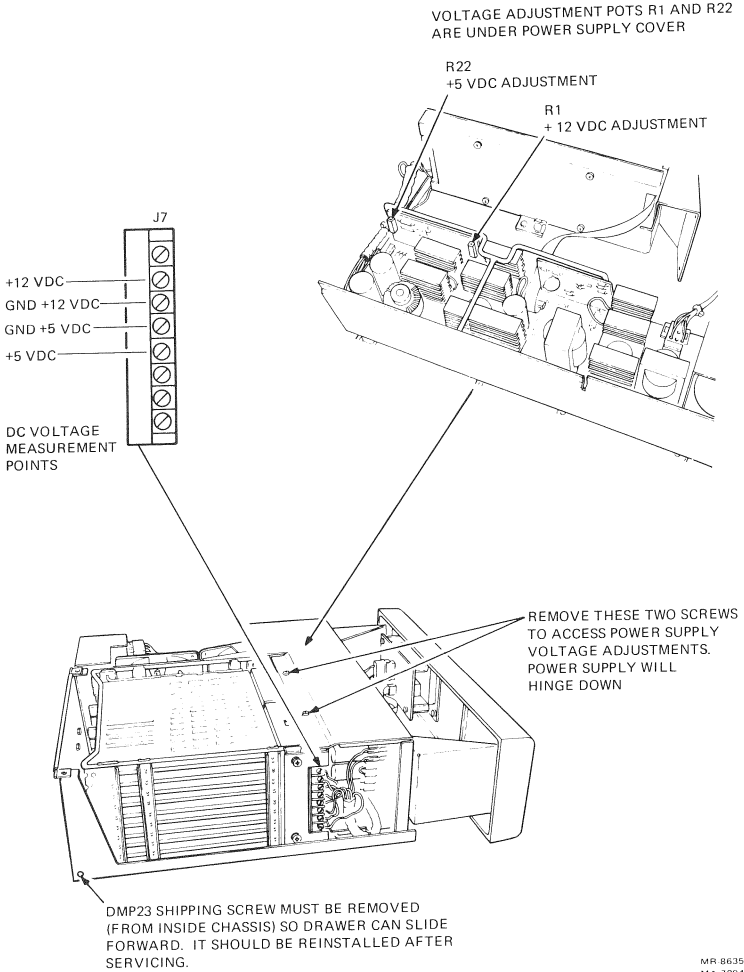
MR-8634
MA-7105

ISV11-B M8084 Module

DPM23

Power Supply Adjustments

The +12 Vdc and +5 Vdc power supply outputs can be adjusted by using R1 and R22. The outputs are monitored at J7 as shown in the following figure. R1 is used to adjust the +12 Vdc output to $+12.0 \pm 0.6$ Vdc, and R22 is used to adjust the +5 Vdc output to $+5.00 \pm 0.25$ Vdc.

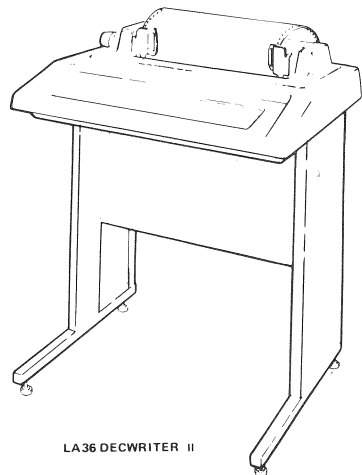
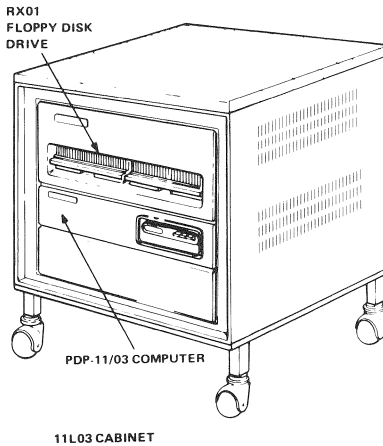


DC Voltage Measurements and Adjustments

LABORATORY SYSTEMS

PDP-11L03

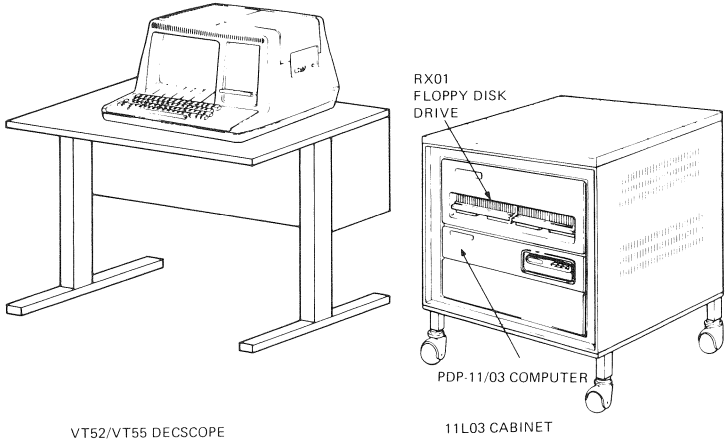
The DECLAB-11/03 (11L03) system includes a PDP-11/03 computer, an RX01 dual floppy disk drive, and a terminal. The terminal is normally an LA36 DECwriter II or a VT55 DECscope, although some custom systems may have a VT52. Each system also includes some combination of DECLAB modules and an H322 distribution panel to facilitate user I/O connections. All models are configured to boot on power-up and halt on BREAK. Early systems have 20K of memory, while later versions use a 16K memory. The figures and tables that follow describe the models, specifications, and components.



MR-0767

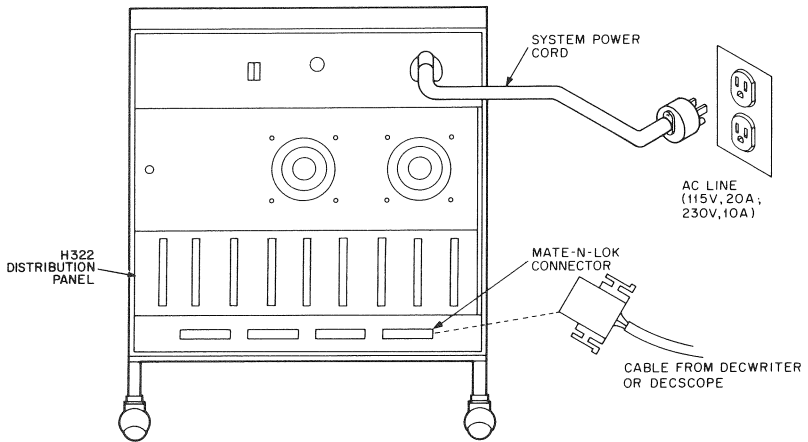
DECLAB-11/03-CA, -CC, -CD, -GD, -HA, -HC, -HD, -MA, -MC, -MD, -KA

PDP-11L03

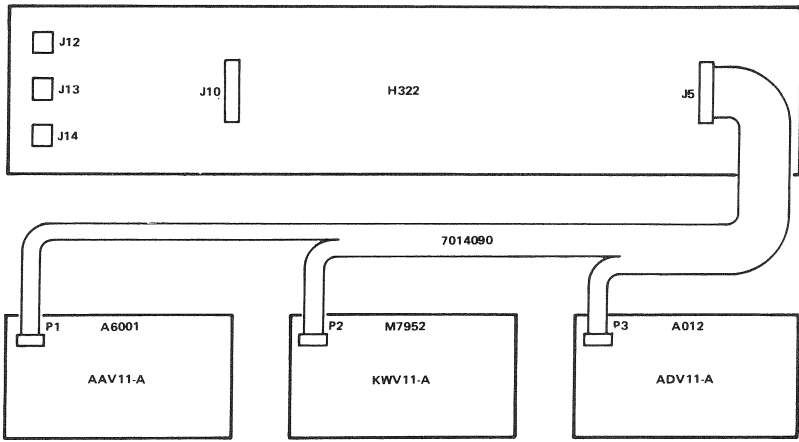


MR-0768

DECLAB-11/03-DA, -DC, -DD, -GC, -JA, -JC, -JD, -NA, -NC, -ND, -LA

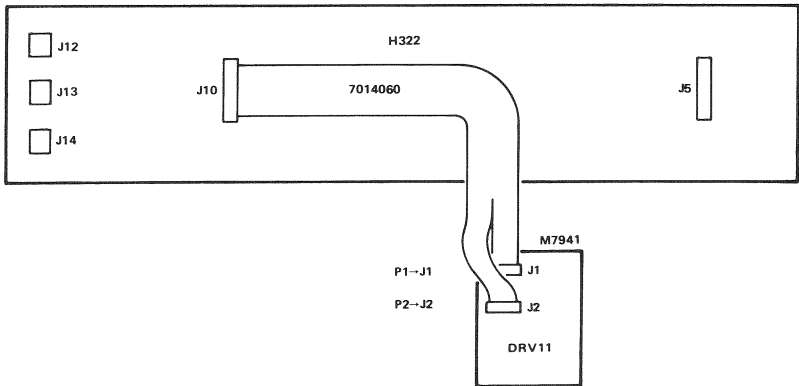


MR-0769



MR-0851

Analog Cable Connections



MR-0852

Digital Cable Connections





DECLAB-11/03 System Model Designations

| System Requirements | CA | CC | CD | GD | DA | DC | DD | GC | HA | HC | HD |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Input Power (V) | 115 | 115 | 220 | 115 | 115 | 115 | 220 | 115 | 115 | 115 | 220 |
| Frequency (Hz) | 60 | 50 | 50 | 60 | 60 | 50 | 50 | 60 | 60 | 50 | 50 |
| PDP-11V03 | HA | HC | HD | HA | JA | JC | JD | JA | HA | HC | HD |
| LA36 | DE | DH | DJ | DE | | | | | DE | DH | DJ |
| VT55 | | | | | FA | FC | FB | FA | | | |
| RXV11 | BA | BC | BD | BA | BA | BC | BD | BA | BA | BC | BD |
| H984 (Cabinet) | BA | BA | BB | BA | BA | BA | BB | BA | BA | BA | BB |
| BA11 Extension Box | ME | ME | MF | ME | ME | ME | MF | ME | ME | ME | MF |
| ADV11 (AD12) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| KWV11 (M7952) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| AAV11 (A6001) | | | | | | | | | 1 | 1 | 1 |
| DRV11 (M7941) | | | | | | | | | 1 | 1 | 1 |
| IBV11 (M7954) | | | | | | | | | 1 | 1 | 1 |

DECLAB-11/03 System Model Designations (Cont)

| System Requirements | CA | CC | CD | GD | DA | DC | DD | GC | HA | HC | HD |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| PDP-11V03 | JA | JC | JD | HA | HC | HD | JA | JC | JD | HA | JA |
| Input Power (V) | 115 | 115 | 220 | 115 | 115 | 220 | 115 | 115 | 220 | 115 | 115 |
| Frequency (Hz) | 60 | 50 | 50 | 60 | 50 | 50 | 60 | 50 | 50 | 60 | 60 |
| LA36 | | | | DE | DH | DJ | | | | DE | |
| VT55 | FA | FC | FB | | | | FA | FC | FB | | FA |
| RXV11 | BA | BC | BD | BA | BC | BD | BA | BC | BD | BA | BA |
| H984 (Cabinet) | BA | BA | BB | BA | BA | BB | BA | BA | BB | BA | BA |
| BA11 Extension Box | ME | ME | MF | | | | | | | ME | ME |
| ADV11 (AD12) | | | | | | | | | | 1 | 1 |
| KWV11 (M7952) | 1 | 1 | 1 | | | | | | | 1 | 1 |
| AAV11 (A6001) | 1 | 1 | 1 | | | | | | | 1 | 1 |
| DRV11 | 1 | 1 | 1 | | | | | | | 1 | 1 |
| IBV11 (M7954) | | | | 1 | 1 | 1 | 1 | 1 | 1 | | 1 |

PDP-11L03

| | 115 V 50/60 HZ | | | 230 V 50 HZ | | |
|--------------------------------|---|-------------|--|---|-------------|--|
| POWER CONNECTOR | PLUG  NEMA # 5-15P DEC # 90-08938 | | RECEPTACLE  5-15R 12-05351 | PLUG  NEMA # 6-15P DEC # 90-08853 | | RECEPTACLE  6-15R 12-11204 |
| | CPU CABINET | LA36 | VT55 | CPU CABINET | LA36 | VT55 |
| AMPERAGE TYPICAL MAXIMUM | 10.1 11.3 | 2.0 | 2.4 | 4.9 5.5 | 1.0 | 1.2 |
| WATTAGE TYPICAL MAXIMUM | 960 1340 | 160 300 | 300 | 1000 1380 | 160 300 | 300 |
| BTU/HOUR TYPICAL MAXIMUM | 2730 3210 | 550 1020 | 500 1000 | 2800 3280 | 550 1020 | 500 1000 |
| WEIGHT KG LBS | 87.3 192 | 46.3 102 | 25.8 57 | 87.3 192 | 46.3 102 | 25.8 57 |

MR-0770

Specifications

Modules Included in the Basic System

Processor

KD11-F (M7264) in systems purchased prior to Oct. 1, 1977.

Resident memory addressed as bank 0
 CPU refresh disabled
 Powers up to 173000

KD11-R (M7264-YA) in systems purchased after Oct. 1, 1977.

No resident memory
 CPU refresh disabled
 Powers up to 173000

Memory

MSV11-B (M7944) in systems purchased prior to Oct. 1, 1977.

4K RAM
 Refreshed by REV11-A
 Addressed as bank 1

MSV11-CD (M7955-YD) in systems purchased after Oct. 1, 1977.

16K RAM
Internal refresh
Addresses start at bank 0
Part of the KD11-R processor option

Serial Line Interface

DLV11 (M7940)

Device address 177560
Vector 60
300 baud in systems using LA36 DECwriter II terminals

9600 baud in systems using VT55 DECscope
20 mA active transmitter and active receiver
One stop bit, eight data bits, no parity
Framing error (BREAK) asserts BHALT

Floppy Disk Interface

RXV11 (M7946)

First device address (disk 0) 177170
First vector 264
Second device address (disk 1) 177150
Second vector 270

Bootstrap/Diagnostic/Terminator

REV11-A (M9400-YA)

Bootstrap enabled
Diagnostics enabled
Refresh enabled in PDP-11V03-A/E
Refresh disabled in PDP-11V03-F/H
120 Ω terminator

Additional Modules Included in Optional Systems *

Analog-to-Digital Converter

ADV11-A (A012)

*For configuration details refer to the "CPU/Options" section.

PDP-11L03

Digital-to-Analog Converter

AAV11-A (A6001)

Programmable Real Time Clock

KWV11-A (M7952)

Parallel Line Unit

DRV11 (M7941)

IEEE Instrument Bus Interface

IBV11-A (M7954)

Module Utilization Notes

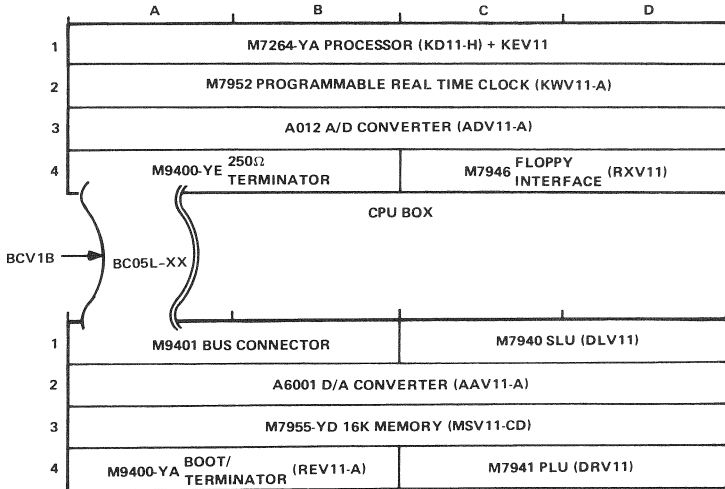
1. Systems purchased before Oct. 1, 1977 have four MSV11-B 4K memory boards instead of one MSV11-CD module. They also have a KD11-F processor instead of a KD11-H.
2. KD11-R = KD11-H + MSV11-CD
KD11-S = KD11-R + KEV11-A
3. All models of PDP-11L03 include the KEV11 EIS/FIS option.

| | A | B | C | D |
|---|-------------------------------------|---|--|---|
| 1 | M7264-YA PROCESSOR (KD11-H + KEV11) | | | |
| 2 | M7955-YD 16K MEMORY (MSV11-CD) | | | |
| 3 | M7940 SLU (DLV11) | | M7946 FLOPPY INTERFACE (RXV11) | |
| 4 | M9400-YA BOOT/TERMINATOR (REV11-A) | | M7954 INSTRUMENT BUS INTERFACE (IBV11-A) | |

MR-0771

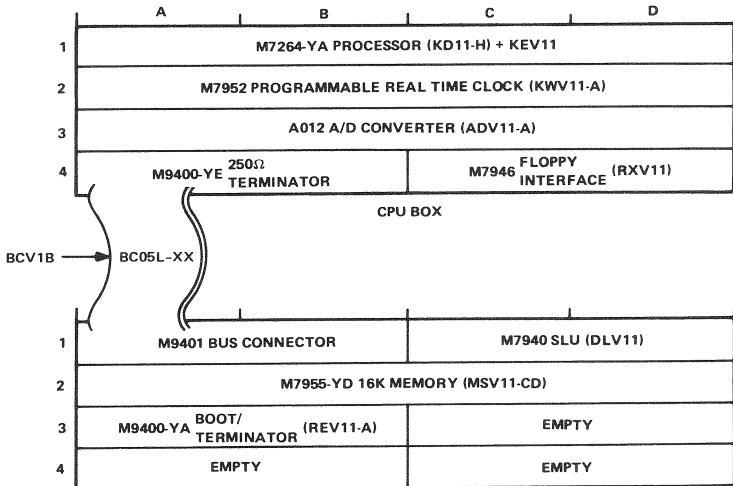
PDP-11L03-MA, -MC, -MD, -NA, -NC, -ND

PDP-11L03



MR-0772

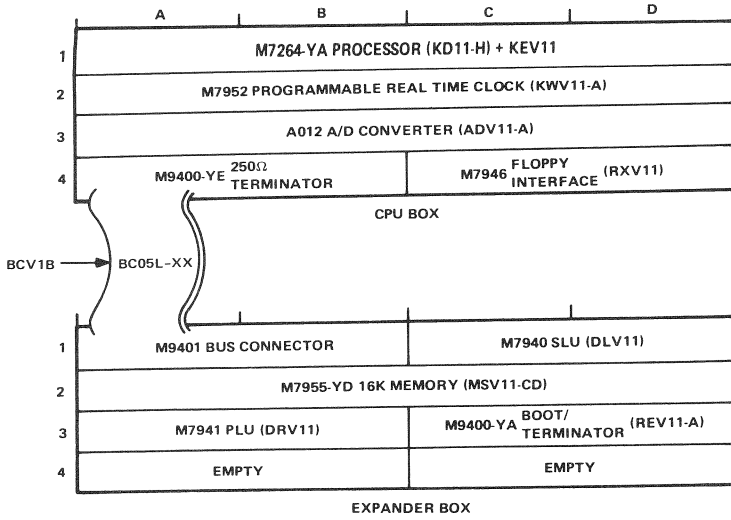
PDP-11L03-KA, -LA



MR-0773

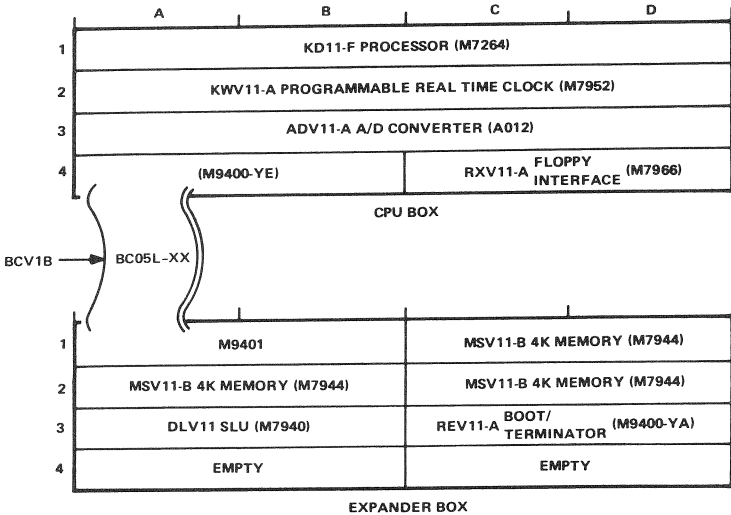
PDP-11L03-HA, -HC, -HD, -JA, -JC, -JD

PDP-11L03



MR-0774

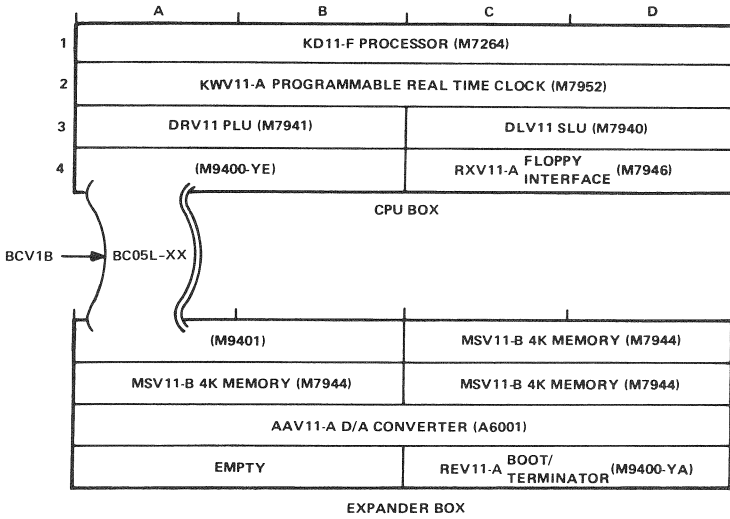
PDP-11L03-CA, -CC, -CD, -GD, -DA, -DC, -DD, -GC



MR-0775

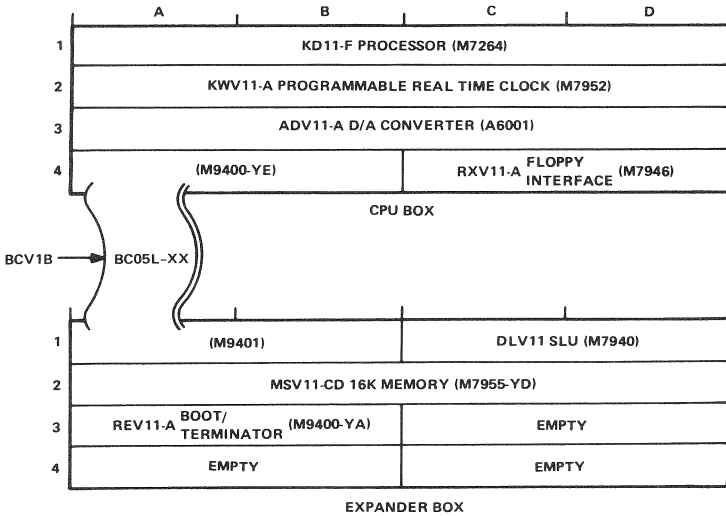
Early 16K PDP-11L03-CA, -CC, -CD, -DA, -DC, -DD Systems

PDP-11L03



MR-0776

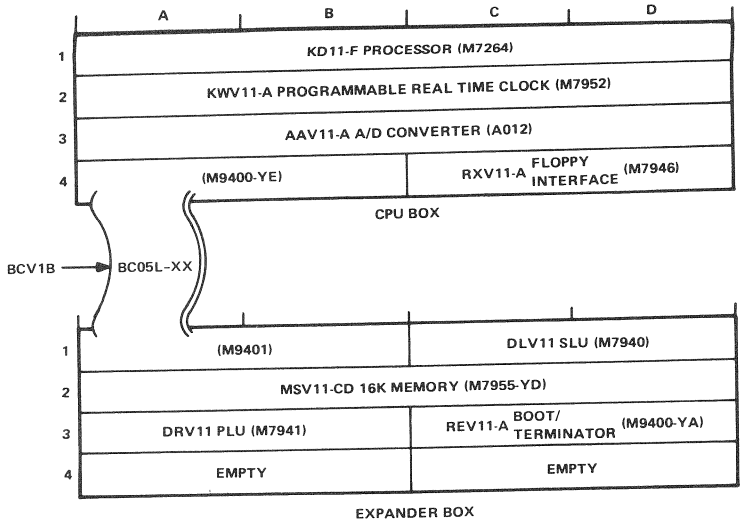
Early 16K PDP-11L03-HA, -HC, -HD, -JA, -JC, -JD Systems



MR-0777

Early 20K PDP-11L03-CA, -CC, -CD, -DA, -DC, -DD Systems

PDP-11L03



MR-0778

Early 20K PDP-11L03-HA, -HC, -HD, -JA, -JC, -JD Systems

TELEPHONE COMPANY SYSTEM

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CC1A PDP-11V03 SYSTEM

A non-DIGITAL terminal is used with this system. The terminal is a Tektronix™ 4023 AN. The Tektronix terminal must be an "AN" version and is configured for 9600 baud and checked out by the Western Electric Company (WECO) representative.

For installation, a null modem is provided by DIGITAL Field Service. Use of an H312 null modem will cause receive status errors, therefore a BC03M-L cable is recommended for installation checkout. The terminal will be connected through the null modem directly to the DLV11, by-passing the Bell interface cabinet located on top of the PDP-11V03 cabinet. After system check, the WECO representative will connect the Bell interface.

When running the Tektronix terminal after the screen is full, the first seven characters will be scrambled owing to terminal and software incompatibilities. Hit the ERASE key or change the baud rate on the back of the terminal (rotary SW) and DLV11 interface to 2400 baud. The diagnostics will run at this lower speed. Remember to return the system to 9600 for the customer.

Step 4 of the installation procedure asks the DIGITAL Field Service engineer to show that the floppy disk will boot from drives 0 and 1. Other versions of the monitor would only boot from drive 0, but recent shipments of this system should contain the newer floppies that will boot from both drives.

Step 4 also asks the DIGITAL engineer to demonstrate the clock diagnostic VKAHAO for at least 10 minutes. After several passes, the "TIME" printout must have incremented to indicate that the clock is running. The clock is unlike most PDP-11 real time clocks in that it is only a line "BEVNT" which goes to the CPU causing an interrupt. If it is not working, check the "LTC" switch on front panel and items in FA&T checklist, sheets 15 and 16.

For troubleshooting, the two backplanes can be separated by removing the M9400-YE in slot 4 and switching DRV11 No. 1 and DLV11 (see sheet 11 of configuration). This will allow the BA11-MA to function as a system without the BA11-ME connected. Remember to reconfigure to the original condition when finished.

TELEPHONE COMPANY SYSTEM

DRV11 No. 1 and DRV11 No. 2 must be set up properly for the slot position where they are located or the wrong lines may be connected to them.

The *PDP-11/V03 System Manual*, EK-11V03-TM, should be available to the Field Service engineer for 11V03 and diagnostic information. The *Micro-computer Handbook* is also a good source of technical PDP-11V03 information.

CC# 1A Diagnostic Check List

RXDP Diskettes

- # 1
- # 2
- # 7
- # 10
- # 15
- # 25
- # 26
- # 30
- SPECIAL DECX 4

| | | | |
|--|--------|------------------|------|
| <input type="checkbox"/> 11V03 ————— | VKAAAO | Basic Inst. Test | # 25 |
| <input type="checkbox"/> ————— | VKABAO | EIS | # 25 |
| <input type="checkbox"/> ————— | VKACBO | FIS | # 25 |
| <input type="checkbox"/> ————— | VKADBO | TRAPS | # 25 |
| <input type="checkbox"/> ————— 1- | VKAHAO | TIME | # 25 |
| <input type="checkbox"/> DLV11 M7940 ——— | VKAEB1 | | # 25 |
| <input type="checkbox"/> DRV11 M7941 — 2 — | VKAFBO | | # 25 |
| <input type="checkbox"/> MSV11CD M7955 — | ZKMADO | | # 25 |
| <input type="checkbox"/> RXV11 M7946 — 3 — | ZRXBEO | | # 15 |
| <input type="checkbox"/> ————— | ZRXAEO | | # 15 |
| <input type="checkbox"/> REV M9400-YA ——— | ZM9ADO | | # 10 |

1. Run two passes minimum, approximately 10 minutes and check that "TIME" printout is incrementing.
2. Use a BC08R-1 loopback cable for testing. Diagnostic will come up testing DRV11 No. 2; therefore, after several passes, halt CPU and change address and vector information as shown:

TELEPHONE COMPANY SYSTEM

```

$IXO
DZQUJ-C 21-JUL-76 R
.R VKAFBO
END OF PASS
END OF PASS
END OF PASS
    } TESTING OF DRV11  2

004410
@1200/167770 167760
001202/167772 167762
001204/167774 167764
001206/167773 167763
001210/000300 310
001212/000302 312
001214/000304 314
001216/000306 316
001220/167770
@200GEND OF PASS
END OF PASS
    } MODIFICATION OF PROGRAM
    } ADDRESS AND VECTORS FOR
    } DRV11  1
    } TYPE L.F. AFTER ENTRY ONLY.
    } TYPE C.R. ON LAST ENTRY.
    } TYPE 200G.
    } TESTING OF DRV11  1

004402
@

```

3. Run ZRXBEO before running ZRXAEO.

4. Special DECX map:

```

.MAF

CPAF0 AT 017752 STAT 040020
CPB10 AT 021502 STAT 040020
FPAF0 AT 023242 STAT 040020
DRCH0 AT 024522 STAT 040020
BMC00 AT 025430 STAT 040020
RXAD0 AT 030054 STAT 140000
.

```

5. Diagnostics available on single floppy.

NOTE

This is not an official software package and is intended for field use only.

| ENTRY# | FILNAM.EXT | DATE | LENGTH | START |
|--------|------------|-----------|--------|--------|
| 000001 | RXDF .BIN | 7-MAR-78 | 17 | 000050 |
| 000002 | UPD2 .BIN | 7-MAR-78 | 30 | 000071 |
| 000003 | XTECO .BIN | 7-MAR-78 | 26 | 000127 |
| 000004 | VKAAA0.BIC | 7-MAR-78 | 17 | 000161 |
| 000005 | VKABA0.BIC | 7-MAR-78 | 17 | 000202 |
| 000006 | VKACB0.BIC | 7-MAR-78 | 16 | 000223 |
| 000007 | VKADB0.BIC | 7-MAR-78 | 12 | 000243 |
| 000010 | VKAEB1.BIC | 10-MAR-78 | 7 | 000257 |
| 000011 | VKAFB0.BIN | 10-MAR-78 | 6 | 000266 |
| 000012 | ZKMAB1.BIC | 10-MAR-78 | 9 | 000274 |
| 000013 | ZKMAD0.BIC | 10-MAR-78 | 9 | 000305 |
| 000014 | ZRXBEO.BIC | 10-MAR-78 | 17 | 000316 |
| 000015 | ZRXAEO.BIC | 10-MAR-78 | 20 | 000337 |
| 000016 | ZM9AD0.BIC | 10-MAR-78 | 7 | 000363 |
| 000017 | VKAHA0.BIC | 4-APR-78 | 17 | 000372 |
| 000020 | CHAIN .CCC | 5-APR-78 | 1 | 000413 |

TELEPHONE COMPANY SYSTEM

CC# 1A Module Jumper Information

| Module | Option | Jumpers | Microcomputer Handbook Page |
|----------|-------------|--|-----------------------------|
| M7264 | CPU | W4, W6, W9 IN | 243, 236 |
| M7955 | MSV11CD | 1-5 ON, 6-8 OFF | 244 |
| M7955 | MSV11CD | 3, 6, 7, 8 OFF, others ON | 244 |
| M7941 | DRV11 No. 1 | A3, A12 IN [A = 767760] V4, V5 IN [V = 310] | 290 |
| M7941 | DRV11 No. 2 | A12, V3, V4, V5 IN [A = 767770] [V = 300] | 290 |
| M9400-YA | REV11-A | Remove W2 | 380 |
| M7940 | DLV11 | Refer to <i>Micro Handbook</i> | 259 |

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | | CONTINUATION SHEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----|---------------------------------------|---------------|------------------------------|----------|------------|------------|------|---|-----------------|---------------|--|---|-----------------------------------|-------------|--|---|---------------------|-------------|--|---|-----------------------------|---------------|--|---|-------------------------------|---------------|--|---|-------------------------------|-------------|--|---|-------------------------|---------------|--|---|---------------------------------|---------------|--|---|-------------------------|-------------|--|----|-------------------------------|-------------|--|----|---------------------|---------------|--|----|-----------------------|---------------|--|----|-----------------------|-------------|--|----|-------------------------------------|---------------|--|----|---------------------------------------|-------------|--|----|---------------------------------------|---------------|--|----|-----------------------|-------------|
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p><u>INDEX</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 10%;"></th> <th style="width: 10%; text-align: center;"><u>ECO</u></th> <th style="width: 10%; text-align: center;"><u>REV</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">PAGE</td> <td>1</td> <td>Index</td> <td>1 A</td> </tr> <tr> <td></td> <td>2</td> <td>Configuration Approvals</td> <td>*</td> </tr> <tr> <td></td> <td>3</td> <td>Users Page.</td> <td>*</td> </tr> <tr> <td></td> <td>4</td> <td>System Description.</td> <td>1 A</td> </tr> <tr> <td></td> <td>5</td> <td>Configuration Notes</td> <td>1 A</td> </tr> <tr> <td></td> <td>6</td> <td>Configuration Notes</td> <td>*</td> </tr> <tr> <td></td> <td>7</td> <td>Equipment List.</td> <td>1 A</td> </tr> <tr> <td></td> <td>8</td> <td>Installation Procedure.</td> <td>1 A</td> </tr> <tr> <td></td> <td>9</td> <td>Cabinet Layout.</td> <td>*</td> </tr> <tr> <td></td> <td>10</td> <td>Cabinet Modification.</td> <td>*</td> </tr> <tr> <td></td> <td>11</td> <td>Box Layout.</td> <td>1 A</td> </tr> <tr> <td></td> <td>12</td> <td>Bus Sequence.</td> <td>1 A</td> </tr> <tr> <td></td> <td>13</td> <td>Cable Layout.</td> <td>*</td> </tr> <tr> <td></td> <td>14</td> <td>Device Address Assignment</td> <td>1 A</td> </tr> <tr> <td></td> <td>15</td> <td>Telco FA&T 11V03WA Checklist.</td> <td>*</td> </tr> <tr> <td></td> <td>16</td> <td>Telco FA&T 11V03WA Checklist.</td> <td>1 A</td> </tr> <tr> <td></td> <td>17</td> <td>Change Page</td> <td>*</td> </tr> </tbody> </table> | | | | | | <u>ECO</u> | <u>REV</u> | PAGE | 1 | Index | 1 A | | 2 | Configuration Approvals | * | | 3 | Users Page. | * | | 4 | System Description. | 1 A | | 5 | Configuration Notes | 1 A | | 6 | Configuration Notes | * | | 7 | Equipment List. | 1 A | | 8 | Installation Procedure. | 1 A | | 9 | Cabinet Layout. | * | | 10 | Cabinet Modification. | * | | 11 | Box Layout. | 1 A | | 12 | Bus Sequence. | 1 A | | 13 | Cable Layout. | * | | 14 | Device Address Assignment | 1 A | | 15 | Telco FA&T 11V03WA Checklist. | * | | 16 | Telco FA&T 11V03WA Checklist. | 1 A | | 17 | Change Page | * |
| | | <u>ECO</u> | <u>REV</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PAGE | 1 | Index | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | Configuration Approvals | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | Users Page. | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | System Description. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | Configuration Notes | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | Configuration Notes | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 7 | Equipment List. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8 | Installation Procedure. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 9 | Cabinet Layout. | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | Cabinet Modification. | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 11 | Box Layout. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | Bus Sequence. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 13 | Cable Layout. | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14 | Device Address Assignment | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15 | Telco FA&T 11V03WA Checklist. | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 16 | Telco FA&T 11V03WA Checklist. | 1 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 17 | Change Page | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | SIZE A | CODE | NUMBER MFGENG-0 CONF-0004 | REV A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEC 16-(392)-1082-W672

SHEET 1 OF 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | |
|--|---|---------------|-------------|--------------------|---|
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | |
| <u>CONFIGURATION APPROVALS</u> | | | | | |
| _____ Digital Account Representative | | | | | |
| _____ Digital Project Manager | | | | | |
| _____ Digital Manufacturing Engineering Manager | | | | | |
| _____ Digital Quality Control Manager | | | | | |
| _____ Digital Field Service Product Support | | | | | |
| _____ Digital TELCO Engineering | | | | | |
| _____ Diagnostic Engineering | | | | | |
| _____ Production Manager | | | | | |
| * <u>CONFIGURATION REVIEWED</u> | | | | | |
| _____ Bell Labs Representative | | | | | |
| _____ Western Electric Purchasing | | | | | |
| *Any review of these specifications by any Bell System representative shall be for general arrangement of the work and shall in no case relieve you in any way of your responsibilities as defined by our purchase orders. | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">SIZE</td> <td style="width: 50%;">CODE</td> </tr> <tr> <td style="text-align: center;">A</td> <td></td> </tr> </table> | SIZE | CODE | A | |
| SIZE | CODE | | | | |
| A | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">NUMBER</td> <td style="width: 50%;">REV</td> </tr> <tr> <td style="text-align: center;">MFGENG-0 CONF-0004</td> <td style="text-align: center;">*</td> </tr> </table> | NUMBER | REV | MFGENG-0 CONF-0004 | * |
| NUMBER | REV | | | | |
| MFGENG-0 CONF-0004 | * | | | | |

DEC 16-(392)-1082-N672

SHEET 2 OF 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | | | | | |
|---|--|--------------------|------|--------|-----|---|--|--------------------|---|
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | | | | |
| <p>TO THE USERS OF THIS DOCUMENT:</p> <p>This is a Digital Manufacturing Specification for a DEC system purchased by Western Electric. Configuration approvals are included in order to assure that a system is manufactured in accordance with the latest known requirements.</p> <p>The information contained herein is consistent with the information included in:</p> <p style="margin-left: 40px;">Bell Telephone Laboratories - SD# 1P039-01 Western Electric J-Drawing - # J1C016K-1 DEC Standard Price List</p> <p>It is imperative that the Bell Laboratories and/or Western Electric Purchasing signatories contact the Digital Account Representative in the event of changes to the SD and/or J-drawing. Should these changes affect the contents of this document, the Digital Account Representative shall contact the Digital Project Manager who, in turn, shall have this document updated. Conversely, no changes shall be made to the product manufactured under this specification without written notification to and expressed approval of the Bell System signatories.</p> <p>When Digital issues a new price list, the Digital Account Representative shall assure that all requisite equipment continues to be offered under the DEC codes listed herein. If any of these items is no longer listed, either of the following procedures shall apply.</p> <ol style="list-style-type: none"> 1) The Digital Account Representative shall notify the Bell Laboratories and Western Electric signatories of changes to nomenclature and packaging in order to include the then current equipment lists in the next issued SD and J-drawing. <p style="text-align: center;">-OR-</p> <ol style="list-style-type: none"> 2) The Digital Project Manager shall convene a configuration review committee meeting (attended by all the signatories of this document or their designated representatives) for the purpose of identifying the alternate equipment to be used for this project configuration. At such a time, the short-term requirements and availabilities of the equipment listed herein shall be determined and the appropriate transition plans shall be made. <p>Digital Field Service shall adhere to the information contained in this document. If the end-user wishes anything different, the end-user should be told to contact the appropriate Western Electric Regional Office.</p> <p>This specification is included with all shipments of DEC equipment for this project.</p> | | | | | | | | | |
| | <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding: 2px;">SIZE</td> <td style="padding: 2px;">CODE</td> <td style="padding: 2px;">NUMBER</td> <td style="padding: 2px;">REV</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td></td> <td style="padding: 2px;">MFGENG-0 CONF-0004</td> <td style="text-align: center; padding: 2px;">*</td> </tr> </table> | SIZE | CODE | NUMBER | REV | A | | MFGENG-0 CONF-0004 | * |
| SIZE | CODE | NUMBER | REV | | | | | | |
| A | | MFGENG-0 CONF-0004 | * | | | | | | |

DEC 16-(392)-1082-4672

SHEET 3 OF 17

TELEPHONE COMPANY SYSTEM

| | | | | | | | | | |
|---|--|--------------------|-------------|---------------|------------|---|--|--------------------|---|
| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | | | | | |
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | | | | |
| <p><u>SYSTEM DESCRIPTION</u></p> <p>The PDP11V03-WA configuration is a subsystem of the switching control center system's control console No. 1A.</p> <p>The control console No. 1A is used to provide remote maintenance, alarm, surveillance and control of unattended electronic telephone switching offices. Its most important function is to provide remote control capabilities to restore the telephone switching office to service after certain types of failures. The reliability and availability of the control console are extremely important due to its potential use during critical periods where telephone service in a particular telephone switching office has been interrupted. It may be used in continuous service (24 hr/day) application.</p> <p>The microcomputer is connected via the DLV11 to a CRT for display of alarm data as well as input of remote control requests. The connection is accomplished via a null modem cable to provide the proper handshaking and data interchange.</p> <p>A telemetry data network is driven via a DRV11 and is the primary link from the control console to the remote telephone switching office. Another DRV11 sends data to a circuit that drives a local alarm display.</p> <p>The microcomputer configuration carries a Western Electric designation of J1C016K-1. The telemetry equipment, local alarm interface and cables (including a null modem cable) have a designation of J1C016L-1. The CRT is designated J1C016M-1.</p> | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SIZE</td> <td style="width: 15%;">CODE</td> <td style="width: 40%;">NUMBER</td> <td style="width: 30%;">REV</td> </tr> <tr> <td style="text-align: center;">A</td> <td></td> <td style="text-align: center;">MFGENG-O CONF-0004</td> <td style="text-align: center;">A</td> </tr> </table> | SIZE | CODE | NUMBER | REV | A | | MFGENG-O CONF-0004 | A |
| SIZE | CODE | NUMBER | REV | | | | | | |
| A | | MFGENG-O CONF-0004 | A | | | | | | |

DEC 16-(382)-1062-M672

SHEET 4 OF 17

TELEPHONE COMPANY SYSTEM

| | | | | | | | | | |
|---|--|--------------------|-------------|---------------|------------|---|--|--------------------|---|
| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | | | | | |
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | | | | |
| <p><u>CONFIGURATION NOTES (cont.)</u></p> <p>14. In order to assure a higher quality level, pages 15 and 16 (Telco FA&T 11V03WA, SCCS Control Console NO. 1A (CC NO. 1A) Configuration Checklist) is to be completed by the PSI personnel for each system. Their initials will signify that they have completed or verified each indicated procedure.</p> | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SIZE</td> <td style="width: 15%;">CODE</td> <td style="width: 20%;">NUMBER</td> <td style="width: 50%;">REV</td> </tr> <tr> <td style="text-align: center;">A</td> <td></td> <td style="text-align: center;">MFGENG-0 CONF-0004</td> <td style="text-align: center;">*</td> </tr> </table> | SIZE | CODE | NUMBER | REV | A | | MFGENG-0 CONF-0004 | * |
| SIZE | CODE | NUMBER | REV | | | | | | |
| A | | MFGENG-0 CONF-0004 | * | | | | | | |

DEC 16-(992)-1082-4672

SHEET 6 OF 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | | CONTINUATION SHEET | | | | |
|--|------------|--|-----------|------|------------------------------|----------|
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | |
| <u>EQUIPMENT LIST</u> | | | | | | |
| One (1) 11V03WA composed of the following: | | | | | | |
| <u>ITEM</u> | <u>QTY</u> | <u>DESCRIPTION</u> | | | | |
| 1 | 1 | 11/03-KA consisting of: -MSV11-CD -KEV11A -KD11-R -BA11-MA | | | | |
| 2 | 2 | DRV11 | | | | |
| 3 | 1 | DLV11 | | | | |
| 4 | 1 | MSV11-CD | | | | |
| 5 | 1 | REV11-A | | | | |
| 6 | 1 | BA11-ME | | | | |
| 7 | 1 | BCV1B-06 | | | | |
| 8 | 1 | H984-DA | | | | |
| 9 | 1 | BC05C-25 | | | | |
| 10 | 1 | RXV11-BA | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">SIZE A</td> <td style="text-align: center;">CODE</td> <td style="text-align: center;">NUMBER MFGENG-0 CONF-0004</td> <td style="text-align: center;">REV A</td> </tr> </table> | SIZE A | CODE | NUMBER MFGENG-0 CONF-0004 | REV A |
| SIZE A | CODE | NUMBER MFGENG-0 CONF-0004 | REV A | | | |

DEC 16-392-1082-1672

SHEET 7 OF 17

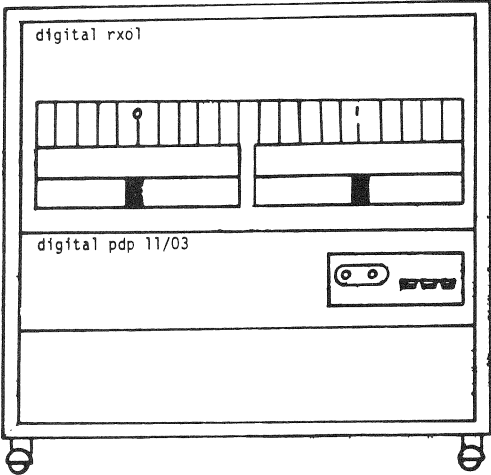
TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | | | | | |
|---|--------------------|------|---|--|---|--------|-----|--------------------|---|
| <p>TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION</p> | | | | | | | | | |
| <p><u>INSTALLATION PROCEDURE</u></p> | | | | | | | | | |
| <p>The control console No. 1A consists of:</p> <ul style="list-style-type: none"> -DEC Processor, J1C016K-1 -Interface Unit, J1C016L-1 -Tektronix model 4023AN CRT Terminal, J1C016M-1 <p>After the above equipment has arrived at the site storage location, the following procedures and guidelines shall be followed.</p> <ol style="list-style-type: none"> 1. The Western Electric (WECO) installer shall verify that the CRT terminal is operational. 2. The WECO installer shall make arrangements for the DEC representative to be at the job location and will secure permission for movement of the DEC processor from the storage location to the job site. 3. At the job site, WECO installation shall provide all labor required for unpacking and placing the equipment in the desired location. The DEC representative will supervise the unpacking and placement of DEC equipment and verify any evident damages for subsequent claims. 4. After the WECO installer has mounted the interface unit on the processor and lowered the interconnect cables to the processor area, the DEC installer will run diagnostics on the processor. The DEC installer will provide the null modem cable to interconnect the DLV11 to the CRT terminal for testing. In addition to DEC diagnostics, the DEC installer shall demonstrate the capability to boot from drive 0, Drive 1 and demonstrate that the system clock is operational. 5. Upon successful completion of the diagnostics, the DEC installer shall connect the following cables, previously lowered by the WECO installer, to the processor. <ul style="list-style-type: none"> "J1-DRV(2).side up" "J2-DRV(2).side up" "J-DLV.side up" "J1-DRV(1).side up" "J2-DRV(1).side up" AC Power Plug 6. The DEC installer shall demonstrate that the removal and reinsertion of processor boards for cable connection did not affect processor operation. 7. Upon successful completion, the WECO installer will accept the DEC processor and initiate control console No. 1A diagnostics. | | | | | | | | | |
| <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">SIZE</td> <td style="padding: 2px;">CODE</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;"></td> </tr> </table> | SIZE | CODE | A | | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">NUMBER</td> <td style="padding: 2px;">REV</td> </tr> <tr> <td style="padding: 2px;">MFGENG-0 CONF-0004</td> <td style="text-align: center; padding: 2px;">A</td> </tr> </table> | NUMBER | REV | MFGENG-0 CONF-0004 | A |
| SIZE | CODE | | | | | | | | |
| A | | | | | | | | | |
| NUMBER | REV | | | | | | | | |
| MFGENG-0 CONF-0004 | A | | | | | | | | |

DEC 16-(392)-1082-4672

SHEET 8 OF 17

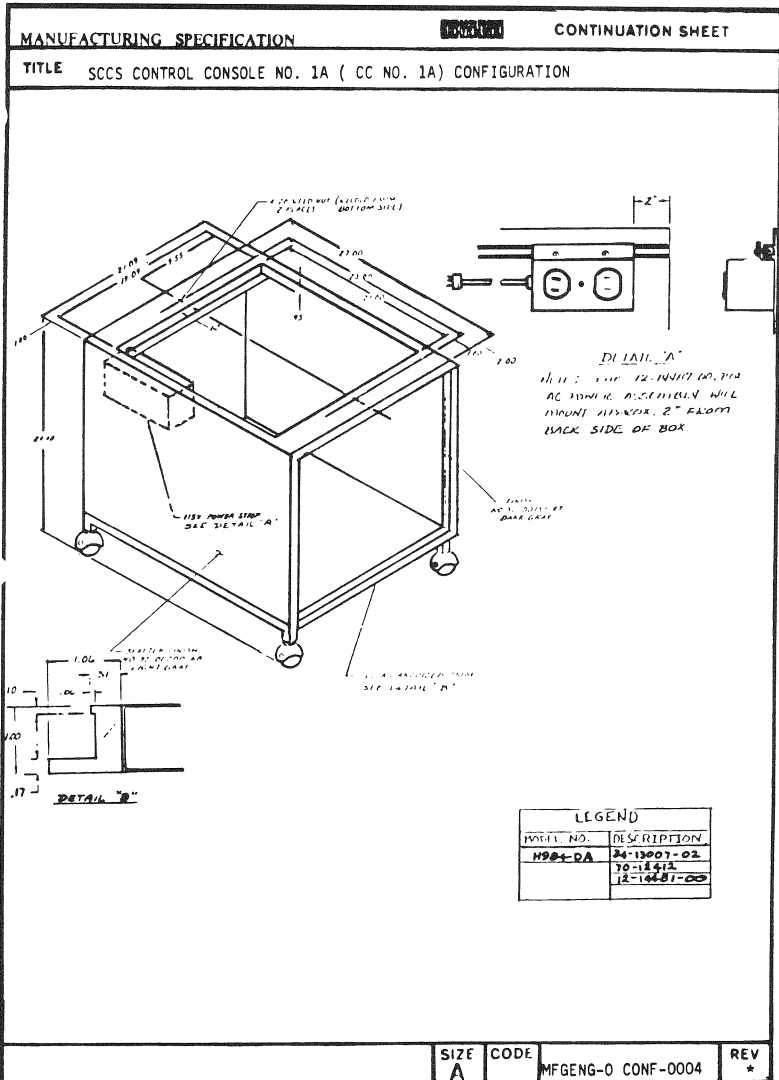
TELEPHONE COMPANY SYSTEM

| | | | |
|--|-------------|-------------------------------------|-----------------|
| MANUFACTURING SPECIFICATION | | CONTINUATION SHEET | |
| TITLE SCSS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | |
| CABINET LAYOUT | | | |
|  <p>The diagram shows a cabinet layout with two main sections. The top section is labeled 'digital rx01' and contains two rows of vertical slots, each with a small circle above it. Below these slots are two horizontal bars. The bottom section is labeled 'digital pdp 11/03' and contains a single horizontal bar with a control panel on the right side. The control panel has two circular indicators and some text. The cabinet is supported by four casters at the bottom.</p> | | | |
| SIZE A | CODE | NUMBER MFGENG-0 CONF-0004 | REV * |

DEC 16-(388)-1082-4672

SHEET 9 OF 17

TELEPHONE COMPANY SYSTEM



DWG. 16-1392-1082-N672

SHEET 10 OF 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | | CONTINUATION SHEET | | | |
|---|----------|--------------------|------------|--------------------|-----|
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | |
| CABINET LAYOUT | | | | | |
| BA11-MA | | | | | |
| | A | B | C | D | |
| 1 | | M7264-YA | (KD11-H) | | |
| 2 | | M7955 | (MSV11-CD) | | |
| 3 | | M7955 | (MSV11-CD) | | |
| 4 | M9400-YE | | M7941 | (DRV11 #1) | |
| BA11-ME | | | | | |
| | A | B | C | D | |
| 1 | M9401 | | M7940 | (DLV11) | |
| 2 | M7946 | (RXV11) | M7941 | (DRV11 #2) | |
| 3 | M9400-YA | (RFV11-A) | UNUSED | | |
| 4 | UNUSED | | UNUSED | | |
| | | SIZE | CODE | NUMBER | REV |
| | | A | | MFGENG-0 CONF-0004 | A |

DEC 16-2002-1082-M672

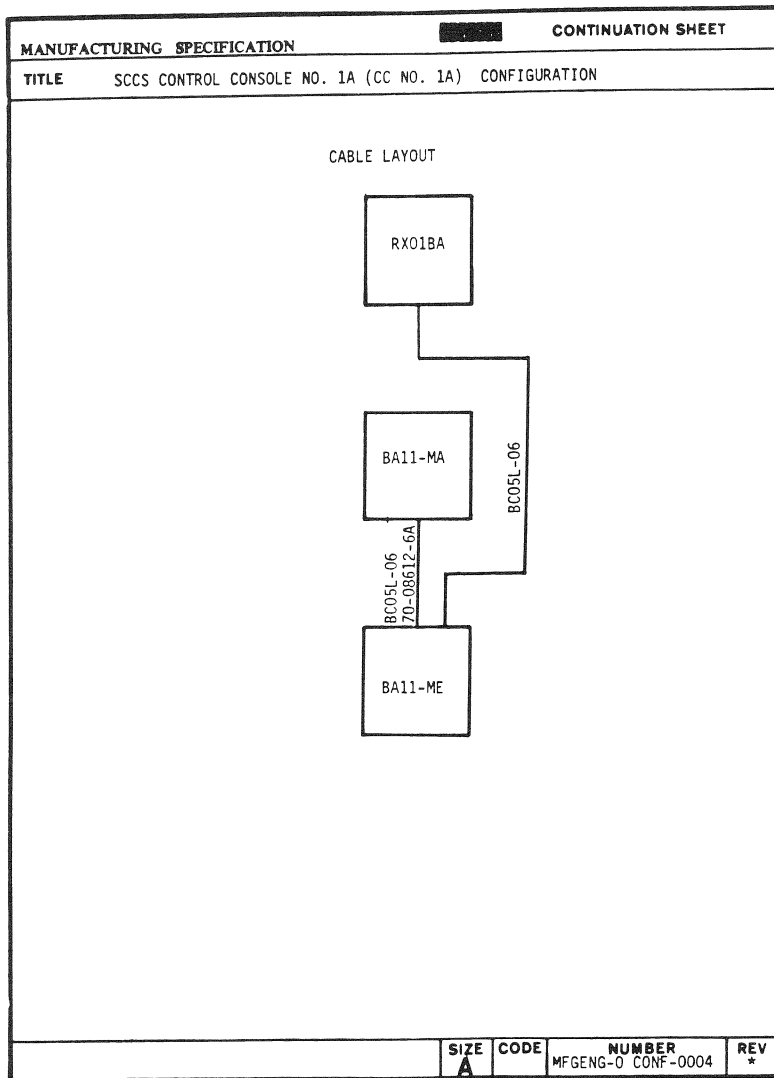
SHEET 11 OF 17

TELEPHONE COMPANY SYSTEM

| | | | |
|--|-----------------|---------------------------|------------|
| MANUFACTURING SPECIFICATION | CONF-004 | CONTINUATION SHEET | |
| TITLE SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | |
| <p>BUS SEQUENCE</p> | | | |
| SIZE | CODE | NUMBER | REV |
| A | | MFGENG-0 CONF-0004 | A |
| SHEET <u>12</u> OF <u>17</u> | | | |

DEC 16-(898)-1089-4672

TELEPHONE COMPANY SYSTEM



DEC 16-(392)-1082-9672

| | | | |
|------------------|-------------|-------------------------------------|-----------------|
| SIZE A | CODE | NUMBER MFGENG-0 CONF-0004 | REV * |
|------------------|-------------|-------------------------------------|-----------------|

SHEET 13 **OF** 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | | | | | | CONTINUATION SHEET | | |
|-----------------------------|------------------|------------------|----------------|----------|---------------|--------------------|--|-----------|
| TITLE | | | | | | | | |
| DEVICE ADDRESS ASSIGNMENT | | | | | | | | |
| REC DESIGNATION | MECO DESIGNATION | REGISTER ADDRESS | VECTOR ADDRESS | PRIORITY | MOUNTING CODE | +5VDC | BUS LOADS | COMMENTS |
| DRV11 #1 | Parallel 1 | 767760 | 310 | 1 | 2 Slots | | 1 | |
| DRV11 #2 | Parallel 2 | 767770 | 300 | 3 | 2 Slots | | 1 | |
| DLV11 | Serial 1 | 777560 | 60 | 2 | 2 Slots | | 1 | 9600 BAUD |
| RXV11 | Disk-Cont | 777170 | 264 | 4 | 2 Slots | | 1 | |
| | | | | | | | NOTE: PRIORITY DETERMINED BY DEVICE CLOSEST TO THE CPU. SEE BUS SEQUENCE: PRIORITY 1 = HIGHEST | |

SIZE
A

CODE

MFGENG-0 CONF-0004

REV
A

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | CONTINUATION SHEET | | | | | | | | |
|---|--------------------|--------------------|--------|-----|---|--|--------------------|---|--|
| TITLE <u>SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION</u> | | | | | | | | | |
| <u>TELCO FA&T 11V03-WA SCCS CONTROL CONSOLE NO. 1A (CC NO. 1A) CHECKLIST</u> | | | | | | | | | |
| | INITIAL | | | | | | | | |
| 1.) The cab fan power cord should be plugged into the rear plug of the dual receptacle. (Mounted on side of cab). | _____ | | | | | | | | |
| 2.) DRV11's should have a sticker on the module, side 2 under the cable, giving address, vector and DRV11 number 1 or 2. | _____ | | | | | | | | |
| 3.) Cables for DRV11 should be installed ribbed side up. | _____ | | | | | | | | |
| 4.) Check for a green wire on the console board between TP2 and W4. | _____ | | | | | | | | |
| 5.) All ribbon cables should have the red strip on the right. | _____ | | | | | | | | |
| 6.) Cable from J2 (console board) should be routed behind the switch panel. | _____ | | | | | | | | |
| 7.) Run diagnostic VKAHAD as shown. If the time is 000000, the clock is not running. Write the time printed for pass number 2: _____ (it takes 5 minutes per pass). | _____ | | | | | | | | |
| <p> DXO DZRUJ-C 21-JUL-74 RXR - XXDP RX11/RX01 MONITOR 28K A VKAHAD </p> | | | | | | | | | |
| <p> DVKAH-A MEMORY= 157776 _____ </p> | | | | | | | | | |
| <p> PASS=000001 ERROR=000000 RXERROR=000000 TIME=044416 _____ </p> | | | | | | | | | |
| <p> PASS=000002 ERROR=000000 RXERROR=000000 TIME=110707 _____ </p> | | | | | | | | | |
| 8.) DLV11 should be set up for EIA before software is run. (NOTE: Do not ship 70-08360 cable). | _____ | | | | | | | | |
| 9.) 74-16240-0-0 stickers on 11V03 and BA11-ME should be filled out as shown. Note that DRV11 #1 is addressed at 767760, vector 310 and is in the 11V03 box. DRV11 #2 is addressed at 767770, vector 300 and is in the BA11-ME box. | _____ | | | | | | | | |
| <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">SIZE</td> <td style="padding: 2px;">CODE</td> <td style="padding: 2px;">NUMBER</td> <td style="padding: 2px;">REV</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td></td> <td style="padding: 2px;">MFGENG-0 CONF-0004</td> <td style="text-align: center; padding: 2px;">*</td> </tr> </table> | SIZE | CODE | NUMBER | REV | A | | MFGENG-0 CONF-0004 | * | |
| SIZE | CODE | NUMBER | REV | | | | | | |
| A | | MFGENG-0 CONF-0004 | * | | | | | | |

DEC 16-(392)-1082-M672

SHEET 15 OF 17

TELEPHONE COMPANY SYSTEM

| MANUFACTURING SPECIFICATION | | | | | CONTINUATION SHEET | | | |
|--|---------------|----------|-----|------|--------------------|----------|-----|---------|
| TITLE SCGS CONTROL CONSOLE NO. 1A (CC NO. 1A) CONFIGURATION | | | | | | | | |
| CPU | | | | | | | | |
| SLOT | MODULE NUMBER | | CS | ETCH | MODULE NUMBER | | CS | ETCH |
| | A | B | REV | REV | C | D | REV | REV |
| 1 | | KD | 1 | 1 | R | H | * | * |
| 2 | | MSV | 1 | 1 | | CD | * | * |
| 3 | | MSV | 1 | 1 | | CD | * | * |
| 4 | | BCVIB-06 | * | * | | DRVII #1 | * | * |
| CPU | | | | | | | | |
| SLOT | MODULE NUMBER | | CS | ETCH | MODULE NUMBER | | CS | ETCH |
| | A | B | REV | REV | C | D | REV | REV |
| 1 | | BCVIB-06 | * | * | | DLVII | * | * |
| 2 | | RxVII | * | * | | DRVII #2 | * | * |
| 3 | | REVII-A | * | * | | | | |
| 4 | | | | | | | | |
| * = Current Revision | | | | | | | | INITIAL |
| 10.) Check that the red light (D1) on the console board goes off when DC power is turned off. | | | | | | | | _____ |
| 11.) Check that drive 0 and drive 1 will boot, load and run RXDP diagnostics (Rev D required). | | | | | | | | _____ |
| DEC# _____ | | | | | | | | |

DEC 14-(392)-1082-4672

SHEET 16 OF 17

GENERAL MODULE INFORMATION

GENERAL MODULE INFORMATION

This volume lists LSI-11 modules alphanumerically by option designation. The tables below list modules by option designation for cross-referencing. All modules are (or will be) covered in the *Microcomputer Processor Handbook*, EB-20175-20, (CPUs and memories) or the *Minicomputer Interfaces Handbook*, EB-18451-20.

The following conventions are used in presenting module data.

Registers

The base address is listed first. This is normally the address of a control status register. Abbreviations containing "CS" or "CSR" are for control status registers. Abbreviations containing "DB," "DBR," or "BUF" refer to data buffer registers.

Switches

Switches are labeled "S1, S2, S3, ..." although they may be located in the same DIP switch pack. Rocker switch states are selected by pressing the side closest to the label of the state desired. For example, to select the ON position, press the side of the rocker closest to the edge of the switch on which "ON" is printed; disregard the red line on the end of the rocker.

Jumpers

"I" indicates that a jumper is inserted. "R" indicates that it is removed. "X" indicates a "don't care" condition. Location drawings show jumpers installed, for clarity, although they may not actually be installed for the standard configuration. Tables define the jumper states. Jumpers are shown as a solid line if they are normally installed.

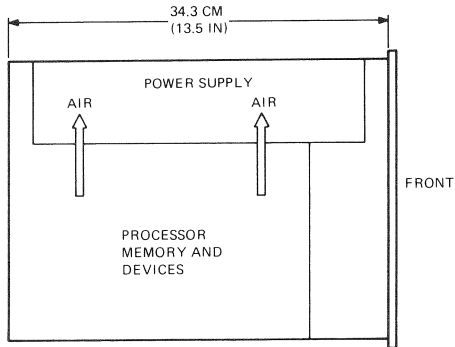
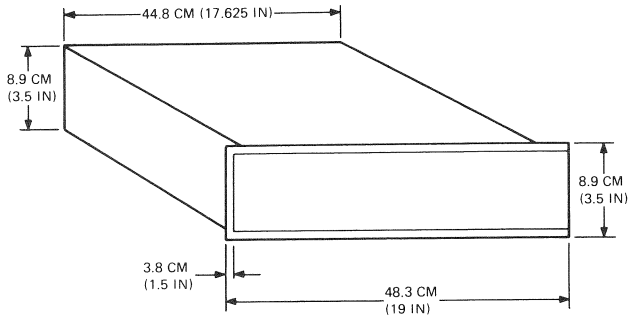
NOTE

Jumpers are not always installed for a 1 and removed for a 0; on some modules the reverse is true. See Appendix A for XXDP+ diagnostic names, functions, and multimedia assignments.

BA11-M

BA11-M MOUNTING BOX

Mounting Box: Physical Specifications



MR-2466

BA11-M Assembly Unit

Electrical (These specifications reflect the characteristics of the H780 power supply.)

Input Voltage (Continuous: see Note 1.)

100 Vac-127 Vac (H780-C, -H, -K)

200 Vac-254 Vac (H780-D, -J, -L)

Temporary Line Dips Allowed

100% of voltage, 20 ms max.

AC Inrush Current

70 A at 127 V 60 Hz (8.33 ms)

25 A at 254 V 50 Hz (10 ms)

Input Power (Fans Included)

340 W at full load max.

290 W at full load typical

EMI (Emission and Susceptibility)

Per DEC STD 102.7 and VDE N-12 limits

Input Protection

H780-C, -H, -K (100 Vac-127 Vac) fast blow, 5 A fuse

H780-D, -J, -L (200 Vac-254 Vac) fast blow, 2.5 A fuse

Hi-Pot

2 kV for 60 seconds from input to output, or input to chassis

Output Power (Combinations not to exceed 110 W.)

+5 V, 1.5 A - 18 A

+12 V, 0.25 A - 3.5 A

Maximum DC Current Under Fault Conditions

+5 V bus = 28 A

+12 V bus = 9.5 A

+5 V Output

Total regulation 5 V \pm 3%

Line regulation \pm 0.5%

Load regulation \pm 1.0%

Stability 0.1%/1000 hours

Thermal drift 0.025%/° C (See Note 2.)

Ripple 150 mV p-p (1% for f<3 kHz)

Dynamic load regulation \pm 1.2%

di/dt = 0.5 A/ μ s

Δ L = 5 A

BA11-M

| | |
|--------------------------|--|
| Noise | 1% peak at 5 > 100 kHz (noise is superimposed on ripple) |
| Interaction due to +12 V | $\pm 0.05\%$ |
| +12 V Output | |
| Total regulation | 12 V $\pm 3\%$ |
| Line regulation | $\pm 0.25\%$ |
| Load regulation | $\pm 0.5\%$ |
| Stability | 0.1%/1000 hours |
| (See Note 2.) | 0.025%/° C above 25° C |
| Ripple | 350 mV p-p (1% for f < 3 kHz) |
| Dynamic load regulation | $\pm 0.8\%$ |
| | di/dt = 0.5 A/ μ s |
| | f < 500 Hz |
| | $\Delta L = 3$ A |
| Noise | 1% peak f > 100 kHz (Noise is superimposed on ripple.) |
| Interaction due to +5 V | $\pm 0.2\%$ |
| Overvoltage Protection | |
| +5 V | 6.3 V nominal 5.65 V min. 6.8 V max. |
| +12 V | 15 V nominal 13.6 V min. 16.5 V max. |
| Adjustments | |
| +5 V output | 4.05 V-6.8 V Guarantee range 4.55 V-5.65 V |
| +12 V output | 10.6 V-16.5 V Guarantee range 11.7 V-13.6 V |
| Controls | |
| Rear panel | AC ON/OFF switch |
| Front console | DC ON/OFF switch HALT/ENABLE switch |
| (Master only) | LTC ON/OFF switch |

Console Indicators

DC ON
RUN (master)
SPARE (master only)

Backplane Signals

| | | |
|---------|---|------------------------|
| BPOK H | } | Transmitted |
| BDCOK H | | |
| BEVNT L | | |
| BHALT L | | |
| SRUN L | | Received (master only) |

Mechanical**Cooling**

Two self-contained fans provide 0.7140 m³/min (30 ft³/min) air flow.

Size

13.97 cm w × 8.43 cm h × 37.15 cm l
(5-1/2 in w × 3-1/3 in h × 14-5/8 in l)

Weight

5.90 kg (13 lb)

Environmental**Temperature**

Ambient 5°-50° C (41°-122° F)
Storage -40°-70° C (-40°-158° F)

Humidity

90% maximum without condensation

NOTES

1. Operation from ac lines below 100 V may cause the power supply to overheat because of decreased air flow from the cooling fans.
2. Thermal drift parameters apply after five minutes of warm-up and are measured with an averaging meter at the processor backplane terminal block under system loading.

BA11-M

Option Variations

- BA11-MA Consists of a BA11-MC mounting box with H9270-A backplane and H780A power supply for 115 Vac, 60 Hz.
- BA11-MB Consists of BA11-MC mounting box with H9270-A backplane and H780-B power supply for 230 Vac, 50 Hz.
- BA11-MC Consists of 3.5 inch high mounting box with no backplane or power supply.
- BA11-ME Consists of BA11-MC mounting box with H9270-A backplane and H780-E power supply for 115 Vac, 60 Hz.
- BA11-MF Consists of BA11-MC mounting box with H9270-A backplane and H780-F power supply for 230 Vac, 50 Hz.

Power Supply Models

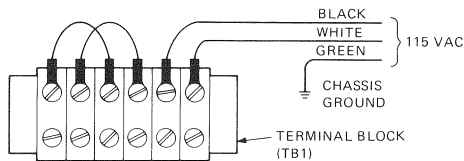
| | 115 Vac | 230 Vac | Line Cord | Fans | Console Type |
|--------|---------|---------|-----------|------|--------------|
| H780-A | X | | X | X | Master |
| H780-B | | X | X | X | Master |
| H780-C | X | | | X | None |
| H780-D | | X | | X | None |
| H780-E | X | | X | X | Slave |
| H780-F | | X | X | X | Slave |
| H780-H | X | | | X | Master |
| H780-J | | X | | X | Master |
| H780-K | X | | | X | Slave |
| H780-L | | X | | X | Slave |
| H780-M | X | | | | Note 1 |
| H780-N | | X | | | Note 1 |
| H780-P | X | | X | X | Note 2 |
| H780-R | | | X | X | Note 2 |

NOTES

1. The H780-M and -N have no control panel on the basic option. The Business Products 320 line uses a control panel that has two DC ON indicators (PN 54-12695). This control panel is carried as part of the 11/03-J computer.
2. The H780-P and -R also use the 54-12695 control panel. They differ from the -M and -N in that the basic power supply option includes the control panel, a line cord, and fans.
3. The 115 Vac options operate on 100 Vac–127 Vac at either 50 or 60 Hz. The 230 Vac options operate on 200 Vac–254 Vac at either 50 or 60 Hz.

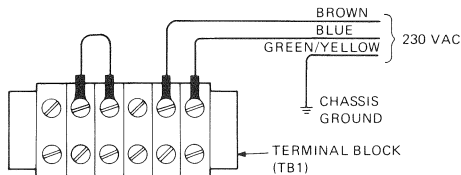
Power Supply/Control Panel Interface Cables

| Cable | DEC PN |
|---|--------------|
| DC output cable | 7011584-0-0 |
| Power supply status cable (logic cable) | 7011411-0K-0 |
| Power supply console cable | 7008612-0M-0 |



MR-5430

115 Vac Terminal Block Wiring

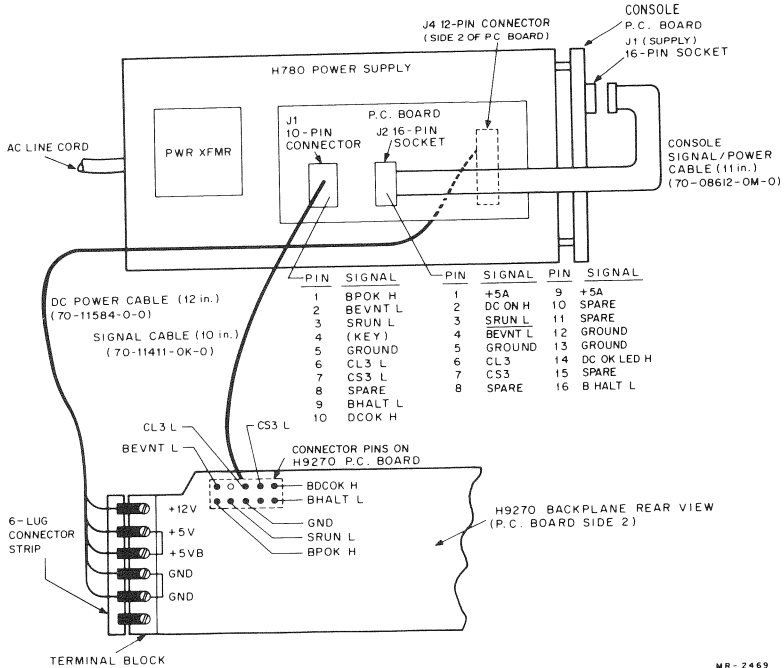


MR-5431

230 Vac Terminal Block Wiring

BA11-M

Cable Interconnections



H780 to H9270 Backplane Connections

Master/Slave Interface Cables

Length

DEC PN

| | |
|------------------|------------|
| 10.2 cm (4 in) | 7008612-0D |
| 15.0 cm (6 in) | 7008612-0F |
| 22.9 cm (9 in) | 7008612-0K |
| 27.5 cm (11 in) | 7008612-0M |
| 35.6 cm (14 in) | 7008612-1B |
| 45.7 cm (18 in) | 7008612-1F |
| 124.0 cm (49 in) | 7008612-4A |
| 61.0 cm (2 ft) | 7008612-02 |
| 1.83 m (6 ft) | 7008612-6A |
| 3.05 m (10 ft) | 7008612-10 |
| 4.88 m (16 ft) | BC034-16* |

*Refer to the "Systems Configurations" section for applications using this cable.

+ 12 V Adjustment

Perform the following procedure when adjusting the + 12 Vdc output.

1. Apply power to the LSI-11 or PDP-11/03 system and allow a five minute warm-up period.
2. Using a DVM, measure the + 12 V output at the LSI-11 or PDP-11/03 backplane terminal block.
3. Using a small screwdriver, adjust R87 until the DVM indicates + 12.0 V (+ 11.64 V to + 12.36 V acceptable range). Turning R87 CW (clockwise) decreases the + 12 V output, while turning CCW (counterclockwise) increases the output.

NOTE

If R87 is turned too far CCW, the + 12 V output will crowbar and drop to approximately 0 V. This will occur between + 13.0 V and + 16.5 V. Do not allow the supply to crowbar as this may blow the internal fuse (F 1) protecting the + 12 V regulator.

4. Using an oscilloscope, measure the ripple on the + 12 V output at the backplane terminal block. The ripple should not be greater than 350 mV peak-to-peak.

+ 5 V Adjustment

Perform the following procedure when adjusting the +5 Vdc output.

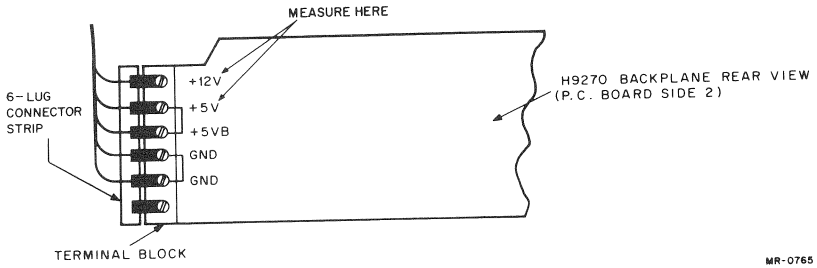
1. Apply power to the LSI-11 or PDP-11/03 system and allow a five minute warm-up period.
2. Using a DVM, measure the + 5 V output at the LSI-11 or PDP-11/03 backplane terminal block.
3. Using a small screwdriver, adjust R88 until the DVM indicates + 5.0 V (+ 4.85 V to + 5.15 V acceptable range). Turning R88 CW decreases the + 5 V output, while turning CCW increases the output.

NOTE

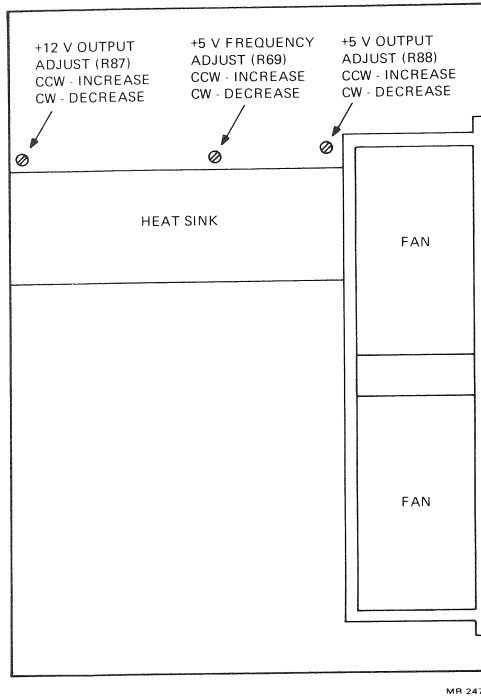
If R88 is turned too far CCW, the + 5 output will crowbar and drop to approximately 0 V. This will occur between + 5.6 V and + 6.8 V. Do not allow the supply to crowbar as this may blow the internal fuse (F2) protecting the + 5 V regulator.

4. Using an oscilloscope, measure the amplitude and frequency of the ripple on the + 5 V output at the backplane terminal block. The ripple should not be greater than 150 mV peak-to-peak with a period from 80 μ s- 140 μ s. If the ripple period is not within 80 μ s- 140 μ s, adjust R96. Turning R96 CW decreases the ripple period, while turning CCW increases the period. After adjusting the ripple period, recheck the + 5 V output (steps 2 and 3).

BA11-M



Backplane Terminal Block



Locations of H780 Adjustments

Controls and Indicators

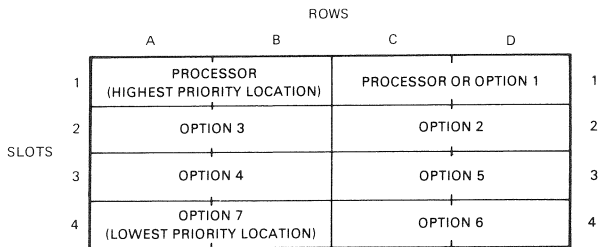
BA11-M/H780 Controls and Indicators

| Control/Indicator | Type | Function |
|-------------------|----------------------------|--|
| DC ON | LED Indicator | <p>Illuminates when the DC ON/OFF toggle switch is set to ON and proper dc output voltages are being produced by the H780.</p> <p>If either the +5 or +12 V output from the H780 is faulty, the DC ON indicator will not illuminate. This is the only indicator on the H780-K and -L slave supplies.</p> |
| RUN | LED Indicator | Illuminates when the processor is in the run state (see ENABLE/HALT). |
| SPARE | LED Indicator | Not used by the H780 or processor. The H780 contains circuitry for driving this indicator for user applications. |
| DC ON/OFF | Two-Position Toggle Switch | <p>When set to ON, enables the dc outputs of the H780. The DC ON indicator will illuminate if the H780 dc output voltages are of proper values. If a slave supply is connected to a master, the slave DC ON indicator will light if the slave dc output voltages are of proper value.</p> <p>When set to OFF, the dc outputs from the H780 are disabled and the DC ON indicator is extinguished. If a slave supply is connected to a master, the slave DC ON indicator will also extinguish.</p> |
| ENABLE/HALT | Two-Position Toggle Switch | When set to ENABLE, the BHALT L line from the H780 to the processor is not asserted and the processor is in the run mode (RUN indicator illuminated). |

BA11-M

BA11-M/H780 Controls and Indicators (Cont)

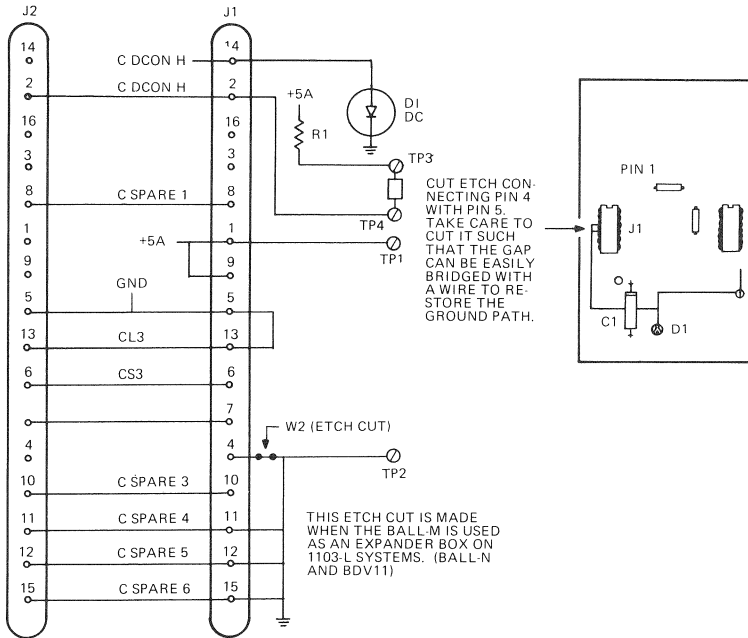
| Control/Indicator | Type | Function |
|------------------------|----------------------------|--|
| ENABLE/HALT | Two-Position Toggle Switch | When set to HALT, the BHALT L line is asserted, allowing the processor to execute console ODT microcode (RUN indicator extinguished). |
| LTC ON/OFF Switch | Two-Position Generation | When set to ON, enables the toggle of the line time clock (LTC) BEVNT L signal by the H780. When set to OFF, disables the H780 line time clock. |
| AC ON/OFF (Rear Panel) | Two-Position Toggle Switch | When set to ON, applies ac power to the H780. When set to OFF, removes ac power from the H780. |
| FUSE (Rear Panel) | 5 A or 2.5 A Fast Blow | Protects H780 from excessive current. H780-C, -H, and -K use a 5 A fuse. H780-D, -J, and -L use a 2.5 A fuse. |



VIEW FROM MODULE SIDE OF BACKPLANE

MR-1152

H9270 Option Positions (Q18)



MR-5378

H780 Slave Console Modification

H780 Slave Console Modification

The slave console (54-12143) for the H780 (in the BA11-ME/F 3.5 inch PDP-11/03 expander box) contains an etch that applies a ground signal to pin 4 (and others) on J1. This is desirable except when the BA11-M is used as an expander box and contains a line clock, such as with the BDV11 or when a BA11-M is used to expand a PDP-11/03-L system. In this case, the BDV11 requires the BEVNT signal to generate line clock interrupts. If this etch is present, the signal BEVNT L is asserted (reference H780 sheet 3 schematic), turning off the BEVNT signal.

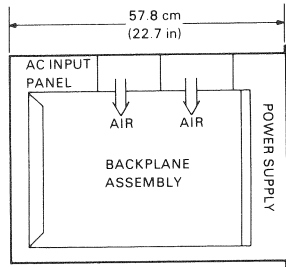
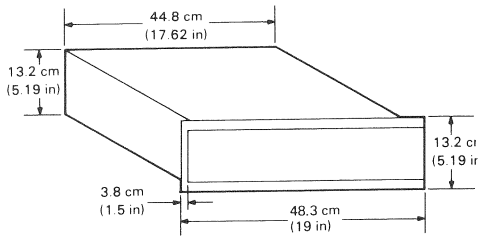
To correct this unwanted condition, it is necessary to cut an etch on the 54-12143 slave console board. The W2 etch cut is made when the BA11-M is used as an expander box on PDP-11/03-L systems (BA11-N and BDV11).

ECO no. 54-12143-PN002 has been written to document this change. In the ECO, the etch cut is referred to as W2. Pay particular attention to this when adding a BA11-M as an expander box, or when replacing the power supply/slave console assembly (H780-E/F/K/L) or the slave console board.

BA11-N

BA11-N MOUNTING BOX

Mounting Box: Physical Specifications



MR - 1158

BA11-NE and BA11-NF Assembly Unit

Power Supply Specifications

| Item | Specification |
|----------------|---|
| Current Rating | 5.5 A at 115 Vrms 2.7 A at 230 Vrms |
| Inrush Current | 100 A peak for one-half cycle at 128 Vrms or 256 Vrms |
| Apparent Power | 630 VA |
| Power Factor | The ratio of input power to apparent power shall be greater than 0.6 at full load and low input voltage. |
| Output Power | +5 Vdc, ± 250 mV at 22 A. (A minimum of 2 A of +5 Vdc power must be drawn to ensure that the +12 Vdc supply regulates properly.) +12 Vdc, ± 600 mV at 11 A. |

Power-Up/Power-Down Characteristics

Static Performance

| | |
|------------|---|
| Power-up | BDCOK H goes high: 75 Vac BPOK H goes high: 90 Vac |
| Power-down | BPOK H goes low: 80 Vac BDCOK H goes low: 75 Vac |

Dynamic Performance

| | |
|------------|---|
| Power-up | 3 ms (min.) from dc power within specification or to BDCOK H asserted. 70 ms (min.) from BDCOK H asserted to BPOK H asserted. |
| Power-down | 4 ms (min.) from ac power off to BPOK H negated. 4 ms (min.) from BPOK H negated to BDCOK H negated. 5 microseconds (min.) from BDCOK H negated to dc power as of specifications. |

BA11-N

Option Variations

- BA11-NC Consists of 13.2 cm (5.2 inch) mounting box with metal cover, H9273 backplane, and H786 power supply with console, for 115 Vac, 60 Hz.
- BA11-ND Consists of 13.2 cm (5.2 inch) mounting box with metal cover, H9273 backplane, and H786 power supply with console, for 230 Vac, 50 Hz.
- BA11-NE Consists of 13.2 cm (5.2 inch) mounting box with metal cover, H9273 backplane, and H786 power supply without console, for 115 Vac, 60 Hz.
- BA11-NF Consists of 13.2 cm (5.2 inch) mounting box with metal cover, H9273 backplane, and H786 power supply without console, for 230 Vac, 50 Hz.

CONFIGURATION

Jumpers and Switches

Backplane Jumper Positions – There are three jumper positions on the H9273 backplane: W1, W2, and W3. Jumpers are installed in all three positions when the backplane is manufactured. The conditions under which jumpers should be inserted or removed are described in the “Backplane Jumpers” table.

The jumper in position W1 is involved with CPU event interrupts. These interrupts can be initiated in two ways. First, a signal source external to the BA11-N can be used to pull the LSI-11 bus BEVNT L line low; in this case, the jumper of W1 of each H9273 backplane in the system would have to be removed. Second, the LTC signal generated in the H786 power supply can be used to pull the BEVNT L line low, thereby initiating vectored interrupts at a rate that depends on the BA11-N line frequency. W1 connects the LTC signal to the BEVNT L line; hence, in this case, the jumper would be left in position W1 of the H9273 backplane. In a multiple-box system, the box containing the M8012 module (i.e., the last box in the system) must be the source of the LTC signal; thus, the W1 jumper must be inserted in the backplane of this box and must be removed from the backplane of the other expander box(es).

The jumper in W2 connects CK1 to CL1 in row 1, while the jumper in W3 connects DK1 to DL1, also in row 1. These jumpers must be inserted whenever a quad KD11 CPU resides in row 1 of the first box.

BA11-N

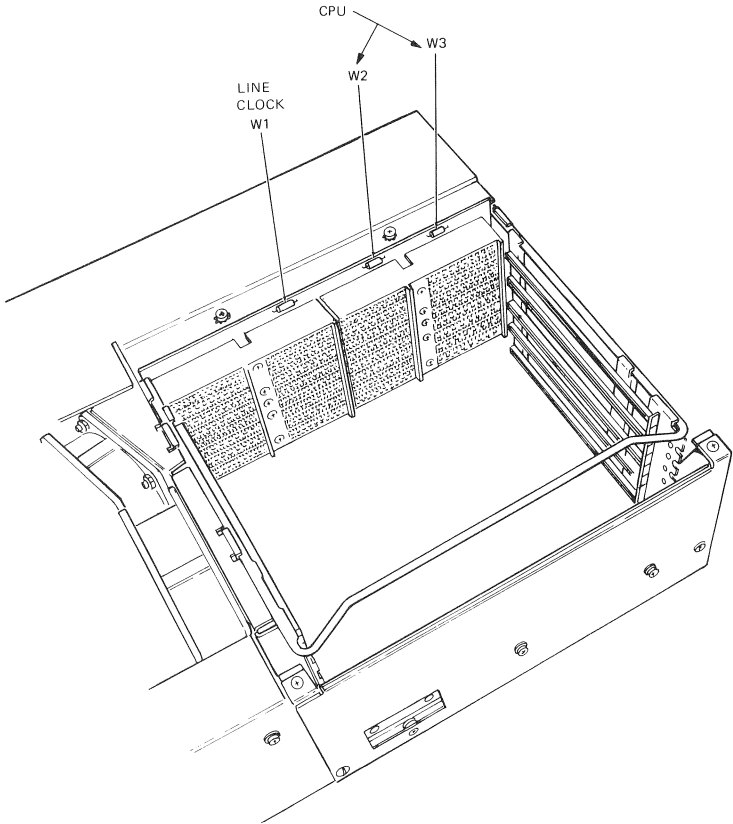
All three of these jumpers can be inserted and removed without any need for disassembly, other than removing the logic box base from the cover. However, if it ever becomes necessary to have clear access to the backplane, follow the instructions given for removal of the logic assembly in the *BA11-N Mounting Box Technical Manual*, EK-BA11N-TM.

Backplane Jumpers

| Jumper Position | Jumper(s) In | Jumper(s) Out |
|-----------------|--|---|
| W1 | When the H786 power-supply generated LTC signal is used to assert the LSI-11 bus BEVNT L signal. | When it is not desired to have line time clock (LTC) sourcing BEVNT L, such as when an external source is used instead. |
| W2, W3 | When a processor module (KD11-H or KD11-F) is inserted in row 1 of the backplane. | When any other module is installed in row 1; that is, when the backplane is part of an expander box. |

NOTE

In multiple backplane systems, only the one backplane can have jumper W1 installed. If a BDV11 module is used, install the jumper in the backplane containing the BDV11 module.



MR-2470

Backplane Jumpers

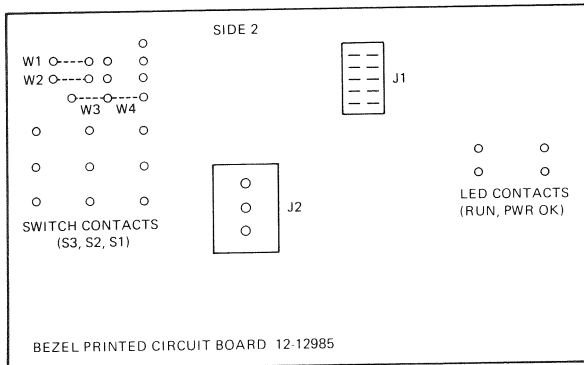
Bezel Assembly Jumper Positions – There are four jumper positions, W1, W2, W3, and W4, on the printed circuit board of the bezel assembly. When the board is manufactured, jumpers are inserted in positions W1, W2, and W4; position W3 is left blank.

If it is necessary to remove the bezel assembly printed circuit board for any reason, follow the instructions for removal of the bezel assembly given in the *BA11-N Mounting Box Technical Manual*, EK-BA11N-TM.

Bezel Assembly Jumpers

| Jumper Position | Jumper In | Jumper Out |
|------------------------|--|--|
| W1, W2 | When the bezel AUX ON/OFF switch is used to control the power-supply-generated LTC signal. (When the switch is in the AUX ON position, LTC-initiated interrupts are possible). | When the bezel AUX ON/OFF switch is used to turn the system power controller on and off. |
| W3 | When the bezel is to be mounted on the expander box. (W3 permits the HALT switch to light the RUN indicator.) | When the bezel is part of the main box; that is, the CPU is mounted in this bezel's backplane. |
| W4 | When the bezel is part of the main box. (W4 enables the S RUN L signal to light the RUN indicator.) | When the bezel is mounted on an expander box. |

BA11-N



NOTES:

1. VIEW IS FROM THE REAR OF THE BEZEL WHEN THE BOARD IS MOUNTED ON THE BEZEL.
2. JUMPERS ARE MOUNTED ON SIDE 1.

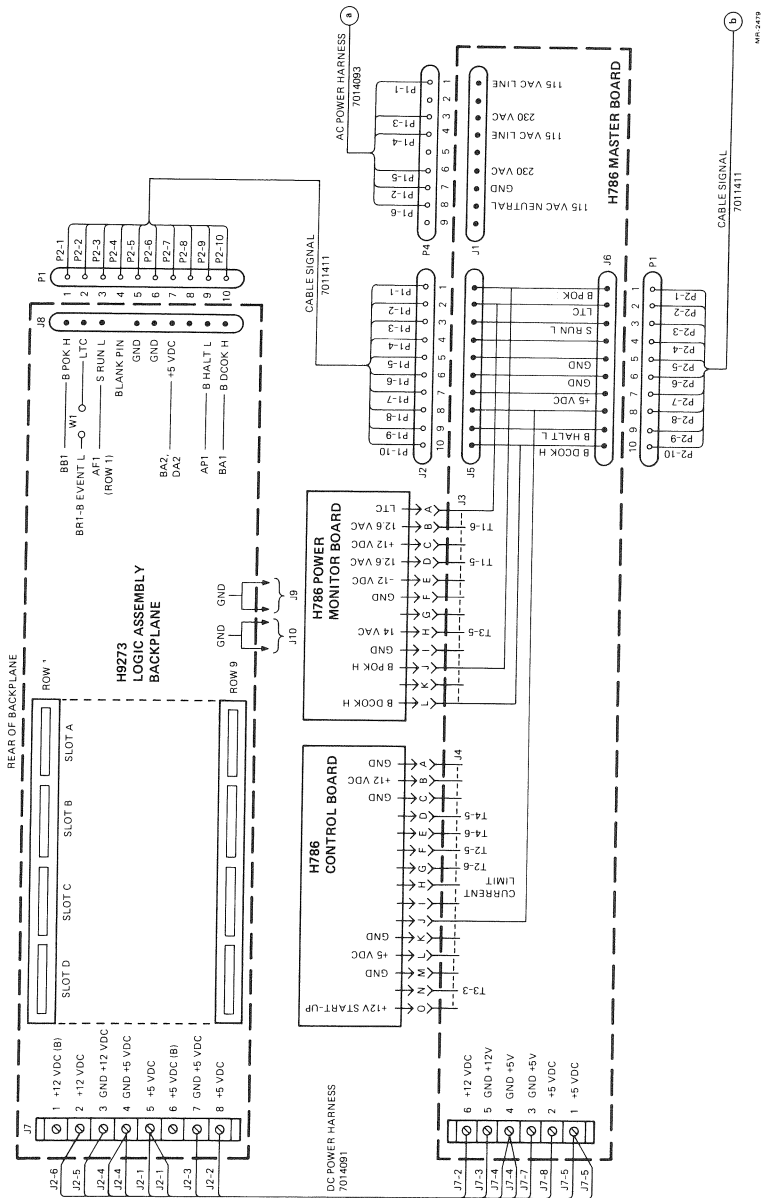
BEZEL ASSEMBLY JUMPERS

| JUMPER POSITION | JUMPER IN | JUMPER OUT |
|-----------------|---|---|
| W1, W2 | WHEN THE BEZEL AUX ON/OFF SWITCH IS USED TO CONTROL THE POWER SUPPLY GENERATED LTC SIGNAL (WHEN THE SWITCH IS IN THE AUX ON POSITION, LTC-INITIATED INTERRUPTS ARE POSSIBLE). | WHEN THE BEZEL AUX ON/OFF SWITCH IS USED TO TURN THE SYSTEM POWER CONTROLLER ON AND OFF. |
| W3 | WHEN THE BEZEL IS TO BE MOUNTED ON THE EXPANDER BOX (W3 PERMITS THE HALT SWITCH TO LIGHT THE RUN INDICATOR). | WHEN THE BEZEL IS PART OF THE MAIN BOX, I.E., THE CPU IS MOUNTED IN THIS BEZEL'S BACKPLANE. |
| W4 | WHEN THE BEZEL IS PART OF THE MAIN BOX (W4 ENABLES THE S RUN L SIGNAL TO LIGHT THE RUN INDICATOR). | WHEN THE BEZEL IS MOUNTED ON AN EXPANDER BOX. |

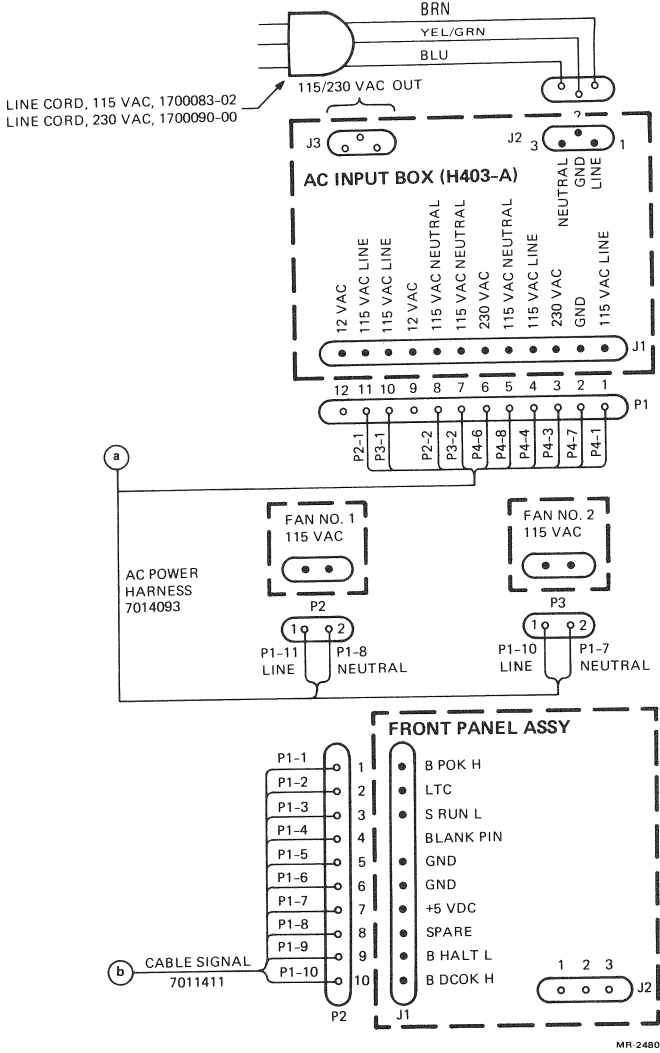
MR.2471

Bezel Printed Circuit Board

BA 11-N Unit Interconnection (Sheet 1 of 2)



BA11-N



BA11-N Unit Interconnection (Sheet 2 of 2)

Adjustments

DC Voltage Measurement – The +5 Vdc and +12 Vdc regulated voltages can be measured at J7 of the backplane or, preferably, at the tip jacks on the M8012 module. The pins of J7 are numbered, and the wires connected to them are color coded. +12 Vdc and +5 Vdc are assigned the following pins and colors.

- +12 Vdc - pin 2, purple wire
- +12 Vdc ground - pin 3, black wire
- +5 Vdc - pin 5, red wire
- +5 Vdc ground - pin 4, black wire

The tip jacks on the M8012 module are color coded and labeled as follows.

- +12 Vdc - J3, purple
- +5 Vdc - J2, red
- ground - J1, black

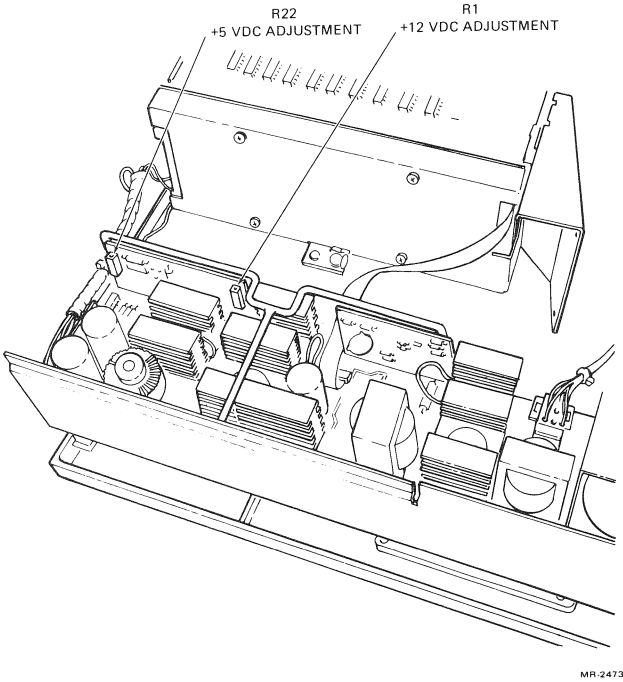
Use a calibrated digital voltmeter to measure the voltages under normal load conditions.

NOTE

Do not measure the dc voltages without a load on the power supply; incorrect readings will result.

The +5 Vdc output should be $+5\text{ V} \pm 250\text{ mV}$, while the +12 Vdc output should be $+12\text{ V} \pm 600\text{ mV}$. If either voltage is out of tolerance, adjust the appropriate potentiometer on the control board. R1 varies the +12 Vdc output and R22 varies the +5 Vdc output. The potentiometers are identified in the figure that follows. The correct output should be achieved when a potentiometer is near its mid-range position. If a potentiometer must be turned to near an extreme position to achieve tolerance limits, there is perhaps a problem somewhere in the regulator. If the output cannot be brought within limits, replace the entire control board.

BA11-N



MR-2473

Power Supply Adjustments

Controls and Indicators

Operation – The BA11-N can have a blank front panel or one equipped with three switches and three indicators. In addition to the front panel switches and indicators, there is an ON/OFF switch and a primary voltage selection switch, both on the ac input box. The ON/OFF switch remains in the ON position when a power controller is used to apply primary power to the BA11-N; if a power controller is not used, the switch can be used to turn power on and off.

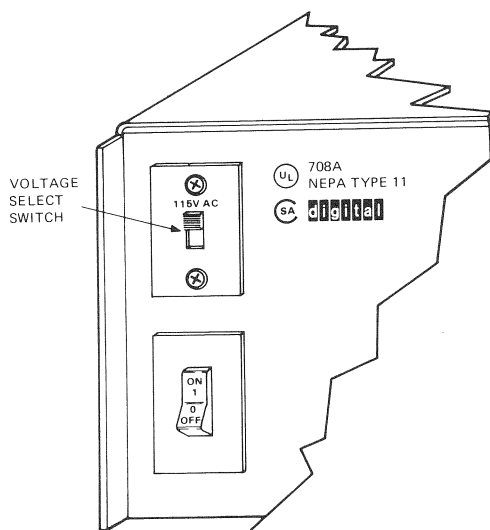
BA11-N Front Panel Switches and Indicators

| Switch | Indicator | Function |
|---------------|-----------|---|
| AUX ON/OFF | | <p>Can be used for any desired function (switch is rated at 48 V, 1 A dc). Two functions are explained below.</p> <p>If the BA11-N is wired to control system power, the AUX switch turns the power on and off; if the BA11-N is not wired to control system power, the switch can control the LTC signal, disabling the signal when the switch is in the OFF position.</p> |
| HALT | | <p>In the down position, the HALT switch forces the CPU to suspend normal program execution, enables console ODT microcode operation, and permits single-instruction execution. To resume program execution, return the HALT switch to the up position and enter a P command from the console terminal (providing that the contents of register R7 were not changed). Refer to the <i>Microcomputer Processor Handbook</i>, EB-18451-20, for a description of console ODT command usage.</p> <p>In an expander box, the HALT switch can be used to light the RUN indicator.</p> |
| RESTART | | <p>When the momentary RESTART switch is activated, the CPU automatically carries out a power-up sequence; thus, the CPU can be rebooted at any time from the front panel.</p> |
| | PWR OK | <p>The PWR OK indicator lights when the power supply dc voltages are present.</p> |
| | RUN | <p>The RUN indicator lights when the CPU is executing programs.</p> |

BA11-N

AC Voltage Selection – The BA11-N can be used with line voltage of either 115 Vac or 230 Vac. Only the ac line cord is different for the two voltages. However, a voltage selecting switch must be set to a position that corresponds to the line voltage being used. This switch is located on the rear of the ac input box, above the circuit breaker. The switch lever protrudes through a plate that is attached to the box.

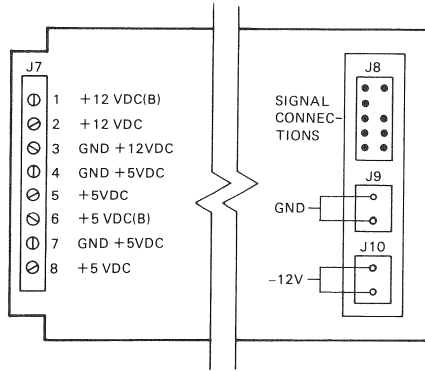
If the line voltage being used is 115 Vac, the designation “115 Vac” should be printed on the plate above the switch lever. If the printing on the plate is 230 Vac, remove the plate. Flip the plate over and notice that 115 Vac is printed on the opposite side; also, notice that the switch lever itself is imprinted with 230 Vac. Move the switch lever down; 115 Vac should appear on the top of the lever. Replace the plate over the switch lever so that the printing on the outside of the plate reads “115” Vac. (When the plate is on, the printing on the switch lever cannot be seen.) The plate is fabricated so that the screw holes in the plate and the input box line up only when the switch position corresponds to the printing on the outside of the plate.



MR-2474

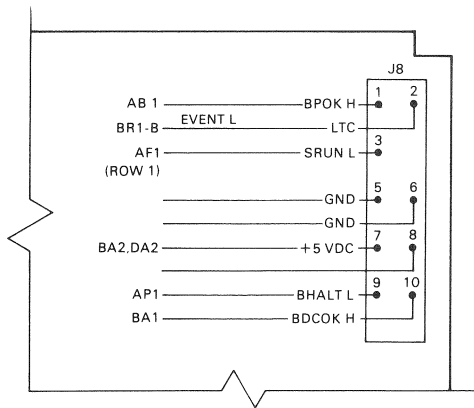
BA11-N Voltage Select Switch

Backplanes



MR - 1154

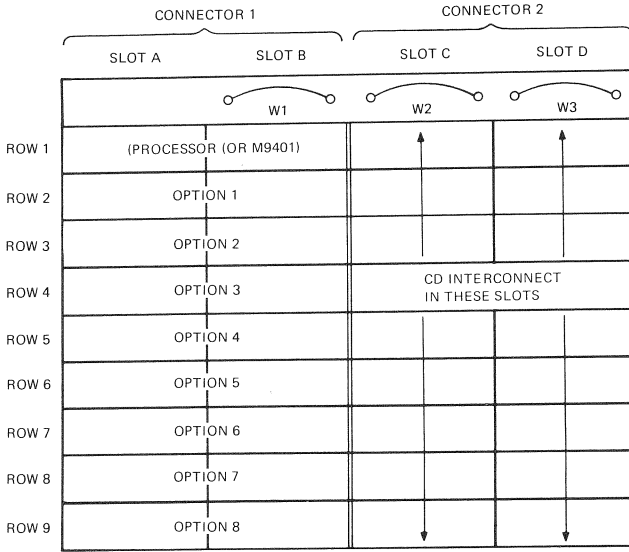
H9273-A Power Connections



MR - 1155

H9273-A Signal Connections

BA11-N



VIEW IS FROM MODULE SIDE OF CONNECTORS.

BACKPLANE JUMPERS

| JUMPER POSITION | JUMPER(S) IN | JUMPER(S) OUT |
|-----------------|--|---|
| W1 | WHEN THE H786 POWER SUPPLY GENERATED LTC SIGNAL IS USED TO ASSERT THE LSI-11 BUS BEVNT L SIGNAL. | WHEN IT IS NOT DESIRED TO HAVE LINE TIME CLOCK (LTC) SOURCING BEVNT L, SUCH AS WHEN AN EXTERNAL SOURCE IS USED INSTEAD. |
| W2, W3 | WHEN A CPU MODULE IS INSERTED IN ROW 1 OF THE BACKPLANE. | WHEN ANY OTHER MODULE IS INSTALLED IN ROW 1, I.E., WHEN THE BACKPLANE IS PART OF AN EXPANDER BOX. |

MR-2475

H9273-A Backplane Connectors

CD Bus Signals – The CD bus signals are supplied by slots C and D. The +5 V supply voltage is bused to all rows on pin A2 of slots C and D (that is, pins CA2 and DA2). Likewise, ground connections on pins CC2, CT1, DC2, and DT1 are bused to all rows. All other pins connect only to an adjacent row.

For example, pin CF2 of any row connects only to pin CF1 of the adjacent higher-numbered row. Pins on side 2 of the slot (B2, C2, etc.) connect to the adjacent higher-numbered row (except DT2, which connects to CT2 of the adjacent lower-numbered row), while pins on side 1 of the slot (B1, C1, etc.) connect to the adjacent lower-numbered row (except pin A1, which connects to C1 of the adjacent higher-numbered row).

Thus, each row, except 1 and 9, has 33 signal connections (other than +5 V and ground) to both the adjacent higher-numbered row and the adjacent lower-numbered row. To facilitate references to these two groups of 33 signals, group 1 is defined as the group of signals connecting a row (row X) to its adjacent lower-numbered row (row X-1). Group 2 is defined as the group of signals connecting a row to its adjacent higher-numbered row (row X+1). Generally, group 1 signals are found on side 1 pins, while group 2 signals are found on side 2 pins.

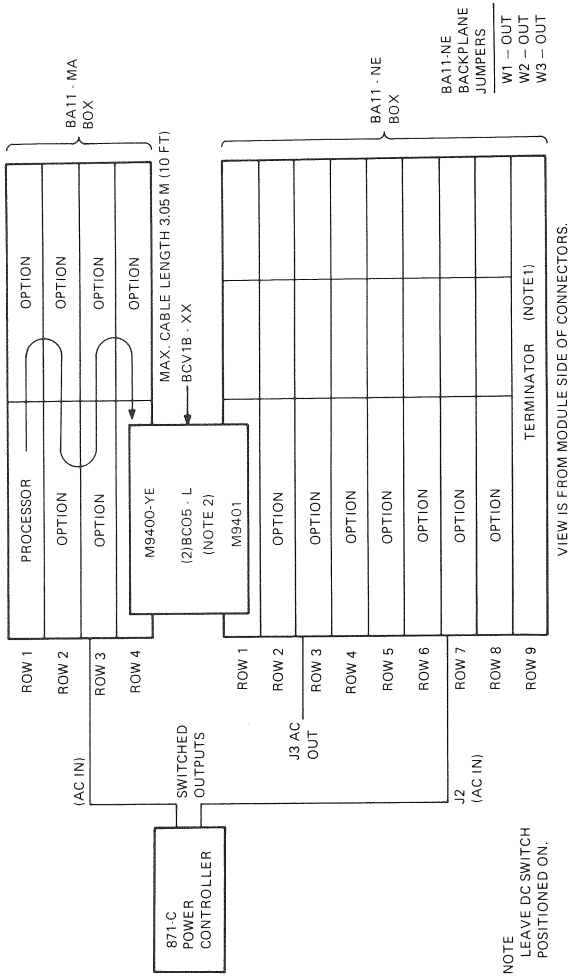
BA11-MA/BA11-NE Expansion Configuration

- The LTC is sourcing the BEVNT L in the BA11-MA box. (BDV11 is not being used.)
- Power is controlled by the 871C power controller ON/OFF switch.

NOTES

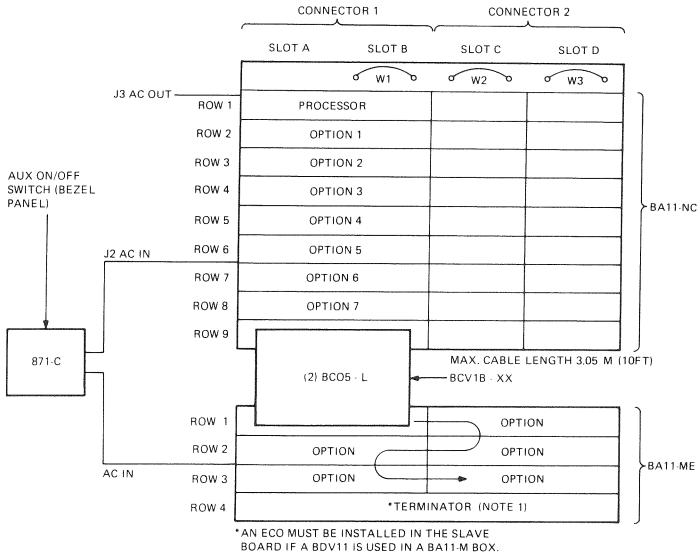
1. If a BDV11, with E21 switch 5 “on,” is used as the last module in the BA11-NE, install W1 in the BA11-NE backplane. Turn off the LTC switch (it must remain off) in the BA11-MA.
2. **BCV1B-XX*** configuration: M9400 YE in first A-B slot after options in BA11-MA backplane. M9401 KD in first A-B slot in BA11-NE backplane.

*XX denotes cable length.



MR 4973

BA11-MA to an NE Box Expansion



MR 4972

BA11-NC to an ME Box Expansion

BA11-NC backplane jumpers:

- W1 – IN
- W2 – IN (If M7264 or M7264-YA CPU is present.
- W3 – IN If not, remove jumper.)

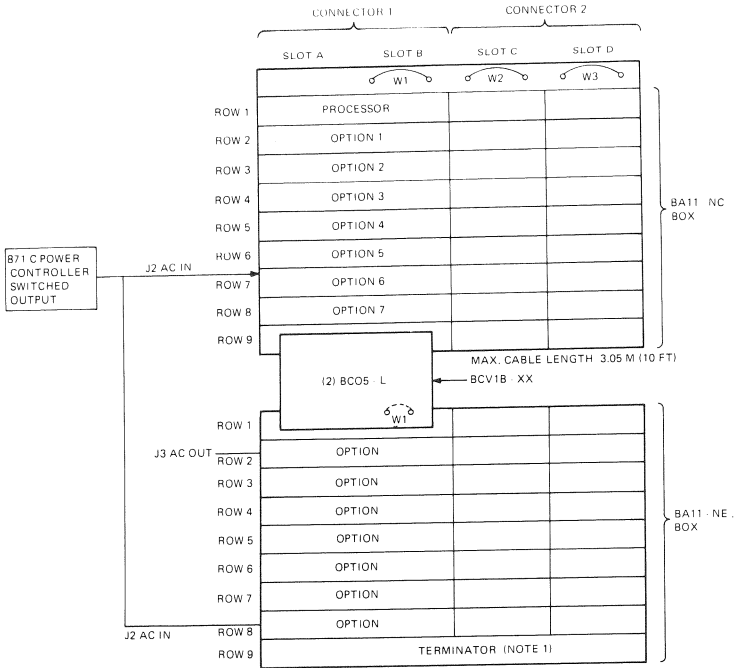
BA11-NC bezel jumpers:

- W1 – IN
- W2 – IN Must be in to allow LTC by front panel AUX ON/OFF SW.
- W1 – OUT When bezel AUX ON/OFF switch is used to turn system
- W2 – OUT power controller on or off; otherwise IN.
- W3 – OUT
- W4 – IN

NOTES

1. If a BDV11, with E21 switch 5 “on,” is used as the last module in the BA11-ME, remove W1 from the BA11-NC backplane.
2. BCV1B-XX configuration: see BA11 MA/NE configuration figure.

BA11-N



BA11-N to Another N Box Expansion

NOTES

1. If a BDV11, with E21 switch 5 "on," is used as the last module in the BA11-NE, install W1 in the BA11-NE backplane. Remove W1 from the BA11-NC backplane.
2. BCV1B-XX* configuration: M9400 YE in first A-B slot after options in BA11-NC. M9401 KD in first A-B slot of BA11-NE.

*XX denotes cable length.

BA11-NC backplane jumpers:

W1 I
W2 I
W3 I If using CPU M7264 or M7264-YA; otherwise R.

BA11-NC bezel jumpers:

W1 I
W2 I
W3 R
W4 I

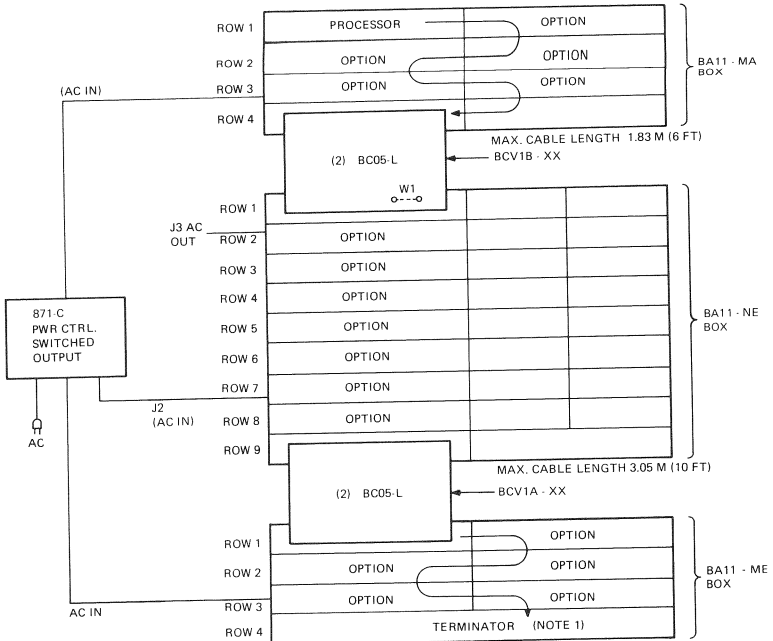
BA11-NE backplane jumpers:

W1 R
W2 R
W3 R

CAUTION

Do not attempt to source ac power for the BA11-N mounting box from the BA11-N box ac outlet, because the current rating of the BA11-N box will be exceeded and severe damage may occur. Also, do not attempt to provide ac power to the three BA11-N boxes from one 871-C power controller.

BA11-N



BA11-NE
BACKPLANE
JUMPERS
W1 - OUT (NOTE1)
W2 - OUT
W3 - OUT
NOTES

*AN ECO MUST BE INSTALLED IN THE SLAVE BOARD
IF A BDV11 IS USED IN A BA11-ME BOX.

MR 4970

BA11-MA to an ME Box Expansion

NOTES

1. If a BDV11, with E21 switch 5 "on," is used as the last module in the BA11-MA, install ECO in the BA11-ME slave console board. Remove W1 from this BA11-NE backplane. Turn off LTC switch (must remain off) on BA11-ME.
2. BCV1B-XX* configuration**: BCV1A-XX; M9400 YD in first A-B slot after options in BA11-NE; M9401 in first A-B slot in BA11-ME backplane.

*XX denotes cable length.
** See BA11-MA to an NE Box Expansion figure.

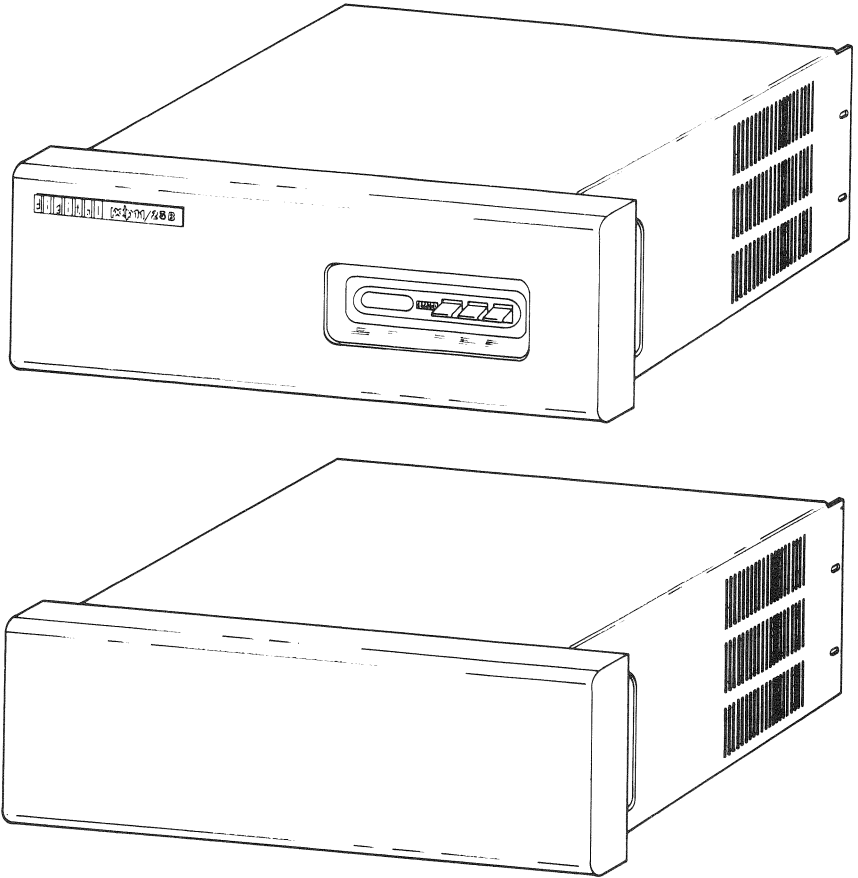
BA11-S MOUNTING BOX**GENERAL**

The mounting box is available for both 120 V and 240 V systems. Because a choice of front panels is provided, the user can select any of the following BA11-S models. Descriptions of the boxes, interconnections, and specifications follow.

BA11-S Models

| Model | Primary Power | Front Panel |
|--------------|----------------------|--------------------|
| BA11-SA | 120 V | Control panel |
| BA11-SB | 240 V | Control panel |
| BA11-SC | 120 V | Blank panel |
| BA11-SD | 240 V | Blank panel |

BA11-S



MR-6534

BA11-S with Control Panel and Blank Front Panel

BA11-S

BA11-S Mounting Box Specifications

| Item | Specifications |
|-----------------------------------|---|
| Dimensions (including bezel) | |
| Width | 48.3 cm (19 in) |
| Height | 13.2 cm (5.19 in) |
| Depth (without mounting brackets) | 57.8 cm (22.75 in) |
| Weight (without modules) | 20 kg (44 lb) |
| Operating temperature* | 5° C to 50° C (41° F to 122° F) |
| Operating humidity | 10% to 95% with a maximum wet bulb temperature of 32° C (90° F) and a minimum dew point of 2° C (36° F) |
| Input voltage | 120 Vac (BA11-SA/-SC) 240 Vac (BA11-SB/-SD) |
| Input current | 6 A maximum (BA11-SA/-SC) 3 A maximum (BA11-SB/-SD) |
| Output voltage | +5 V @ 2 A to 36 A +12 V @ 0.0 A to 5 A |

*The maximum allowable operating temperature is based on operation at sea level, that is, at 760 mm Hg (29.92 in Hg). Maximum allowable operating temperature will be lowered by a factor of 1.8° C per 100 m (1° F per 100 ft) for operation at higher altitude sites. When the equipment is being operated at the maximum allowable temperature, air flow must maintain air temperature rise to a maximum of 7° C (44.5° F).

POWER SUPPLY

BA11-S boxes use the H7861 power supply to provide operational power.

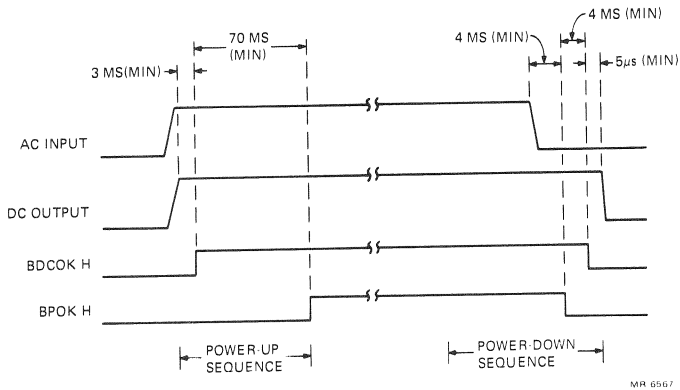
BA11-S Power Supply Specification

| Item | Specification |
|-------------------------------------|--|
| Current rating | 5.5 A @ 120 V rms 2.7 A @ 240 V rms |
| Inrush current | 100 A peak, for 1/2 cycle at 128 V rms or 256 V rms |
| Apparent power | 630 VA |
| Power factor | The ratio of input power to apparent power shall be greater than 0.6 at full load and low input voltage. |
| Output power | +5 Vdc, ± 150 mV, @ 36 A (A minimum of 2 A of +5 Vdc power must be drawn to ensure that the +12 Vdc supply regulates correctly.) |
| Power-up/power-down characteristics | +12 Vdc, @ ± 360 mV, @ 5 A |
| Static performance | |
| Power-up | BDCOK H goes high: @ 75 Vac BPOK H goes high: @ 85 Vac |
| Power-down | BPOK H goes low: @ 80 Vac BDCOK H goes low: @ 75 Vac |
| Dynamic performance | |
| Power-up | 3 ms (minimum) from dc power within specification to BDCOK H asserted. 70 ms (minimum) from BDCOK H asserted to BPOK H asserted. |
| Power-down | 4 ms (minimum) from ac power off to BPOK H negated. 4 ms (minimum) from BPOK H negated to BDCOK H negated. 5 μ s (minimum) from BDCOK H negated to dc power outside of specifications. |

BA11-S

BDCOK and BPOK

The power-up and power-down sequence controls the BDCOK and BPOK signals as follows.



Power-Up/Power-Down Timing

DC Voltage Adjustments

The +5 Vdc and +12 Vdc regulated voltages can be measured at J1 of the backplane or, preferably, at J2 of the power supply. The pins of connector J1 are numbered and the wires connected to them are color coded. The following pins and colors are assigned to +12 Vdc and +5 Vdc.

| | |
|----------|----------------------------------|
| + 12 Vdc | Pin 1, violet wire |
| + 5 Vdc | Pins 6, 7 and 8, red wires |
| Ground | Pins 2, 3, 4, and 5, black wires |

Use a calibrated digital voltmeter to measure the voltage under typical conditions.

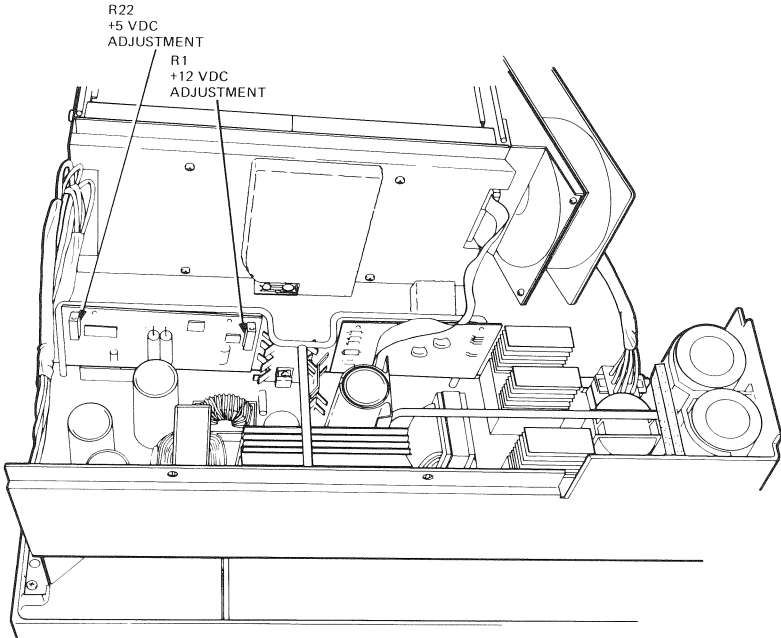
NOTE

Do not measure the dc voltage without a load on the power supply: incorrect readings will result.

The +5 Vdc output should be between 4.85 V and 5.15 V, while the +12 Vdc output should be between 11.64 V and 12.36 V. If either voltage is out of tolerance, adjust the appropriate potentiometer on the control board. R1 adjusts the +12 Vdc output and R22 varies the +5 Vdc output. The potentiometers are located by referring to the power supply adjustments drawing that follows.

NOTE

Adjust the +5 Vdc potentiometer first before adjusting the +12 Vdc potentiometer. Adjusting the +12 V potentiometer first, beyond the +12 V range, may cause a crowbar effect.



NOTE:
WHEN THE H7861 POWER SUPPLY LOCKING SCREWS ARE REMOVED AND THE POWER SUPPLY IS TIPPED FORWARD, THE SAFETY GROUND CONNECTION FOR THE BA11-S MOUNTING BOX IS NO LONGER PRESENT.

MR 6586

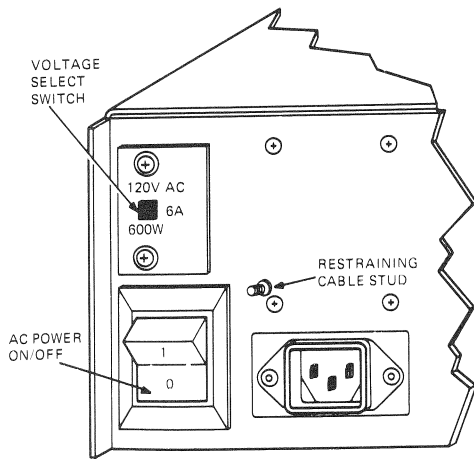
Power Supply Adjustments

BA11-S

AC Voltage Selection

The BA11-S can be used with line voltage of either 120 Vac or 240 Vac. Only the ac line cord is different for the two voltages. However, a voltage selection switch must be set to the position that agrees with the line voltage being used. This switch is found on the rear of the ac input box, above the circuit breaker. The switch lever extends through a plate that is attached to the box. The plate is made so that the screw holes in the plate and the input box line up only when the switch position agrees with the printing on the outside of the plate. If the line voltage being used is 120 Vac, the label "120 Vac" should be printed on the plate above the switch lever. If the printing on the plate is "240 Vac," remove the plate, and flip it over. The label "120 Vac" should be there. Also, see that the switch lever itself is imprinted with "240 Vac." Move the switch lever down; "120 Vac" should appear on the top of the lever. Replace the plate over the switch lever so that the printing on the outside of the plate reads "120 Vac."

The ac power is applied to the box by setting the 1/0 switch to the "1" position and off by setting the switch to the "0" position.

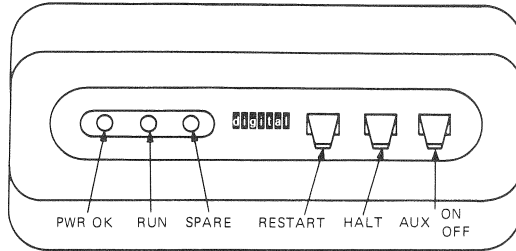


MR 8678

BA11-S Voltage Selection Switch

FRONT PANEL SWITCHES AND INDICATORS

The BA11-S can have either a blank front panel or one equipped with three switches and three indicators. The following figure shows the control-equipped front panel. The switch and indicator functions are also described in the following table.



MR 6649

Front Panel Switches and Indicators

BA11-S Front Panel Switches and Indicators

| Description | Function |
|-----------------|---|
| Switches | |
| AUX ON/OFF | If the BA11-S is wired to control system power, the AUX switch turns the power on and off. If the BA11-S is not wired to control system power, the switch can control the LTC signal, disabling the signal when the switch is in the off position. |
| HALT | In the down position, the HALT switch forces the CPU to suspend usual program execution, enables console ODT microcode operation, and permits single-instruction execution. To continue program execution, return the HALT switch to the up position and enter a P command from the console terminal (providing the contents of register R7 were not changed). In an expander box, the HALT switch can be used to light the RUN indicator. |
| RESTART | When the user presses the momentary RESTART switch, the CPU automatically carries out a power-up sequence; then, the user can reboot the CPU at any time from the front panel. |

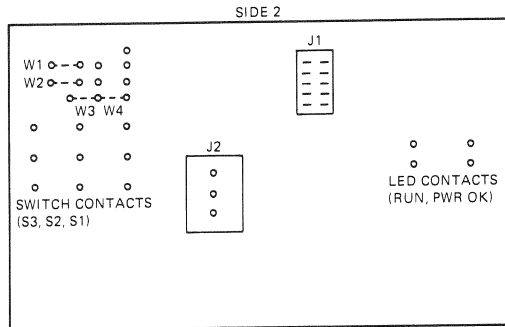
BA11-S

BA11-S Front Panel Switches and Indicators (Cont)

| Description | Function |
|-------------|--|
| Indicators | |
| PWR OK | The PWR OK indicator lights when the power supply dc voltages are present. |
| RUN | The RUN indicator lights when the CPU is executing programs. |

FRONT PANEL BEZEL

There are four jumper positions — W1, W2, W3, and W4 — on the printed circuit board of the bezel assembly. When the board is built, jumpers are inserted in positions W1, W2, and W4; position W3 is left blank. The conditions under which jumpers are inserted or removed follow.



NOTES:

1. VIEW IS FROM THE REAR OF THE BEZEL WHEN THE BOARD IS MOUNTED ON THE BEZEL.
2. JUMPERS ARE MOUNTED ON SIDE 1.

MR 6545

Front Panel Bezel Printed Circuit Board

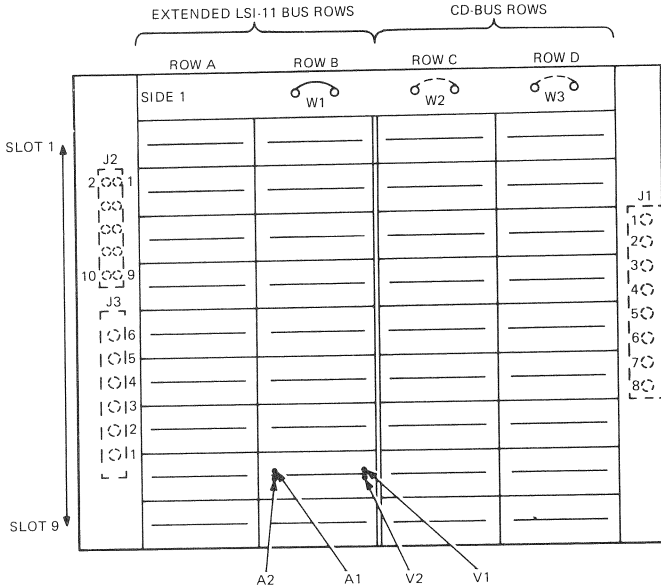
Bezel Assembly Jumpers

| Jumper | Jumper(s) In | Jumper(s) Out |
|--------|--|--|
| W1, W2 | When the bezel AUX ON/OFF switch is used to control the power supply generated LTC signal. (When the switch is in the AUX ON position, LTC-initiated interrupts are possible.) | When the bezel AUX ON/OFF switch is used to turn the system power controller on and off. |
| W3 | When the bezel is to be mounted on an expander box. (W3 permits the HALT switch to light the RUN indicator.) | When the bezel is part of the main box, that is, the CPU is mounted in this bezel's backplane. |
| W4 | When the bezel is part of the main box. (W4 enables the S RUN L signal to light the RUN indicator.) | When the bezel is mounted on an expander box. |

H9276 BACKPLANE

The BA11-S backplane is a 9 × 4 backplane that accepts both dual-height and quad-height modules. The backplane structure is unique; it provides two separate buses, the extended LSI-11 bus and the CD bus. The figure that follows shows these two buses and the backplane and points out the power and signal connectors (J1-J3). Modules are inserted in slots 1 through 9 of the backplane. The extended LSI-11 bus signals appear on rows A and B; the CD bus signals appear on rows C and D.

BA11-S



NOTE:
VIEW IS FROM MODULE
SIDE OF CONNECTORS

MR 6571

H9276 Backplane

Backplane Jumper Positions

There are three jumper positions — W1, W2, and W3 — on the H9276 backplane. A jumper is installed in jumper position W1 when the backplane is manufactured. The jumper conditions are as follows.

Backplane Jumpers

| Jumper | Jumper(s) In | Jumper(s) Out |
|--------|--|--|
| W1 | When a power supply generated LTC signal is used to assert the extended LSI-11 bus BEVBT L signal. | To disable the line time clock as BEVNT from the power supply. |
| W2, W3 | Only when using a KD-11 quad LSI-11 CPU module (M7264) in slot 1. | For all other LSI-11 type processors in slot 1. |

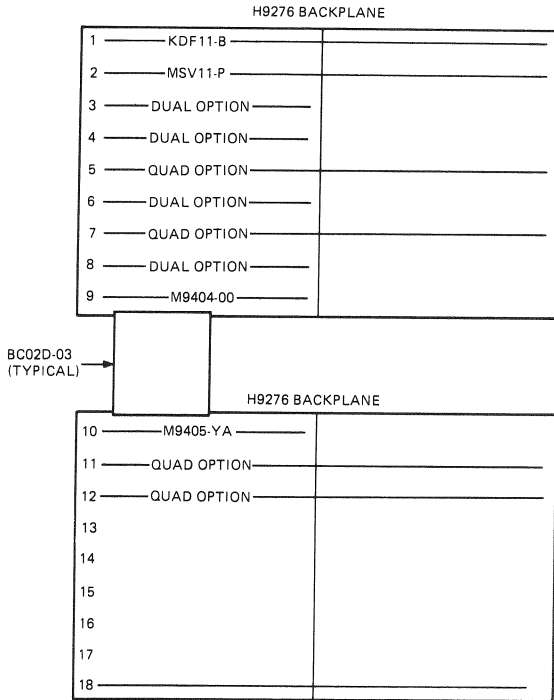
BA11-S

EXPANSION

The BA11-S box can be expanded if the backplane exceeds the 20 dc load or the 35 ac load requirements. The expansion cables are described in the following table and the typical expanded systems are shown in the following figures.

Extended LSI-11 Bus Expansion Cable Assemblies

| Assembly | Assembly Arrangement | Insert Modules In |
|-----------------|--|--|
| BC02D | Two BC02D-03 cables One M9404-00 module | Rows A and B of the first open slot after all other extended LSI-11 bus options have been installed in the main box. |
| | One M9405-00 module | Rows A and B of slot 1 of expander box 1. |
| BC02D | Two BC02D-10 cables One M9404-00 module | Rows A and B of the first open slot after all other Q22 bus options have been installed in expander box 1. |
| | One M9405-YA module | Rows A and B of slot 1 of expander box 2. |



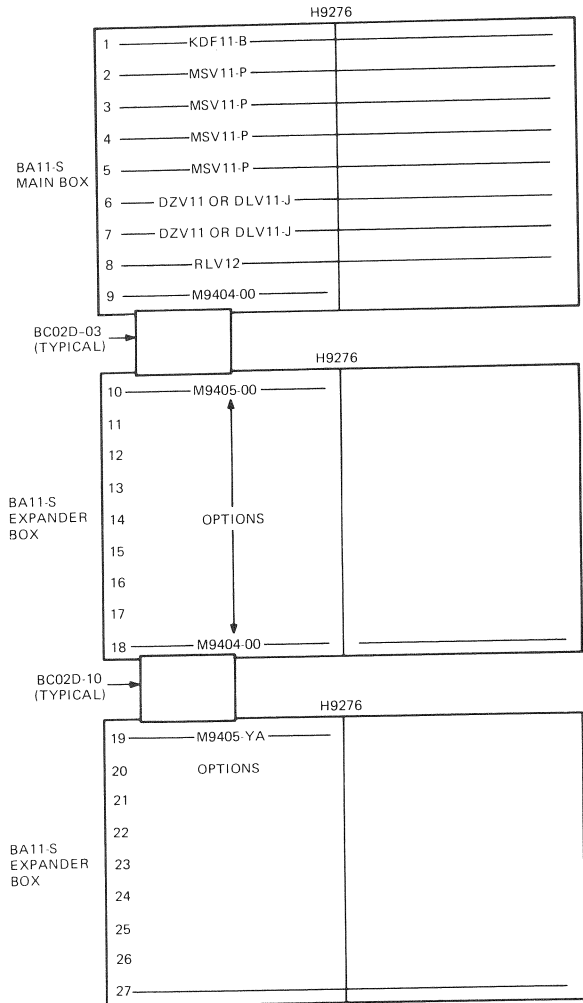
NOTES:

1. THE TOTAL DC LOADS OF BOTH BOXES CANNOT EXCEED 20.
2. EACH BC02D CABLE MUST BE AT LEAST 90 CM (3 FT) LONG, IF CONNECTED FROM THE MAIN BOX TO THE FIRST EXPANSION BOX.
3. EACH BC02D CABLE MUST BE AT LEAST 300 CM (10 FT) LONG, WHEN CONNECTED BETWEEN THE SECOND AND THIRD EXPANSION BOX.

MR 6694

BA11-S Two Backplane Configuration

BA11-S



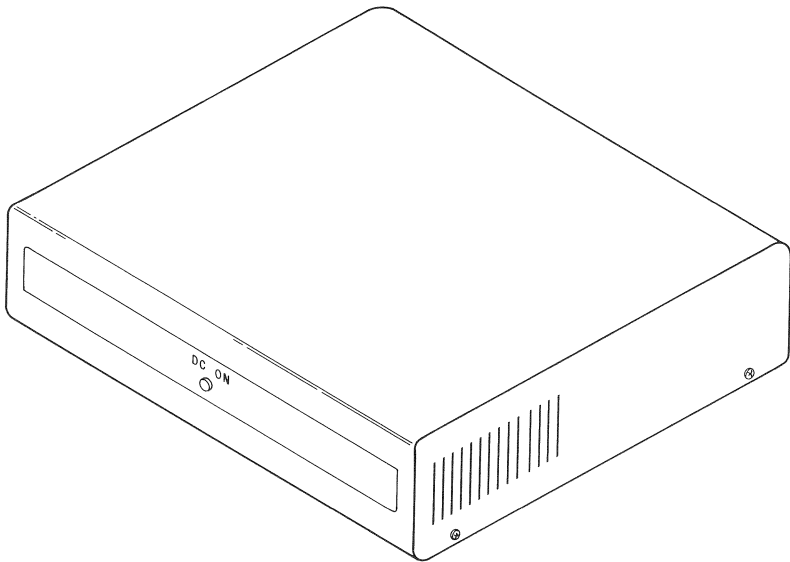
MR-6597

BA11-S Three Backplane Configuration

BA11-VA MOUNTING BOX

GENERAL

The BA11-VA mounting box is a self-contained LSI-11 2×4 backplane commonly described as the shoe box. This backplane contains only four slots and will only accept a dual-height type module.



BA11-VA Mounting Box

BA11-VA

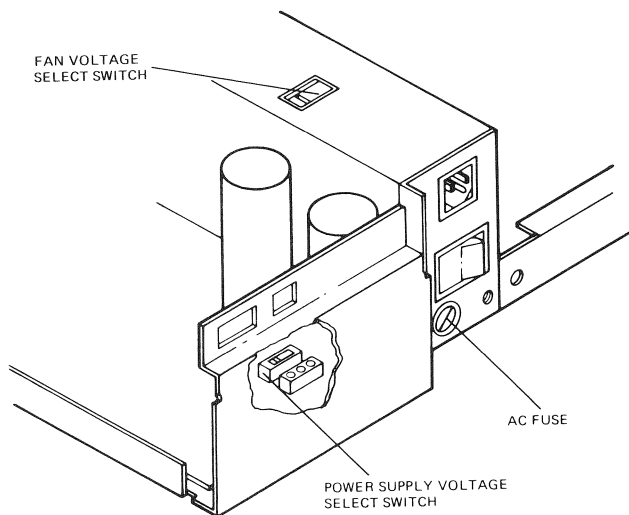
Power Requirements

Maximum ac input power 115 Vac 50/60 Hz @ 3 A
 230 Vac 50 Hz @ 1.6 A

Maximum dc power +5 Vac @ 5.6 A
including auxiliary output +12 Vac @ 1.6 A

Power Selection

The BA11-VA mounting box operates on either 115 Vac or 230 Vac and must be configured as follows before power is applied.



MR 8447

AC Input Voltage Selection

CAUTION

Be sure the voltage selections are identical before the power cord is inserted.

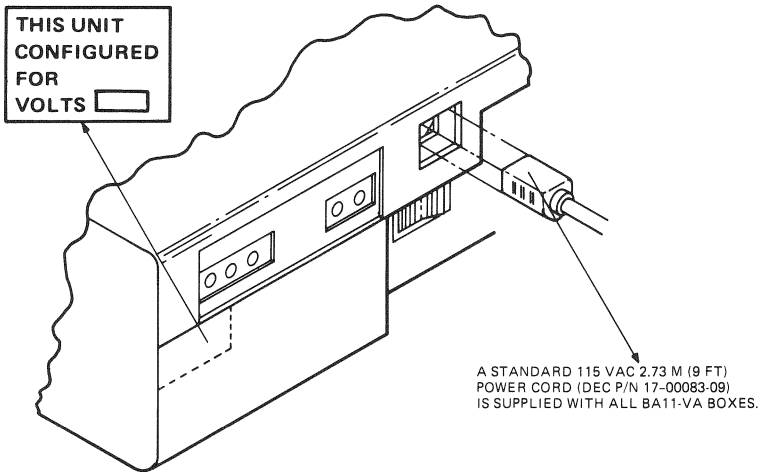
1. Remove the top cover by removing the four side screws.
2. Determine the voltage needed.
3. Set both the fan and power supply voltage select switches to the required voltage.

CAUTION

Both switches must be set for the same voltage.

4. Select the appropriate voltage decal, which is provided in the mounting hardware package, and apply the decal to the back of the BA11-VA box as shown.
5. Replace the top cover using the four screws removed in step 1.
6. Insert the ac power cord as shown.

The ac fuse holder (flush mounted) contains a 3 A fuse for 115/230 Vac operation. For 230 Vac operation, a 230 Vac power cord is needed for connection to a BA11-VA box.



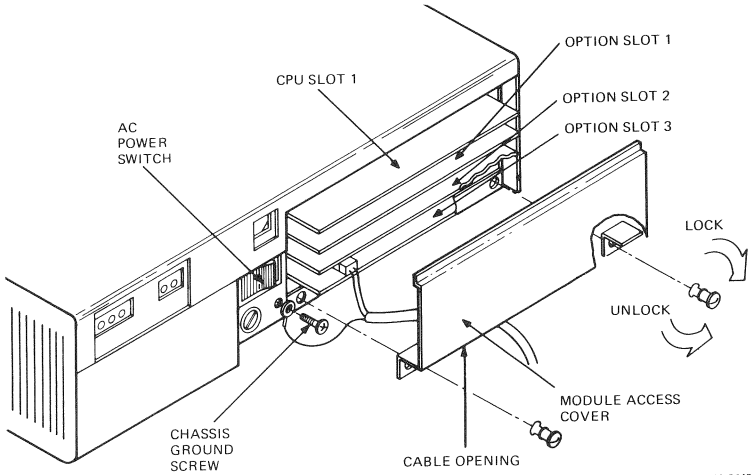
AC Power Cord

MR 8448

BA11-VA

Module Access

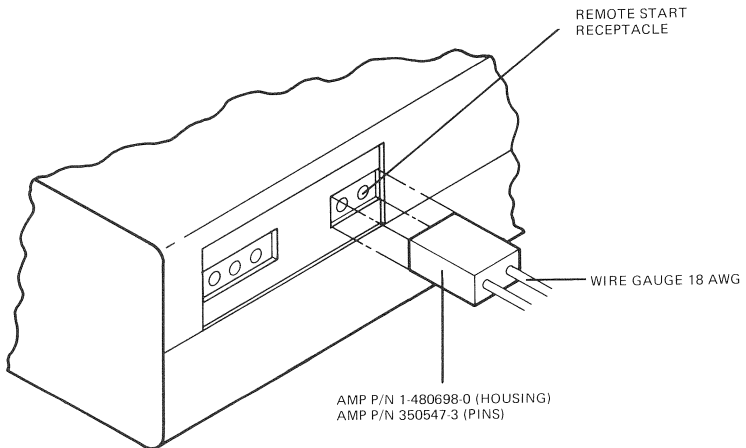
The module access cover is removed by turning the two screws a quarter turn counterclockwise (see the following figure). This allows access to the LSI-11 modules installed in the backplane.



Module Access

Remote Restart

The BA11-VA box is remotely controlled by installing a cable to the remote restart receptacle as (see the following figure).



Remote Restart

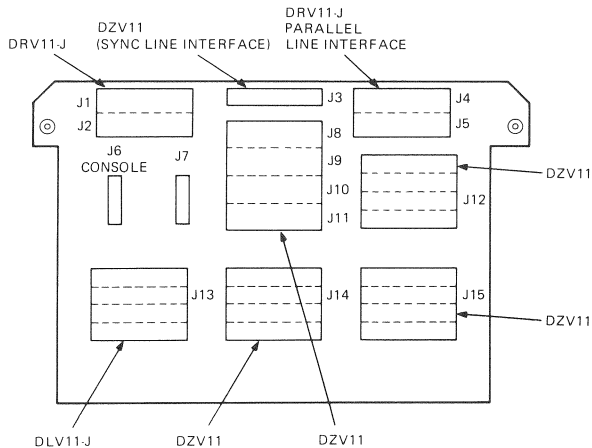
H349 DISTRIBUTION PANEL

GENERAL

The H349 distribution panel provides a simple and convenient way of interfacing peripheral equipment to a microcomputer system. The panel is normally installed within the system and is accessible from the rear.

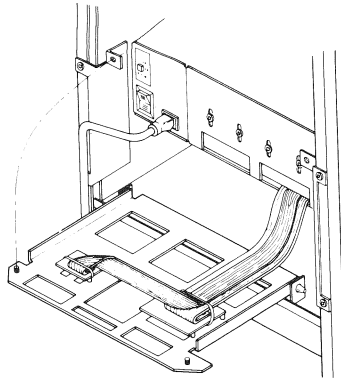
This 28.32 cm (11.15 in) by 44.10 cm (18 in) hinged panel is held in its vertical position by two quarter-turn captive screws. It can swing down to a horizontal position in order to service the microcomputer system.

The H349 panel contains ten mounting locations that provide mounting for up to fifteen connector cable assemblies (J1 through J15), as illustrated in the following figure. Eleven cable assemblies contain 1×4 slots (J1 through J11) and four contain 4×4 slots (J12 through J15). An adapter is available to transform four of the 1×4 slots (J8 through J11) into a 4×4 slot. When mounted, each cable assembly is connected to the microcomputer system by ribbon cables. The second figure that follows shows a typical installation. A list of cable assemblies used to provide interfacing for the options is provided.



H349 Distribution Panel

MR 8686



MR 8674

Typical Installation

Distribution Panel Cable Assemblies to System Options

| Option | Module | Cable Assembly | Extension Cable |
|----------|--------|-------------------------------------|--|
| DLV11-ED | M8017 | BC03L-2F BC03M-25 or BC22A-25 | BC05D-25 or |
| DLV11-J | M8043 | 7018204-00 | BC22A-25 |
| DMV11-AA | M8053 | BC55H-03 | BC05D-25 (EIA) |
| DMV11-AC | M8054 | BC55F-03 | BC55M-98 (Local) |
| DPV11-DC | M8020 | 7018209-00 | BC05D-25 or BC22B-22 |
| DZV11-C | M7957 | 7018203-00 | BC05D-25 or BC03M-25 or BC22A-25 |
| DRV11-D | M7941 | 7012405-02 | BC08R-25 |
| DRV11-JA | M8049 | | |
| LPV11-AC | M8027 | BC06K-4B and 1214614-01 | 7011212-25 |
| LPV11-BC | | | |
| LPV11-EE | | | |
| LPV11-EF | | | |

H780 POWER SUPPLY

H780 Power Supplies

Models, specifications, and basic adjustments are presented in this section. For more detailed technical information, refer to *H780-C,-D,-H,-J,-K,-L Power Supply User's Manual*, EK-H780C-OP-001, or to *Microcomputer Handbook*, EB0794853.

H780 Specifications

Input Voltage

100 Vac-127 Vac (H780-A, -C, -E, -H, -K, -M, -P)

200 Vac-254 Vac (H780-B, -D, -F, -J, -L, -N, -R)

Operation from ac lines below 100 V may cause the power supply to overheat because of decreased air flow from the cooling fans.

Temporary Line Dips Allowed

100% of voltage, 20 ms max.

AC Inrush Current

70 A @ 127 V, 60 Hz (8.33 ms)

25 A @ 254 V, 50 Hz (10 ms)

Fuses

5.0 A fast blow for 115 Vac options

2.5 A fast blow for 230 Vac options

Input Power (Fans Included)

340 W @ full load max.

290 W @ full load typical

EMI (Emission and Susceptibility)

Per DEC STD. 102.7 and VDE N-12 limits

Output Power (Combinations not to exceed 110 W)

+5 V 1.5 A-18 A

+12 V 0.25 A-3.5 A

H780

+5 V Output

| | |
|--------------------------|--|
| Total regulation | 5 V \pm 3% |
| Line regulation | \pm 0.5% |
| Load regulation | \pm 1.0% |
| Ripple | 150 mV p-p (1% for f < 3 kHz) |
| Dynamic load regulation | \pm 1.2% |
| | di/dt = 1.5 A/s |
| | Δ I = 5 A |
| Noise | 1% peak at f > 100 kHz (noise is superimposed on ripple) |
| Interaction due to +12 V | \pm 0.05% |

+12 V Output

| | |
|-------------------------|---|
| Total regulation | 12 V \pm 3% |
| Line regulation | \pm 0.25% |
| Load regulation | \pm 0.5% |
| Ripple | 350 mV p-p (1% for f < 3 kHz) |
| Dynamic load regulation | \pm 0.8% |
| | di/dt = 0.5 A/s |
| | f < 500 Hz |
| | Δ I = 3 A |
| Noise | 1% peak f > 100 kHz (noise is superimposed on ripple) |
| Interaction due to +5 V | \pm 0.2% |

Overvoltage Protection

| | |
|-------|--|
| +5 V | 6.3 V nominal min. = 5.65 V max. = 6.8 V |
| +12 V | 15 V nominal min. = 13.6 V max. = 16.5 V |

Adjustments

| | |
|--------------|--|
| +5 V output | 4.05 V-6.8 V guarantee range 4.55 V-5.65 V |
| +12 V output | 10.6 V-16.5 V guarantee range 11.7 V-13.6 V |

Backplane Signals

BPOK H
BDCOK H
BEVNT L
BHALT L
SRUN L

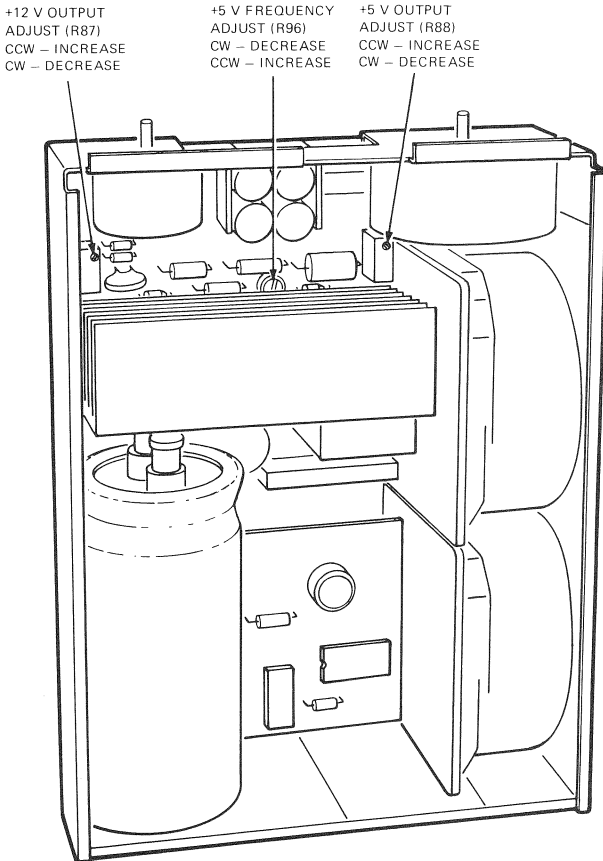
H780

Size

13.97 cm w × 8.43 cm h × 37.15 cm l
(5-1/2 in w × 3-1/3 in h × 14-5/8 in l)

Weight

5.90 kg (13 lbs)



MR-0766

H780 Voltage Adjustments

H780

H780 Controls and Indicators

| Control/ Indicator | Type | Function |
|-----------------------|-------------------------------|---|
| DC ON | LED Indicator | <p>Illuminates when the DC ON/OFF toggle switch is set to ON and proper dc output voltages are being produced by the H780.</p> <p>If either the +5 V or +12 V output from the H780 is faulty, the DC ON indicator will not illuminate. This is the only indicator on the H780-K and -L slave supplies.</p> |
| RUN | LED Indicator | <p>Illuminates when the LSI-11 or PDP-11/03 processor is in the run state (see ENABLE/HALT).</p> |
| SPARE | LED Indicator | <p>Not used by the H780 or processor. The H780 contains circuitry for driving this indicator for user applications.</p> |
| DC ON/OFF | Two-Position Toggle Switch | <p>When set to ON, enables the dc outputs of the H780. The DC ON indicator will illuminate if the H780 dc output voltages are of proper values. If a slave supply is connected to a master, the slave DC ON indicator will light if the slave dc output voltages are of proper value.</p> <p>When set to OFF, the dc outputs from the H780 are disabled and the DC ON indicator is extinguished. If a slave supply is connected to a master, the slave DC ON indicator will also be extinguished.</p> |
| ENABLE/HALT | Two-Position Toggle Switch | <p>When set to ENABLE, the BHALT L line from the H780 to the LSI-11 bus is not asserted and the processor is in the run mode (RUN indicator illuminated).</p> <p>When set to HALT, the BHALT L line is asserted, allowing the processor to execute console ODT microcode (RUN indicator extinguished).</p> |

H780 Controls and Indicators (Cont)

| Control/ Indicator | Type | Function |
|---------------------------|-------------------------------|--|
| LTC ON/OFF | Two-Position Toggle Switch | <p>When set to ON, enables the generation of the line time clock (LTC) by the H780.</p> <p>When set to OFF, disables the H780 line time clock.</p> |
| AC ON/OFF (Rear Panel) | Two-Position Toggle Switch | <p>When set to ON, applies ac power to the H780.</p> <p>When set to OFF, removes ac power from the H780.</p> |
| FUSE (Rear Panel) | 5 A or 2.5 A Fast Blow | Protects H780 from excessive current. H780-C, -H, and -K use a 5 A fuse. H780-D, -J, and -L use a 2.5 A. |

H786

H786/H7861 POWER SUPPLIES

SPECIFICATIONS

Current Rating

5.5 A @ 120 V rms

2.7 A @ 240 V rms

Inrush Current

100 A peak, for 1/2 cycle at 128 V rms or 256 V rms

Apparent Power

630 VA

Power Factor

The ratio of input power to apparent power shall be greater than 0.6 at full load and low input voltage.

Output Power

H786

+5 Vdc, ± 250 mV, @ 22 A (A minimum of 2 A of +5 Vdc power must be drawn to ensure that the +12 Vdc supply regulates properly; however, the +12 Vdc output will not go **above** 12.6 Vdc no matter what +5 Vdc current is drawn.)

H7861

+5 Vdc, ± 150 mV, @ 36 A (A minimum of 2 A of +5 Vdc power must be drawn to ensure that the +12 Vdc supply regulates correctly is drawn.)

Power Up/Down Characteristics

H786

+12 Vdc, ± 600 mV, @ 11 A

H7861

+12 Vdc, @ ± 360 mV, @ 5 A

Static Performance

Power up

BDCOK H goes high: @ 75 Vac

BPOK H goes high: @ 85 Vac

Power down

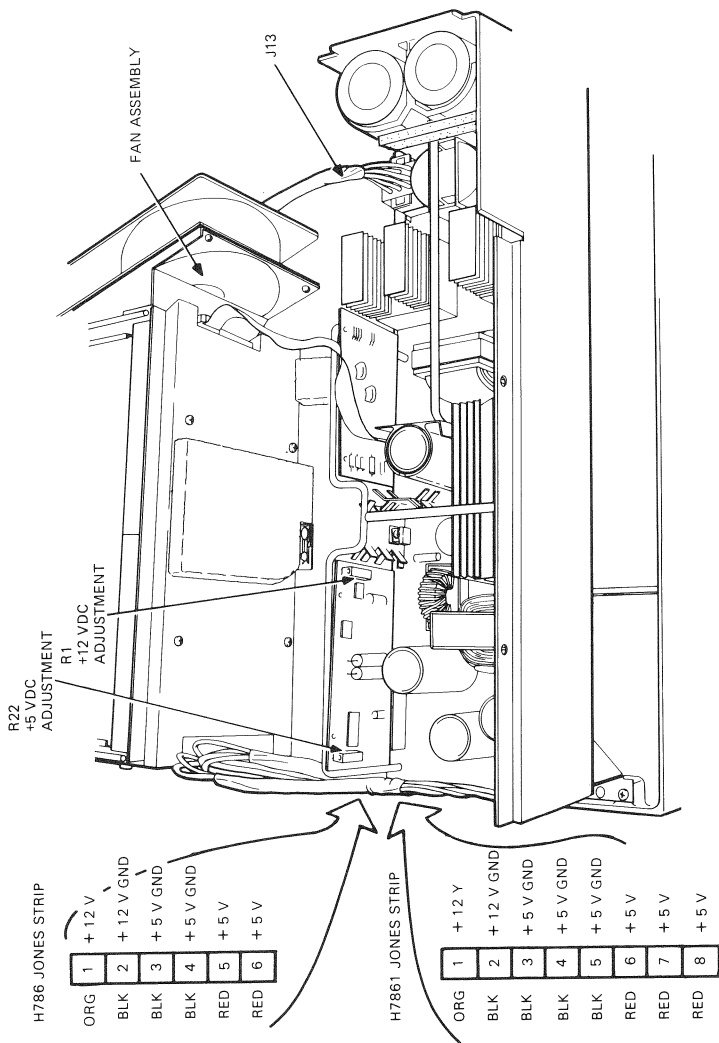
BPOK H goes low: @ 80 Vac

BDCOK H goes low: @ 75 Vac

Dynamic Performance

| | |
|------------|---|
| Power up | 3 ms (min.) from dc power within specification to BDCOK H asserted |
| | 70 ms (min.) from BDCOK H asserted to BPOK H asserted. |
| Power down | 4 ms (min.) from ac power OFF to BPOK H negated. |
| | 4 ms (min.) from BPOK H negated to BDCOK H negated. |
| | 5 μ s (min.) from BDCOK H negated to dc power out of specification. |

H786



MR 9742

H786/H7861 Power Supplies

H7864 POWER SUPPLY**SPECIFICATIONS**

Physical

Weight 77 kilograms (15.4 pounds)

Input Voltage

120 Vac 3 wire single phase (93 to 128 VRMS)

240 Vac 3 wire single phase (176 to 256 VRMS)

Line Frequency

47 to 63 Hz (either input voltage range)

Input Line Current

120 Vac @ 4.6 A

240 Vac @ 2.75 A

Output Voltages

+5 Vdc @ 8 A (min.) 36 A (max.)

| | |
|------------------------|---------------------------|
| Normal output | 5.1 V +5% |
| Minimum load | 8.0 A |
| Maximum load | 36.0 A |
| Ripple and noise | 50 mV peak to peak (max.) |
| Total regulation | +5% |
| Long term stability | 1%/1000 hr. |
| Overcurrent | 36 A (min.) 40 A (max.) |
| Short circuit current | 8 A (max.) |
| Overvoltage protection | 7 V (max.) with crowbar |

H7864

+12 Vdc @ 0 (min.) 7 A (max.)

| | |
|-----------------------|---------------------------|
| Normal output | 12.1 V |
| Minimum load | 0 A |
| Maximum load | 6.0 A |
| Ripple and noise | 75 mV peak to peak (max.) |
| Total regulation | +5% |
| Long term stability | .1%/1000 hr. |
| Overcurrent | 8 A (min.) – 11 A (max.) |
| Short circuit current | 2 A (max.) |
| Overvoltage | 14 V with crowbar protect |
| f = 500 Hz | |

–12 Vdc 0.5 Vdc (max.)

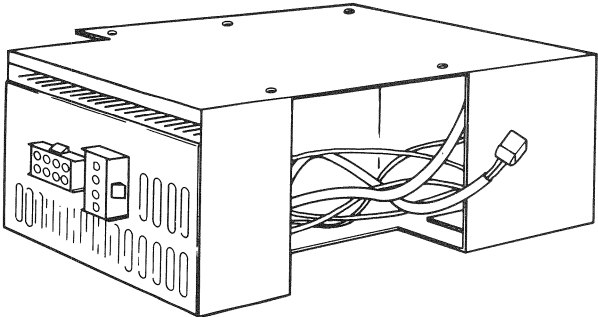
| | |
|-----------------------|----------------------------|
| Normal output | –12 V |
| Minimum load | 0 A |
| Maximum load | 0.5 A |
| Ripple and noise | 100 mV peak to peak (max.) |
| Total regulation | –5% |
| Long term stability | .1% /1000 hr. |
| Overcurrent protect | 0.5 A (max.) |
| Short circuit current | .5 A (max.) |

NOTE

Under any combination of load 230 watts of output power will not be exceeded.

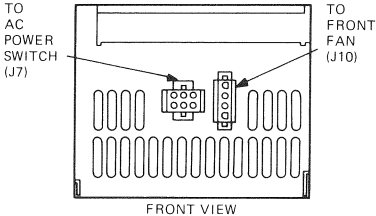
The power supply will support the following backplane signals:

BDCOK H
BPOK H
BEVENT L
DC OK
POWER OK



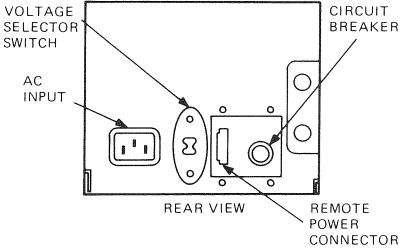
MR-9536

H7864 Power Supply (Side View)



MR-9534

H7864 Power Supply (Front View)



MR-9535

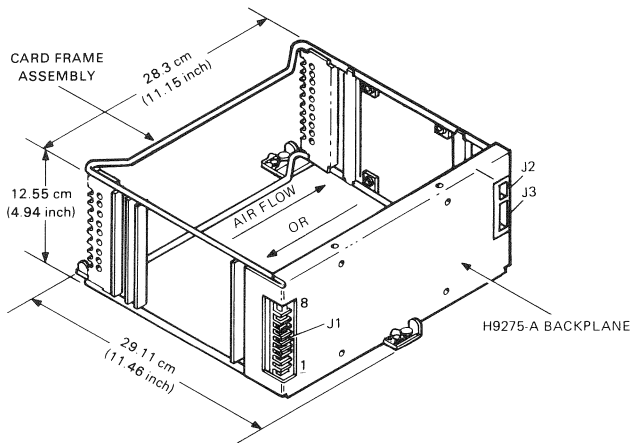
H7864 Power Supply (Rear View)

H9275

H9275 BACKPLANE

GENERAL

The H9275 backplane is designed to accept the LSI-11 type modules such as processors, memories, and interface modules. The backplane accepts up to 18 dual-height modules or 9 quad-height modules. The dual-height and quad-height modules can be mixed in a single backplane. The 22-bit address and four level interrupt features of the LSI-11/23 class processors are supported by the bus. The configuration can be modified to accept the LSI-11/2 and LSI-11 processors. The bus signals are terminated in the backplane and this eliminates the need for terminator modules.



MR 5494

H9275 Backplane Assembly

SPECIFICATIONS**Mechanical**

| | |
|--------|---------------------|
| Height | 12.55 cm (4.94 in) |
| Width | 28.30 cm (11.15 in) |
| Length | 29.11 cm (11.46 in) |
| Weight | 2.36 kg (5.25 lb) |

Electrical

| | |
|--------------|----|
| AC bus loads | 10 |
| DC bus loads | 0 |

+5 Vdc termination current

| | |
|---------------------|---------|
| Normal (no load) | 360 mA |
| Maximum (operating) | 1000 mA |

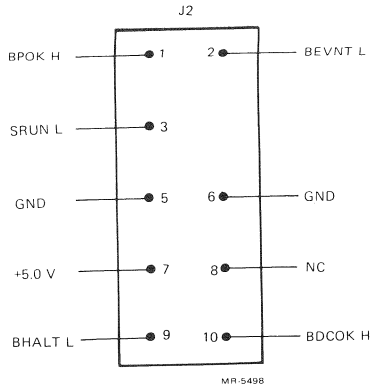
System Power Connector J1

| Terminal | Signal | Row Distribution for Each Slot |
|----------|-----------|--------------------------------|
| 1 | +5.0 Vdc | AA2, BA2, BV1 |
| 2 | +5.0 Vdc | CA2, DA2, DV1 |
| 3 | +5.0 Vdc | |
| 4 | Ground | AC2, AJ1, AM1, AT1 |
| 5 | Ground | BC2, BJ1, BM1, BT1 |
| 6 | Ground | CC2, CJ1, CM1, CT1 |
| 7 | Ground | DC2, DJ1, DM1, DT1 |
| 8 | +12.0 Vdc | AD2, BD2, CD2, DD2 |

Supplemental Power Connector J3

| Terminal | Signal | Slot Distribution |
|----------|--------------------------|-----------------------|
| 1 | -12.0 Vdc | AB2, BB2, CB2, DB2 |
| 2 | Ground | Same as ground for J1 |
| 3 | Ground | |
| 4 | +5.0 Vdc battery backup | AV1, CV1 |
| 5 | +5.0 Vdc battery backup | |
| 6 | +12.0 Vdc battery backup | AS1, CS1 |

H9275



Control Bus Signals J2 Connector

CONFIGURATION

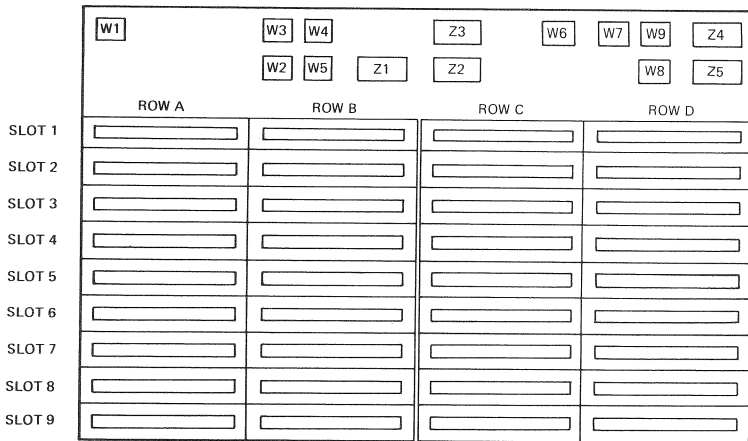
The H9275-A backplane assembly consists of nine slots and four rows that provide bus interface positions for up to 18 dual-height LSI-11 type modules. The assembly has nine jumper wires designated W1 through W9, and these are used to modify the bus configuration.

BEVNT L W1

The BEVNT L input may be provided by the user through the J2 connector. This signal is the external event interrupt request and is triggered by an external device such as a line time clock. To disable the signal from the J2 connector, remove the W1 jumper wire.

LSI-11/2 W2-W5

The LSI-11/2 (KD11-HA) processor can be used in the backplane. The W2, W3, W4, and W5 jumper wires are removed when using this type of processor. The W2 through W5 jumper wires connect the BDAL18 through BDAL21 address lines to position one, which is the processor position. The LSI-11/2 processor connects signals to these lines and will interfere with the operation of the bus if the jumper wires are not removed. The LSI-11/2 processor module identification number is M7270.

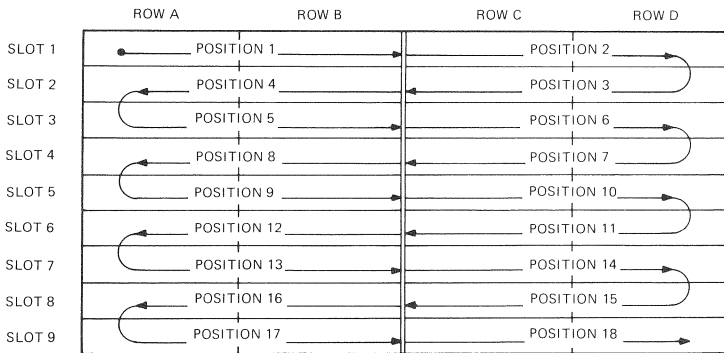


W1-W9 JUMPER WIRES
 Z1-Z5 BUS TERMINATION RESISTORS

VIEW IS FROM MODULE SIDE OF CONNECTORS

MR-5495

H9275-A Backplane Connectors



MR-5499

Horizontal Position Priority Structure

H9275

LSI-11 W6-W9

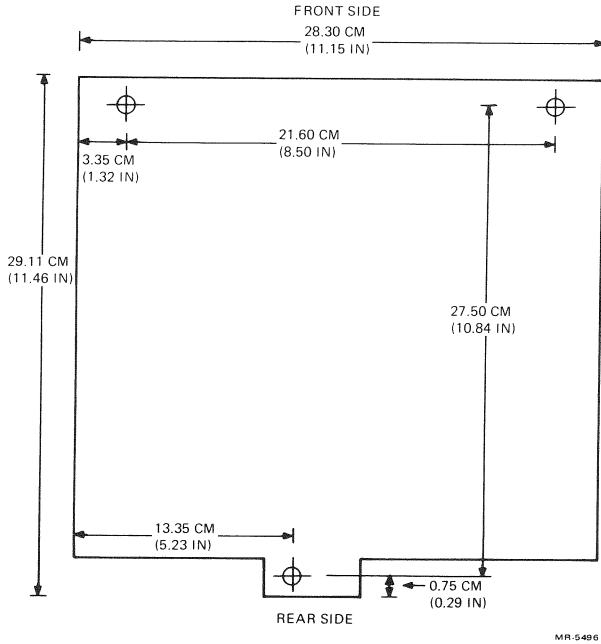
The LSI-11 (KD11-F) processor can be used in the backplane. The W6, W7, W8, and W9 jumper wires are removed when using this type of processor. This is a quad-height module and requires positions one and two on the backplane. The W6 through W9 jumper wires connect the BDAL18 through BDAL21 address lines to position two, which is used by the processor. The LSI-11 processor connects signals to these lines and will interfere with the operation of the bus if the jumpers are not removed. The W2 through W5 jumpers can be either installed or removed and do not interfere with the operation of the LSI-11 processor. The LSI-11 processor module identification number is M7264.

INSTALLATION

The H9275-A backplane assembly is intended to be a component of the user's system. The user is required to provide an adequate mounting surface, cooling air, electrical power, and any externally generated bus signals required to operate the system.

Backplane Mounting

The backplane uses three medium snap slide fasteners to secure it to the mounting surface. The user provides three mounting studs for the snap slide fasteners. These are available from the Dimco Gray Company as part number 25-1-075-093. These studs are positioned in a plane defined by the length and width of the backplane. The mounting stud locations within this plane are shown in the following figure.



Mounting Stud Locations

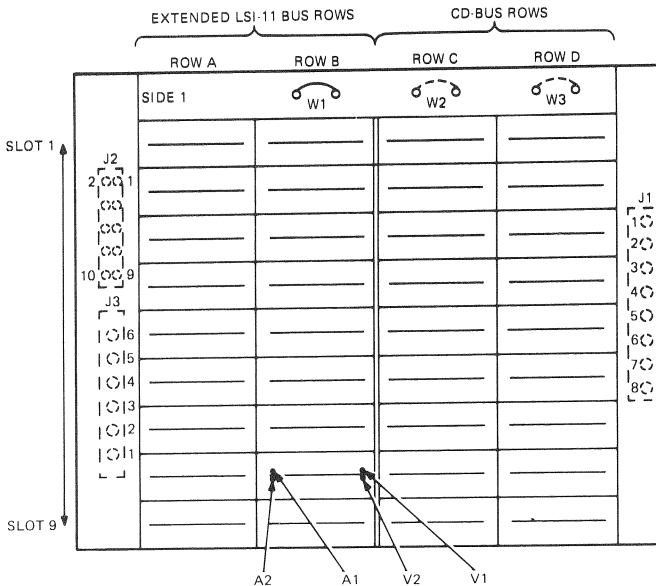
H9276

H9276 BACKPLANE

GENERAL

The H9276 is a 9×4 backplane. Both dual-height and quad-height modules can be inserted. Rows A and B of each slot supply the extended LSI-11 bus signals; these signals are bused to each of the nine slots.

The pins of the C and D rows are not bused; the pins of adjacent slots are connected. This precludes the necessity of top connectors and provides the means for designing buses whose lengths are determined by the number of modules in a set. The C and D rows of the backplane are referred to collectively as the CD bus.



NOTE:
VIEW IS FROM MODULE
SIDE OF CONNECTORS

H9276 Backplane

MR 6571

SPECIFICATIONS**Mechanical**

| | |
|--------|---------------------|
| Height | 12.55 cm (4.94 in) |
| Width | 28.30 cm (11.15 in) |
| Length | 29.11 cm (11.46 in) |
| Weight | 2.36 kg (5.25 lb) |

Electrical

| | |
|--------------|----|
| AC bus loads | 10 |
| DC bus loads | 0 |

+5 Vdc termination current

| | |
|---------------------|---------|
| Normal (no load) | 360 mA |
| Maximum (operating) | 1000 mA |

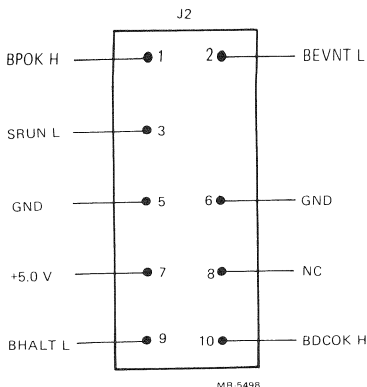
System Power Connector J1

| Terminal | Signal | Row Distribution for Each Slot |
|----------|-----------|--------------------------------|
| 1 | +5.0 Vdc | AA2, BA2, BV1 |
| 2 | +5.0 Vdc | CA2, DA2, DV1 |
| 4 | Ground | AC2, AJ1, AM1, AT1 |
| 5 | Ground | BC2, BJ1, BM1, BT1 |
| 6 | Ground | CC2, CJ1, CM1, CT1 |
| 7 | Ground | DC2, DJ1, DM1, DT1 |
| 8 | +12.0 Vdc | AD2, BD2, CD2, DD2 |

Supplemental Power Connector J3

| Terminal | Signal | Slot Distribution |
|----------|--------------------------|-----------------------|
| 1 | -12.0 Vdc | AB2, BB2, CB2, DB2 |
| 2 | Ground | Same as ground for J2 |
| 3 | Ground | |
| 4 | +5.0 Vdc battery backup | AV1, CV1 |
| 5 | +5.0 Vdc battery backup | |
| 6 | +12.0 Vdc battery backup | AS1, CS1 |

H9276



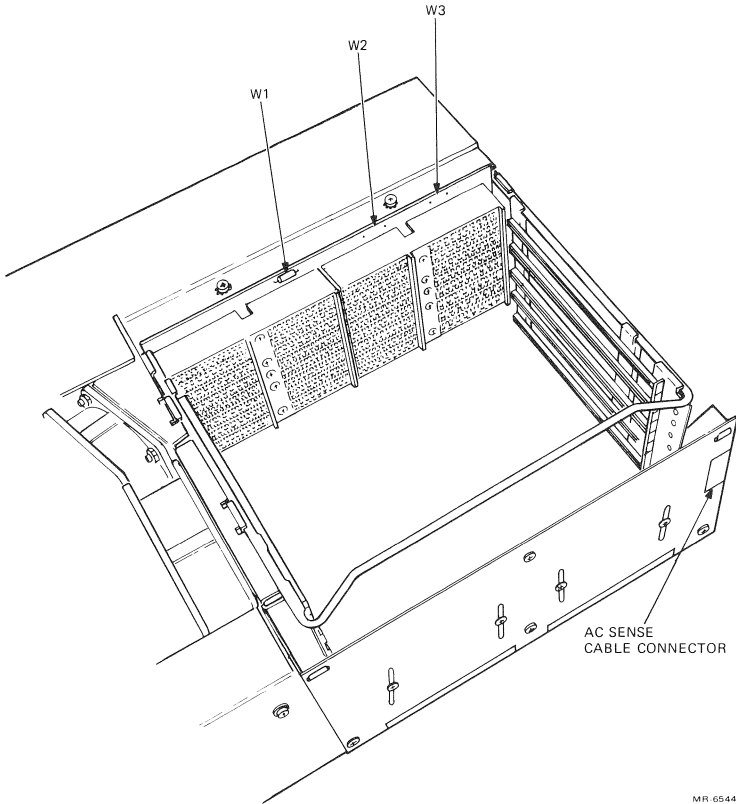
Control Bus Signals J2 Connector

CONFIGURATION

The H9276 backplane has three jumpers designated as W1, W2, and W3 as shown in the following figure. The configuration of these jumpers is listed in the table that follows.

Backplane Jumpers

| Jumper | Jumper(s) In | Jumper(s) Out |
|--------|--|--|
| W1 | When a power supply generated LTC signal is used to assert the extended LSI-11 bus BEVNT L signal. | To disable the line time clock (LTC) as BEVNT from the power supply. |
| W2, W3 | Only when using a KD-11 quad LSI-11 CPU module (M7264) in slot 1. | For all other LSI-11 type processors in slot 1. |



MR-6544

H9276 Backplane Jumpers

H9278-A

H9278-A BACKPLANE

GENERAL

The H9278-A is a Q22-Q22/CD interconnect-type backplane assembly which accepts both dual- and quad-height modules. It consists of eight slots by four rows each; with the first three slots being Q22 Bus on the A and B rows and the CD interconnect on the C and D rows. The remaining five slots contain the Q22 Bus on rows A and B and on rows C and D.

This configuration allows the use of dual and quad Q22 Bus modules.

The backplane may also be used as an expansion backplane. In that case, the expansion cable would exit the slot immediately following the last option module in the kernel backplane, and enter the first slot of the expansion backplane.

Voltages

Bus Load Capacity

| | AC | DC |
|----------------------|-----------|----|
| +5 Vdc @ 36 A (max.) | 32 (max.) | 0 |
| +12 Vdc @ 6 A (max.) | 0 | |

Grant Continuity

The BIAKO L/BIAKI L and BDMGOL/BDMGI L signals are daisy-chained in bus priority positions. Each slot requires the insertion of a module which passes on these grant signals, as no jumpers are provided on the backplane for this purpose.

Backplane Termination

All the Q22 bus lines are terminated by inserting four resistor packs (1318110-00) into positions XZ1, XZ2, XZ3, and XZ4 on the backplane. Each line is then terminated with a 330 ohm resistor to +5 V and a 680 ohm resistor to GND (characteristic impedance – 220 ohms). The first backplane in a two backplane system should have these resistor packs removed.

Power Connectors

There are three power connectors and one signal connector on the backplane. Two are four-pin Mate-N-Loks (J3 and J4) and are used to supply power to the backplane and not to draw power from it. The third connector is an 18-pin straight single in-line connector (J1) used to supply power and signals to the backplane.

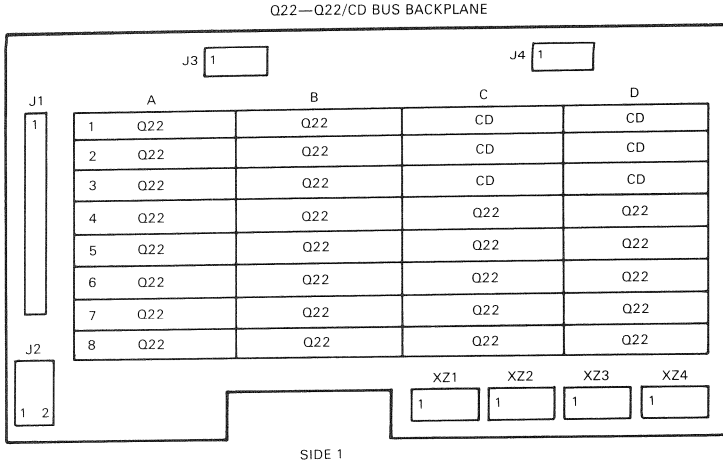
Power Connector Designations

| Voltage | Input | Destinations |
|--------------------------|---------------|------------------------------|
| +5 V @ 36 A (maximum) | J1-11 | A01A2 → A08A2 |
| | thru | B01A2 → B08A2 |
| | J1-6 | B01V1 → B08V1 |
| | | C01A2 → C08A2 |
| | J3-4 | D01A2 → D08A2 |
| | D04V1 → D08V1 | |
| | J4-4 | J2-7 |
| | | J2-8 |
| +12 V @ 6 A (maximum) | J1-17 | A01D2 → A08D2 |
| | | B01D2 → B08D2 |
| | J3-1 | C04D2 → C08D2 |
| | | D04D2 → D08D2 |
| | J4-11 | J2-1 |
| Ground | J1-7 | A01J1 → A08J1, A01M1 → A08M1 |
| | thru | A01T1 → A08T1, A01C2 → AP8C2 |
| | J1-13 | B01J1 → B08J1, B01M1 → B08M1 |
| | | B01T1 → B08T1, B01C2 → B08C2 |
| | J3-2 | C04J1 → C08J1, C04M1 → C08M1 |
| | J3-3 | C01T1 → C08T1, C01C2 → C08C2 |
| | | D04J1 → D08J1, D04M1 → D08M1 |
| | J4-2 | D01T1 → D08T1, D01C2 → D08C2 |
| | J4-3 | J2-5 |
| | J2-6 | |
| BDCOK H | J1-14 | B01A1 → B08A1 |
| | | D04A1 → D08A1 |
| | | J2-10 |
| BPOK H | J1-15 | B01B1 → B08B1 |
| | | D04B1 → D08B1 |
| BEVNT L | J1-16 | B01R1 → B08R1 |
| | | D04R1 → C08R1 |
| | | J2-2 |

Front Panel Connector

There is a 10-pin connector (J2) used to send signals to the front panel if one is required.

H9278-A



NOTE: CONNECTORS J1, J2, J3, AND J4 ARE MOUNTED ON SIDE 2.
XZ1, XZ2, XZ3, AND XZ4 ARE TERMINATOR RESISTOR PACKS.

MR-12864

Backplane Component Layout

Front Panel Connectors

| Connector | Signal | Backplane Source |
|-----------|----------|------------------|
| J2-1 | +12 V | A01D2 |
| J2-2 | BEVENT L | B01R1 |
| J2-3 | S RUN L | A01F1, C01C1 |
| J2-4 | KEY | No connection |
| J2-5 | GND | A01C2 |
| J2-6 | GND | A01C2 |
| J2-7 | +5 V | A01A2 |
| J2-8 | +5 V | A01A2 |
| J2-9 | BHALT L | A01P1 |
| J2-10 | B DCOK L | B01A1 |

CONNECTOR ROWS

| SLOT | A | B | C | D |
|------|-----|-----------|----------|-----------|
| 1 | Q22 | Q22 (P1) | C-INTCON | D-INTCON |
| 2 | Q22 | Q22 (P2) | C-INTCON | D-INTCON |
| 3 | Q22 | Q22 (P3) | C-INTCON | D-INTCON |
| 4 | Q22 | Q22 (P4) | Q22 | Q22 (P5) |
| 5 | Q22 | Q22 (P7) | Q22 | Q22 (P6) |
| 6 | Q22 | Q22 (P8) | Q22 | Q22 (P9) |
| 7 | Q22 | Q22 (P11) | Q22 | Q22 (P10) |
| 8 | Q22 | Q22 (P12) | Q22 | Q22 (P13) |

NOTES: P(X) — INDICATES PRIORITY POSITION: P1 BEING HIGHEST, THROUGH P13 BEING THE LOWEST.

MR.12865

Backplane Sectional Busing Example

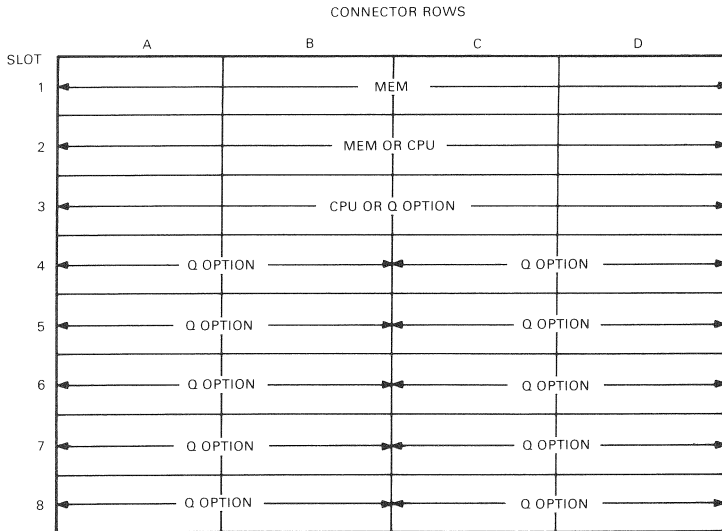
H9278-A

Q22/LSI-11 Bus Designations

| Connector Row A | | Connector Row B | |
|-----------------|------------------|-----------------|-----------|
| Pin | Signal | Pin | Signal |
| A1 | BIRQ 5 L | A1 | BDCOK H |
| A2 | +5 V | A2 | +5 V |
| B1 | BIRQ 6 L | B1 | BPOK H |
| B2 | Not used | *5 B2 | Not used |
| C1 | BDAL 16 L | C1 | BDAL 18 L |
| C2 | GND | C2 | GND |
| D1 | BDAL 17 L | D1 | BDAL 19 L |
| D2 | +12 V | D2 | +12 V |
| E1 | S SPARE 1 | *1 E1 | BDAL 20 L |
| E2 | BDOUT L | E2 | BDAL 02 L |
| F1 | SRUN L/S SPARE 2 | *2 F1 | BDAL 21 L |
| F2 | BRPLY L | F2 | BDAL 03 L |
| H1 | S SPARE 3 | *2 H1 | S SPARE 8 |
| H2 | BDIN L | H2 | BDAL 04 L |
| J1 | GND | J1 | GND |
| J2 | BSYNC L | J2 | BDAL 05 L |
| K1 | M SPARE A | *3 K1 | M SPARE B |
| K2 | BWTBT L | K2 | BDAL 06 L |
| L1 | M SPARE A | *3 L1 | M SPARE B |
| L2 | BIRQ 4 L | L2 | BDAL 07 L |
| M1 | GND | M1 | GND |
| M2 | BIAKI L | M2 | BDAL 08 L |
| N1 | BDMR L | N1 | BSACK L |
| N2 | BIAKO L | N2 | BDAL 09 L |
| P1 | BHALT L | P1 | BIRQ 7 L |
| P2 | BBS7 L | P2 | BDAL 10 L |
| R1 | BREF L | R1 | BEVNT L |
| R2 | BDMGI L | R2 | BDAL 11 L |
| S1 | Not used | *5 S1 | Not used |
| S2 | BDMGO L | S2 | BDAL 12 L |
| T1 | GND | T1 | GND |
| T2 | BINIT L | T2 | BDAL 23 L |
| U1 | P SPARE 1 | *1 U1 | P SPARE 2 |
| U2 | BDAL 00 L | U2 | BDAL 14 L |
| V1 | Not used | *5 V1 | +5 V |
| V2 | BDAL 01 L | V2 | BDAL 15 L |

NOTES

1. All S SPARE and P SPARE pins are stand-alone.
2. SRUN R L is connected to slot 1 only; all other slots are S SPARE stand-alone.
3. M SPARE A pins are wired together on each individual slot.
4. M SPARE B pins are wired together on each individual slot.
5. These pins are not used or bused.



- NOTES: (1) THIS CONFIGURATION DEPICTS A KDJ11-B CPU SYSTEM IN WHICH THE MSV11-J MEMORIES MUST PRECEDE THE CPU.
 (2) FOR SYSTEMS WITH A KDF11-A, KDF11-B, OR KDJ11-A CPU, THE CPU MUST RESIDE IN SLOT 1 WITH THE MEMORIES FOLLOWING IT.
 (3) ILLUSTRATION DEPICTS 1 OR 2 MEMORIES INSTALLED.
 (4) ILLUSTRATION IS FOR SINGLE BACKPLANE SYS. ONLY.

MR-12866

Single Backplane Configuration Using a KDJ11-B CPU System

H9278-A

C-Interconnect Designations

Q22-Q22/CD Bus Backplane

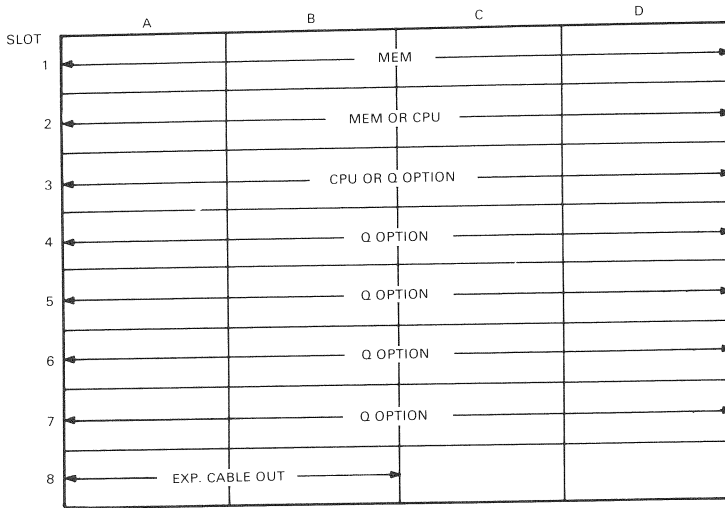
| Connector Row C, Slot (X) | | Connector Row C, Slot (X+1) | |
|---------------------------|-----------|-----------------------------|---------------------|
| Pin | Signal | Pin | Signal |
| A1 | INTCON 1 | A1 | |
| A2 | +5 V | A2 | +5 V |
| B1 | | B1 | INTCON 2 (PMI S1) |
| B2 | INTCON 2 | B2 | |
| C1 | SRUN L * | C1 | INTCON 1 * |
| C2 | GND | C2 | GND |
| D1 | | D1 | INTCON 3 (PMI S2) |
| D2 | INTCON 3 | D2 | |
| E1 | | E1 | INTCON 4 (PMI CK1) |
| E2 | INTCON 4 | E2 | |
| F1 | | F1 | INTCON 5 (PMI S3) |
| F2 | INTCON 5 | F2 | |
| H1 | | H1 | INTCON 6 (PMI S4) |
| H2 | INTCON 6 | H2 | |
| J1 | | J1 | INTCON 7 (PMI CK2) |
| J2 | INTCON 7 | J2 | |
| K1 | | K1 | INTCON 8 (PMI S5) |
| K2 | INTCON 8 | K2 | |
| L1 | | L1 | INTCON 9 |
| L2 | INTCON 9 | L2 | |
| M1 | | M1 | INTCON 10 (PMI CK3) |
| M2 | INTCON 10 | M2 | |
| N1 | | N1 | INTCON 11 (PMI S6) |
| N2 | INTCON 11 | N2 | |
| P1 | | P1 | INTCON 12 (PMI S7) |
| P2 | INTCON 12 | P2 | |
| R1 | | R1 | INTCON 13 (PMI CK4) |
| R2 | INTCON 13 | R2 | |
| S1 | | S1 | INTCON 14 (PMI S8) |
| S2 | INTCON 14 | S2 | |
| T1 | GND | T1 | GND |
| T2 | INTCON 33 | T2 | |
| U1 | | U1 | INTCON 15 |
| U2 | INTCON 15 | U2 | |
| V1 | | V1 | INTCON 16 (PMI CK5) |
| V2 | INTCON 16 | V2 | |

*SRUN L is only present on Slot 1.

D-Interconnect Designations
Q22-Q22/CD Bus Backplane

| Connector Row D, Slot (X) | | Connector Row D, Slot (X+1) | |
|---------------------------|-----------|-----------------------------|---------------------|
| Pin | Signal | Pin | Signal |
| A1 | INTCON 17 | A1 | |
| A2 | +5 V | A2 | +5 V |
| B1 | | B1 | INTCON 18 (PMI CK6) |
| B2 | INTCON 18 | B2 | |
| C1 | | C1 | INTCON 17 (PMI S9) |
| C2 | GND | C2 | GND |
| D1 | | D1 | INTCON 19 (PMI S10) |
| D2 | INTCON 19 | D2 | |
| E1 | | E1 | INTCON 20 (PMI CK7) |
| E2 | INTCON 20 | E2 | |
| F1 | | F1 | INTCON 21 (PMI S11) |
| F2 | INTCON 21 | F2 | |
| H1 | | H1 | INTCON 22 (PMI S12) |
| H2 | INTCON 22 | H2 | |
| J1 | | J1 | INTCON 23 (PMI CK8) |
| J2 | INTCON 23 | J2 | |
| K1 | | K1 | INTCON 24 (PMI S13) |
| K2 | INTCON 24 | K2 | |
| L1 | | L1 | INTCON 25 |
| L2 | INTCON 25 | L2 | |
| M1 | | M1 | INTCON 26 (PMI CK9) |
| M2 | INTCON 26 | M2 | |
| N1 | | N1 | INTCON 27 |
| N2 | INTCON 27 | N2 | |
| P1 | | P1 | INTCON 28 (PMI S14) |
| P2 | INTCON 28 | P2 | |
| R1 | | R1 | INTCON 29 (PMI S15) |
| R2 | INTCON 29 | R2 | |
| S1 | | S1 | INTCON 30 |
| S2 | INTCON 30 | S2 | |
| T1 | GND | T1 | GND |
| T2 | | T2 | INTCON 33 |
| U1 | | U1 | INTCON 31 |
| U2 | INTCON 31 | U2 | |
| V1 | | V1 | INTCON 32 |
| V2 | INTCON 32 | V2 | |

H9278-A



- NOTES: (1) CONFIGURATION IS FOR KDJ11-B CPU.
 (2) MSV11-J MEMORY MUST PRECEDE CPU.
 (3) ILLUSTRATION DEPICTS 1 OR 2 MEMORIES INSTALLED.
 (4) ILLUSTRATION SHOWS POSSIBLE CONFIGURATION FOR AN EXPANDED KERNEL BACKPLANE: EXP CABLE OUT WOULD ENTER SLOT 1 OF THE EXPANDER BACKPLANE.

MR.12867

KDJ11-B CPU System Expanded Backplane Configuration

MMV11-A CORE RAM MEMORY

| Amps | | | Bus Loads | | Cables |
|-------------|-----|-----|------------------|----|---------------|
| | +5 | +12 | AC | DC | |
| Stby. | 3.0 | 0.2 | 1.91 | 1 | None |
| Act. | 7.0 | 0.6 | | | |

Standard Address

Not applicable

Vectors

None

Diagnostic Programs

Refer to Appendix A.

Related Documentation

Microcomputer Processor Handbook (EB-18451-20)
11V03 Field Maintenance Print Set (MP00094)

NOTE

Because of addressing limitations, this module is not compatible with PDP-11/23 systems with more than 64K bytes of memory.

MMV11-A/G653,H223

Backplane Jumpers

When installing the MMV11-A in any slot but the last slot in a backplane, two jumpers must be inserted on the backplane to maintain the interrupt and DMA daisy-chain grants. If the MMV11-A is placed in an even-numbered slot, the jumpers must connect as follows.

| | |
|---|---|
| in the option slot preceding MMV11-A | to the option slot following MMV11-A |
| CN2 | CM2 |
| CS2 | CR2 |

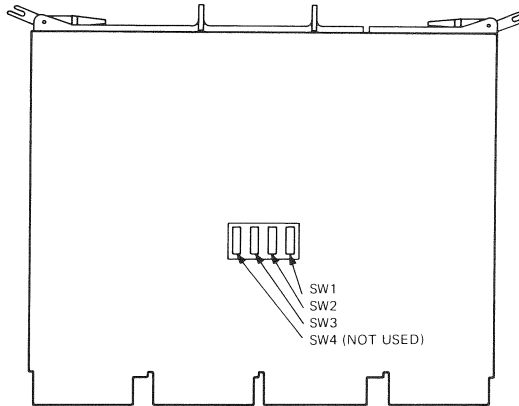
If the MMV11-A is placed in an odd-numbered slot, the jumpers must connect as follows.

| | |
|---|---|
| in the option slot preceding MMV11-A | in the option slot following MMV11-A |
| AN2 | AM2 |
| AS2 | AR2 |

NOTE

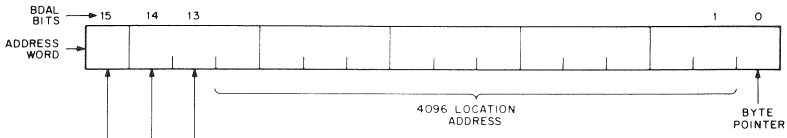
The MMV11-A cannot be used in the BA11-N mounting box, in the H9273 backplane, or in any other backplane that does not have the LSI-11 bus pinning in the "C" and "D" slots.

MMV11-A/G653,H223



MR-5425

G653/H223



| SW3 | SW2 | SW1 | BANK | ADDRESSES |
|-----|-----|-----|------|-----------------|
| ON | ON | ON | 0 | 0 - 17776 |
| ON | ON | OFF | 1 | 20000 - 37776 |
| ON | OFF | ON | 2 | 40000 - 57776 |
| ON | OFF | OFF | 3 | 60000 - 77776 |
| OFF | ON | ON | 4 | 100000 - 117776 |
| OFF | ON | OFF | 5 | 120000 - 137776 |
| OFF | OFF | ON | 6 | 140000 - 157776 |
| OFF | OFF | OFF | 7 | 160000 - 177776 |

NOTE
Bank 7 is normally reserved for peripherals

MR-0856

MMV11-A Addressing

